

Saturday, December 14, 2024

2024 WINTER SCIENTIFIC SEMINAR

December 12-15, 2024

The Westin, Chicago-Lombard, IL



Cervical Cancer screening and HPV

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IOMS Winter Scientific Symposium 2024
12/14/2024

Objectives

- What are the guidelines for cervical cancer screening
- When does screening become different
- What is HPV
- What does HPV cause besides cervical cancer
- HPV vaccination
 - Schedule by age

Cervical Cancer screening average risk patients



USPSTF

Grade A Age 21 - 65

alone q 3 years

21 - 29 cytology

30 - 65

Can do every 3 as
above or q5 HPV alone* or q5
cotesting

Grade D - do not screen:

Younger than 21

Post hysterectomy w/ removal of
cervix w/o hx of precancerous
lesions or cancer

Anyone with a cervix over 65
**with good prior screening and are
not high risk**

Cervical Cancer Screening in average risk patients

ACS

Age <25: Do not screen

25- 65: HPV alone q5(preferred), cotesting q5, cytology q3

65: D/c if normal adequate screening done prior

Adequate screening: 2 consecutive neg HPV tests or 3 negative cytology w/in
past 10 years most recent 3 - 5 years with no hx of CIN2 or more serious in the past
25 years

Post hysterectomy w/ cervix removal: without hx of CIN2 or more severe in last 25
years or cervical cancer ever - no screening

HPV vaccine does not change screening



Table 1. USPSTF Recommendations for Routine Cervical Cancer Screening

Population*	Recommendation	USPSTF Recommendation Grade [†]
Aged less than 21 years	No screening	D
Aged 21–29 years	Cytology alone every 3 years [‡]	A
Aged 30–65 years	Any one of the following: <ul style="list-style-type: none"> • Cytology alone every 3 years • FDA-approved primary hrHPV testing alone every 5 years • Cotesting (hrHPV testing and cytology) every 5 years 	A
Aged greater than 65 years	No screening after adequate negative prior screening results [§]	D
Hysterectomy with removal of the cervix	No screening in individuals who do not have a history of high-grade cervical precancerous lesions or cervical cancer	D

Abbreviations: FDA, U.S. Food and Drug Administration; hrHPV, high-risk human papillomavirus testing.

*These recommendations apply to individuals with a cervix who do not have any signs or symptoms of cervical cancer, regardless of their sexual history or HPV vaccination status. These recommendations **do not apply** to individuals who are at high risk of the disease, such as those who have previously received a diagnosis of a high-grade precancerous cervical lesion. These recommendations also do not apply to individuals with in utero exposure to diethylstilbestrol or those who have a compromised immune system (eg, individuals with human immunodeficiency virus).

[†]Grade A denotes that “The USPSTF recommends the service. There is high certainty that the net benefit is substantial.” A Grade D definition means that, “The USPSTF recommends against the service. There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits.” For more information on the USPSTF grades, see <https://www.uspreventiveservicestaskforce.org/Page/Name/grade-definitions>

[‡]Primary hrHPV testing is FDA approved for use starting at age 25 years, and ACOG, ASCCP, and SGO advise that primary hrHPV testing every 5 years can be considered as an alternative to cytology-only screening in average-risk patients aged 25–29 years.

[§]Adequate *negative prior screening test results* are defined as three consecutive negative cytology results, two consecutive negative cotesting results, or two consecutive negative hrHPV test results within 10 years before stopping screening, with the most recent test occurring within the recommended screening interval for the test used (1, 5).

Data from Curry SJ, Krist AH, Owens DK, Barry MJ, Caughey AB, Davidson KW, et al. Screening for cervical cancer: U.S. Preventive Services Task Force recommendation statement. U.S. Preventive Services Task Force. JAMA 2018;320:674–86. Available at: <https://jamanetwork.com/journals/jama/fullarticle/2697704>. Retrieved April 12, 2021.

ACOG



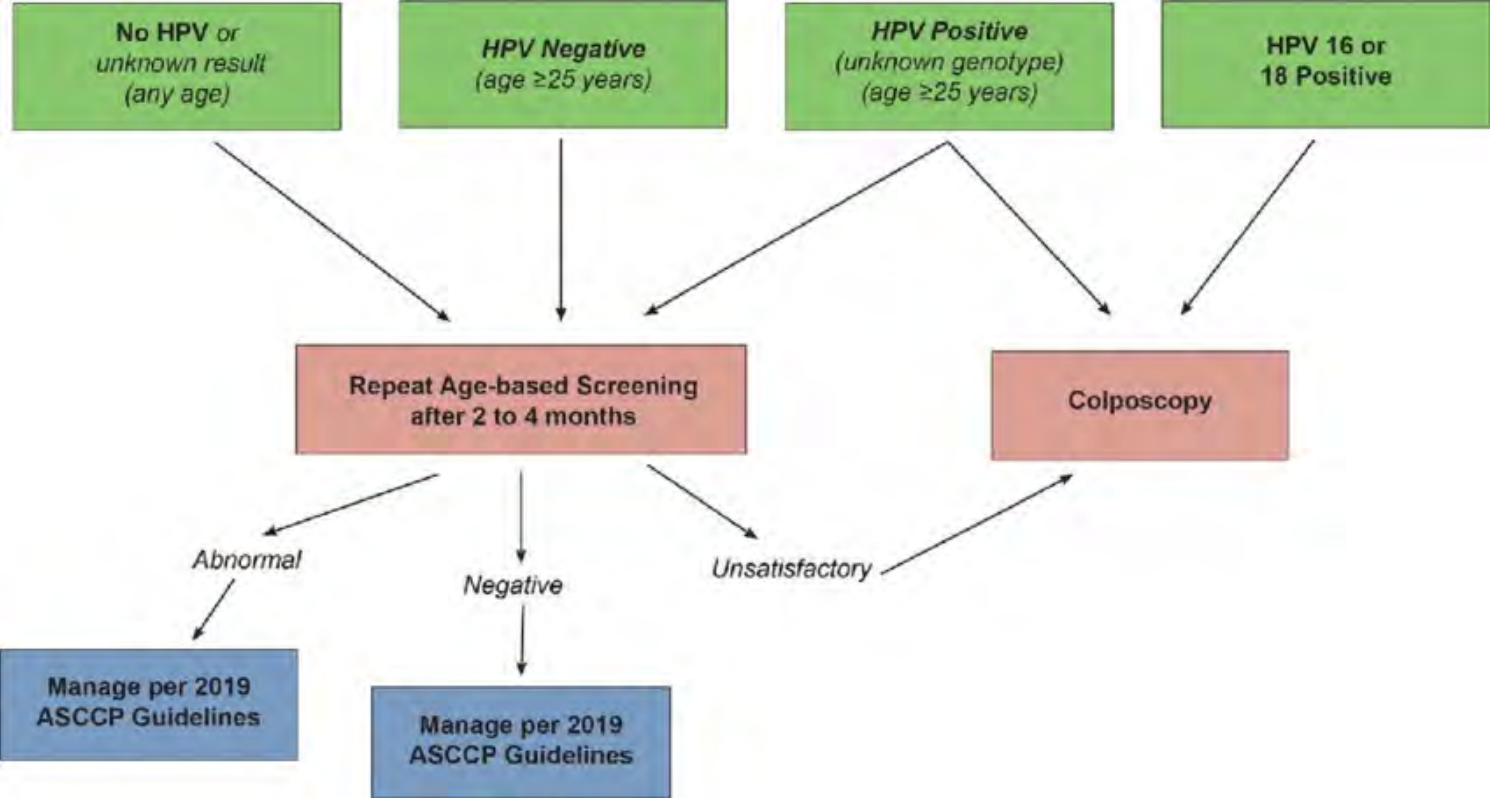
ACOG

The American College of
Obstetricians and Gynecologists

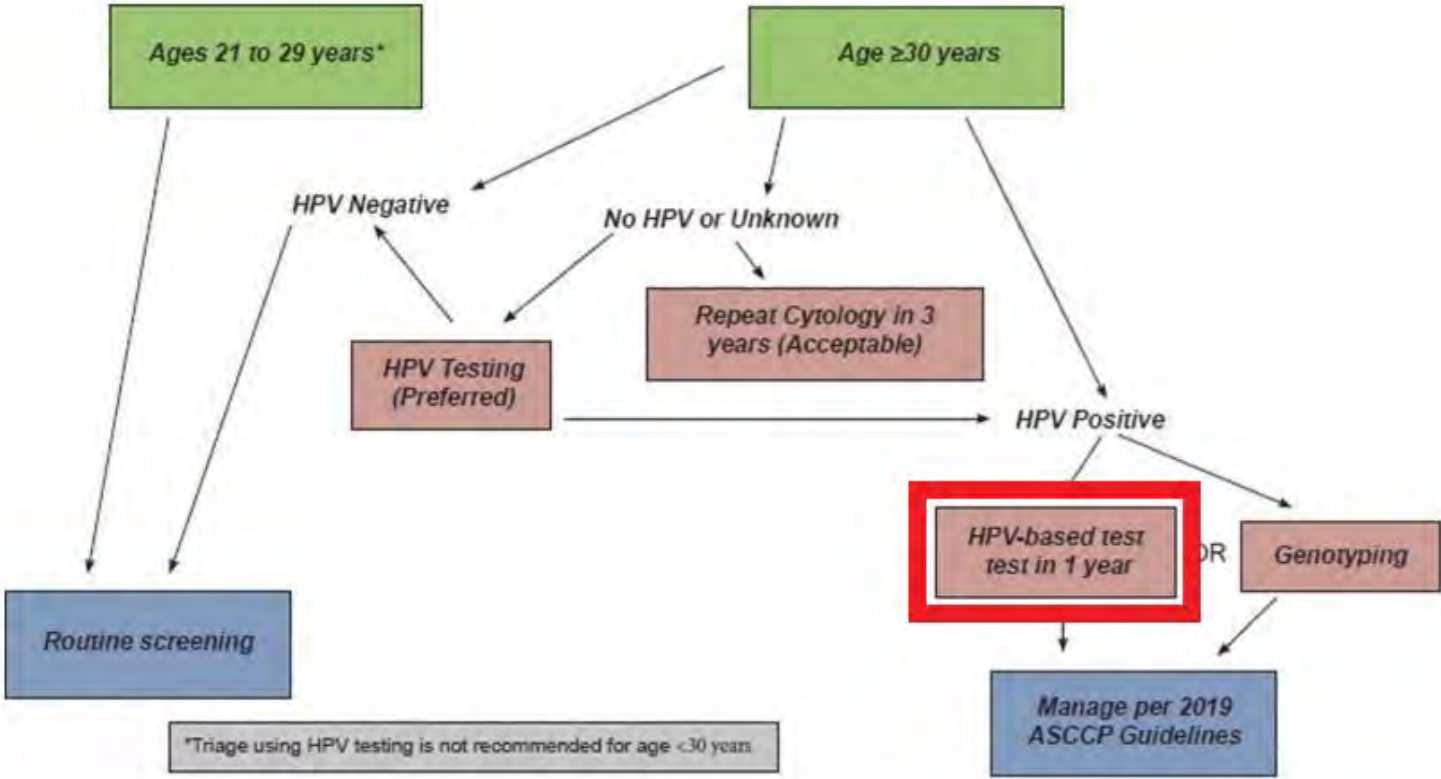
Special scenarios as outlined by ASCCP 2019 guide



Unsatisfactory cytology



NILM w/o transition zone



Management of HSIL

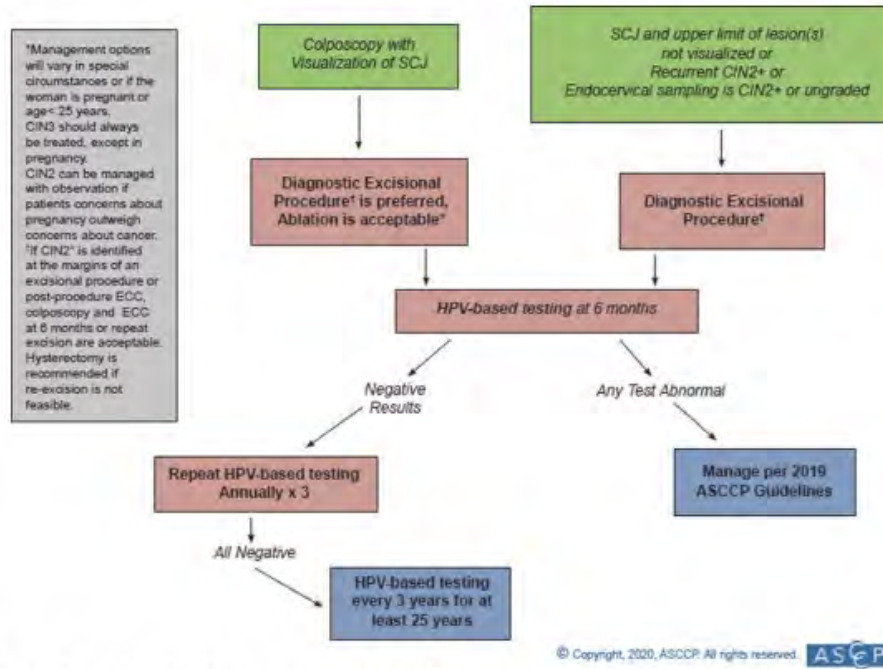


FIGURE 7. This figure describes the steps involved in clinical management of histologic HSIL.

CIN2 with wish of preserved fertility

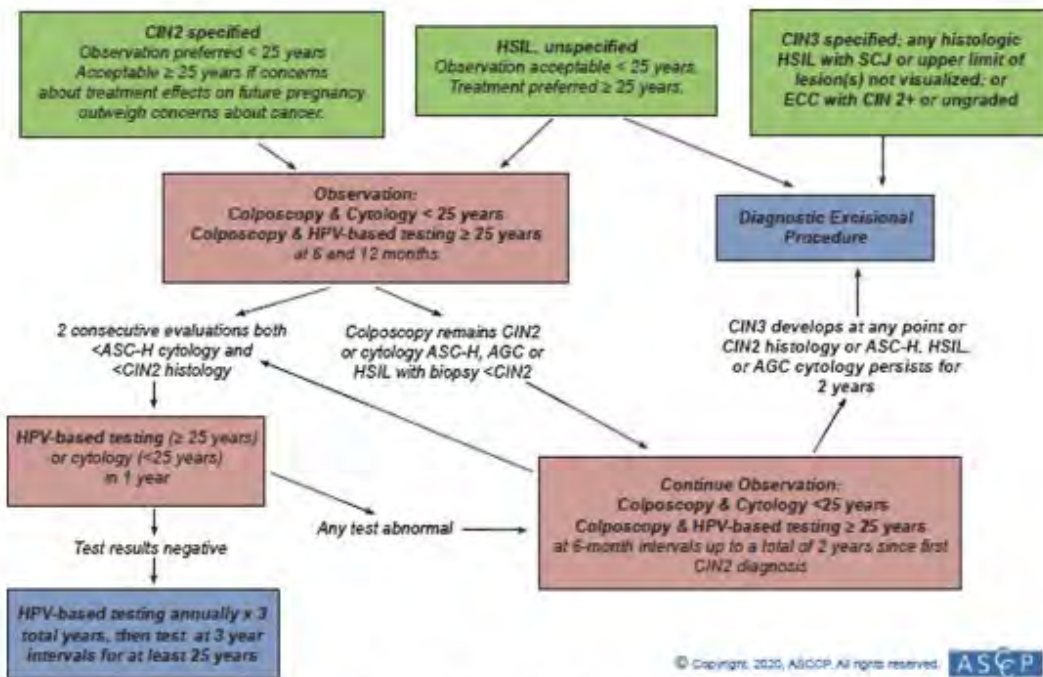
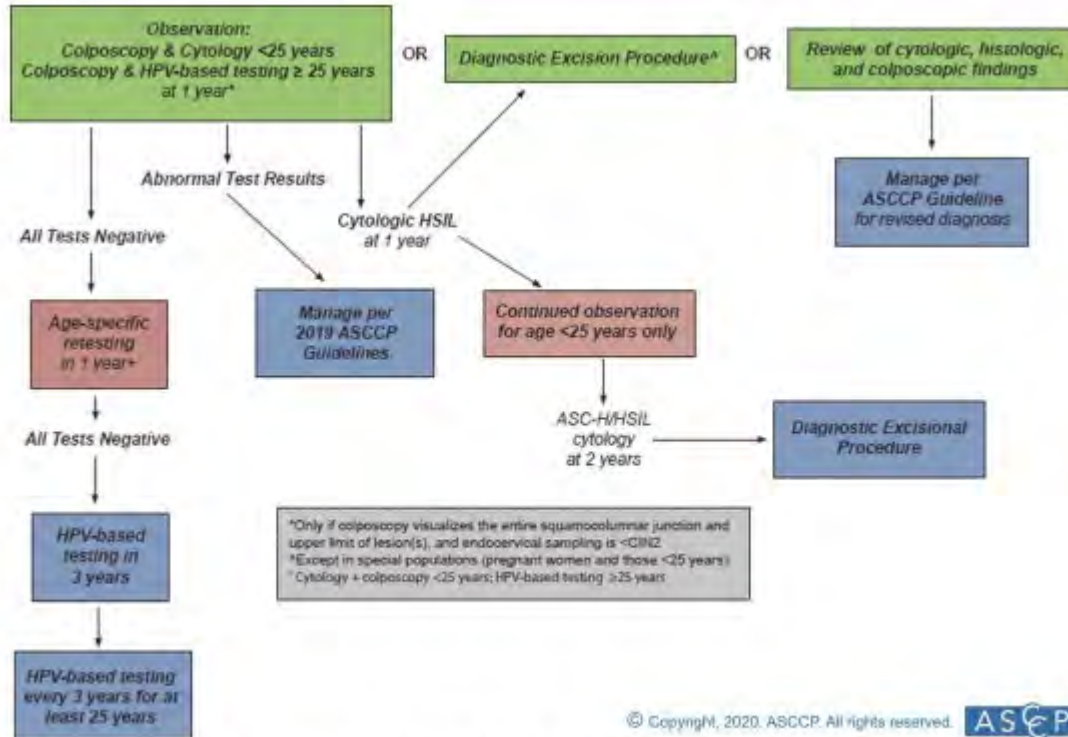


FIGURE 8. This figure describes management of CIN 2 in patients whose concerns about the effects of treatment on a future pregnancy outweigh their concerns about cancer. Also addressed is the management of histologic HSIL not further specified in women younger than 25 years, for whom observation is acceptable, and for women 25 years or older for whom treatment is preferred.

LSIL preceded by HSIL

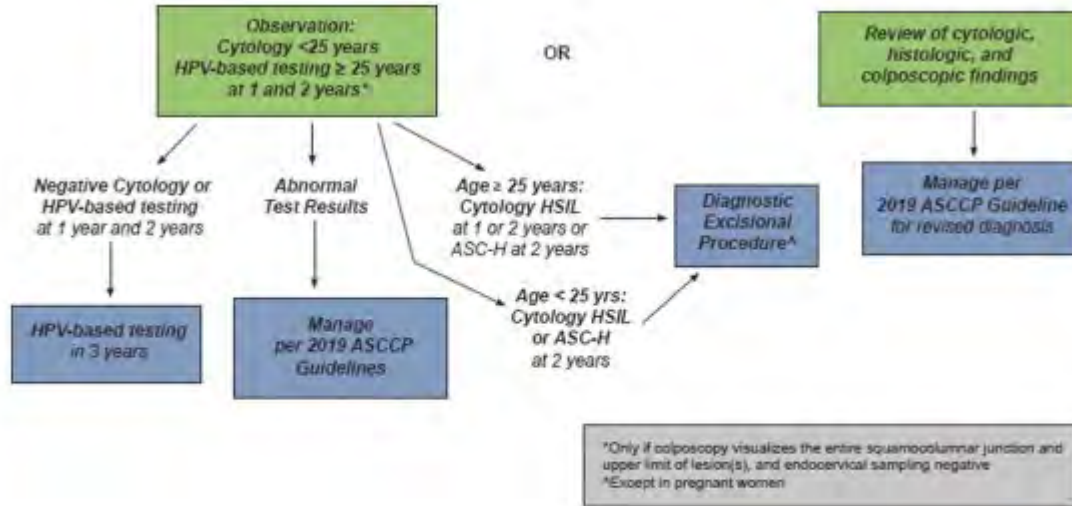


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FIGURE 9. This figure describes management of histologic LSIL (CIN 1) preceded by HSIL cytology.

LSIL preceded by ASC



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FIGURE 10. This figure describes management of histologic LSIL (CIN 1) preceded by ASC-H cytology.

AIS management

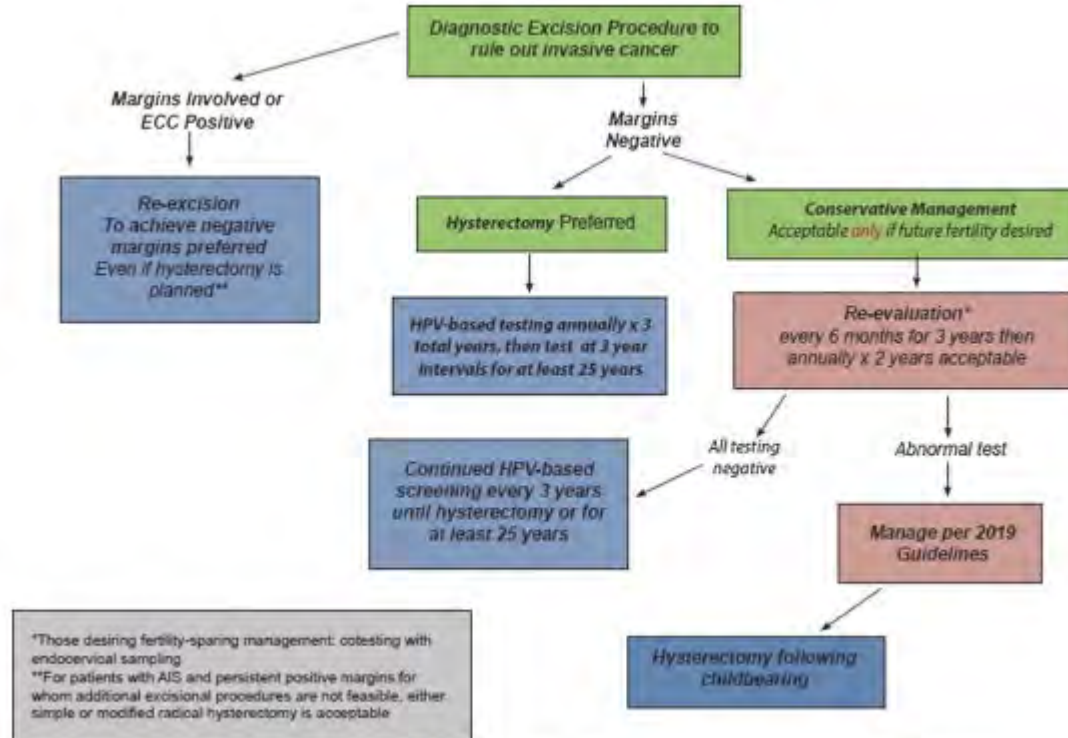


FIGURE 11. **This figure describes management of AIS.** This management algorithm was developed by the Society of Gynecologic

Under 25 abnormal cytology management

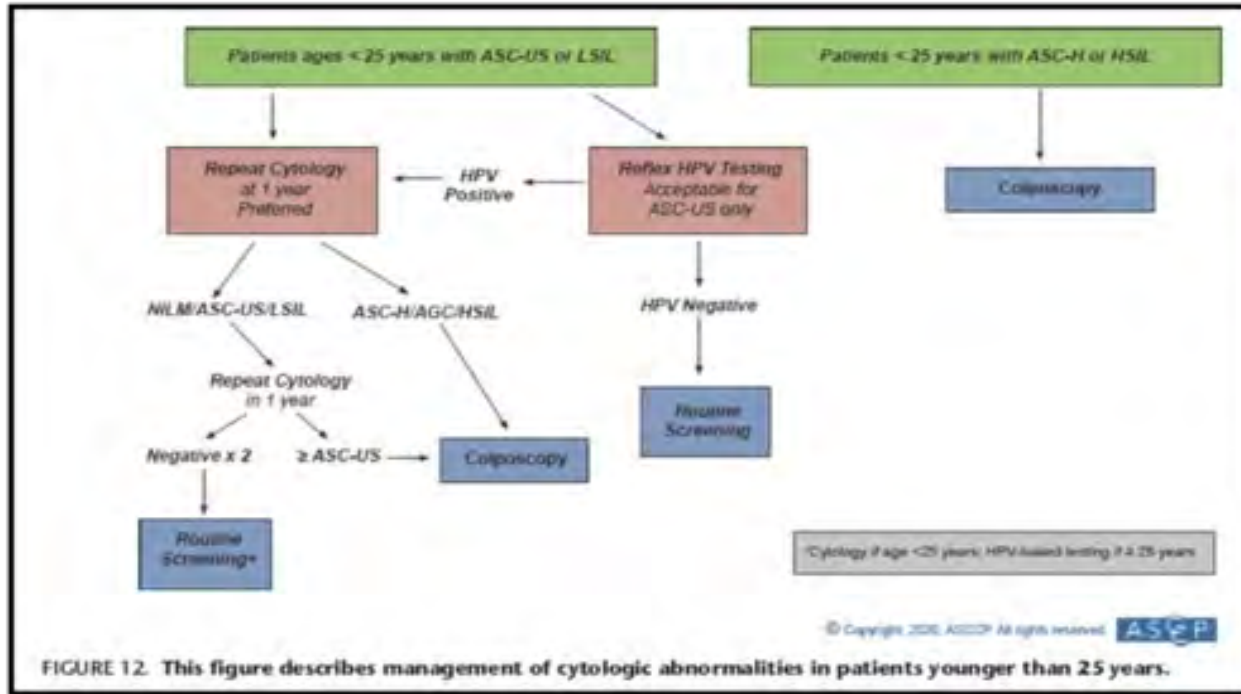
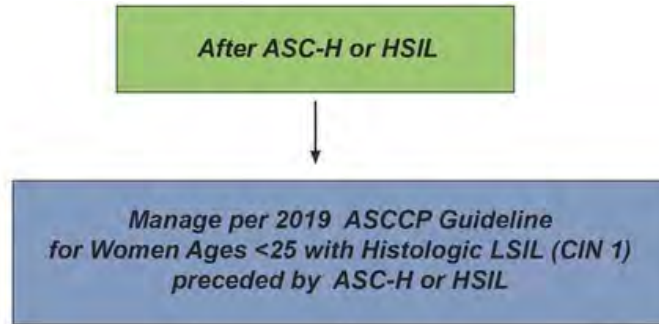
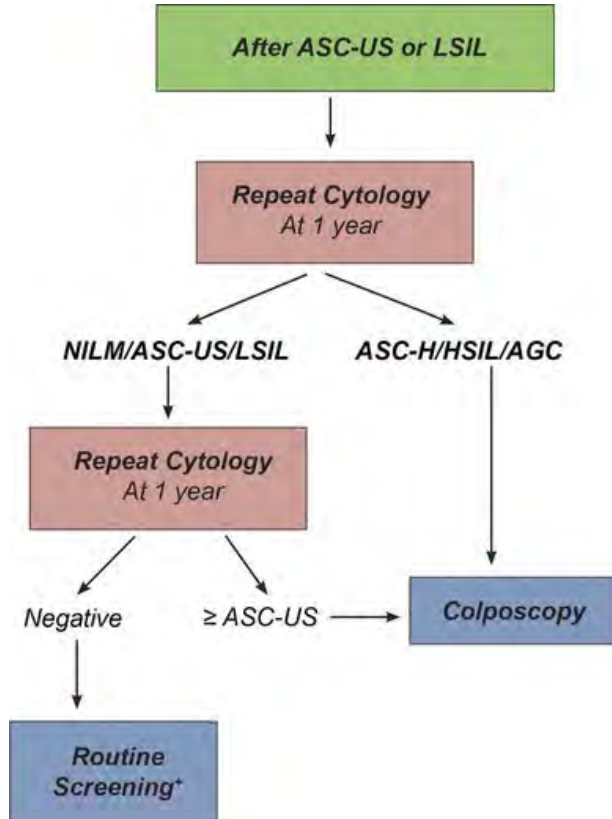


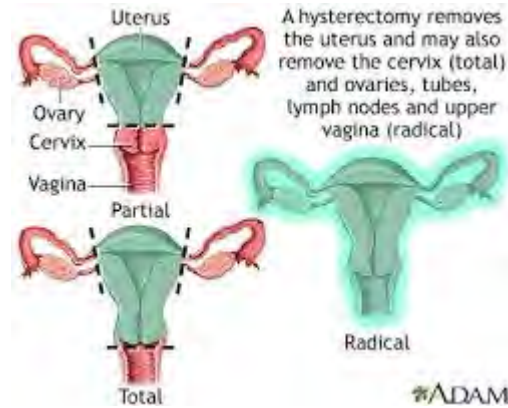
FIGURE 12. This figure describes management of cytologic abnormalities in patients younger than 25 years.

CIN 1 in <25



*Cytology if age <25 years; HPV-based testing if ≥ 25 years

Post hysterectomy



Why was the hysterectomy done?

Done as treatment for Cervical cancer

The pt will need annual HPV testing x3

If these are all negative enter long term surveillance for 25 years

If not related to CIN 2+ or higher treatment of the patient successfully finished 25 year surveillance no longer need any screening.

- HPV q3

Symptomatic pts

What is considered symptomatic?

Abnormal uterine bleeding, Abnormal vaginal bleeding, A visible abnormality

This is no longer screening

Now diagnostic testing

What qualifies as diagnostic testing

Cytology, colposcopy, imaging, cervical endocervical or endometrial biopsy

Use clinical judgement



Immunosuppressed

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Does not matter why they are immunosuppressed!!!

Cytology starts within 1 year of first insertional sexual activity or becoming immunosuppressed

Follow with cytology q1 year x3

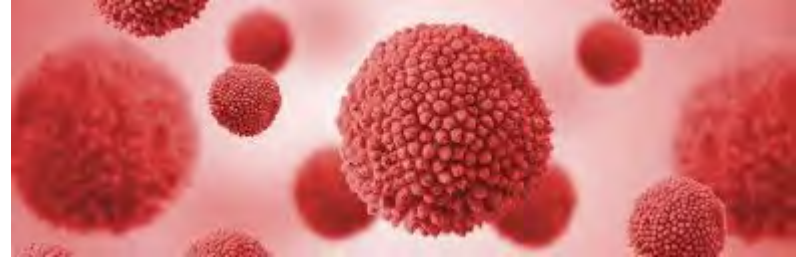
Follow with cytology q3 years until 30

Once 30 Cytology or co testing q3 for lifetime

All HPV + ASCUS or higher - > Immediate colposcopy

ASCUS without HPV repeat in 6 months if ASCUS or higher or HPV + at this time immediate colposcopy

Cytology of LSIL or worse colpo, regardless of HPV status



What constitutes immunosuppression

— — —

Solid Organ Transplant

Hematopoietic Stem Cell Transplant

New genital or chronic GVHD s/p stem cell transplant should have more intensive screening

Inflammatory Bowel Disease: on immunosuppression

(Not on immunosuppression follow general guidelines)

SLE and RA: All SLE and RA on immunosuppression (RA not on immunosuppression should follow standard guidelines)

Type 1 Diabetes Mellitus: General population guidelines



DES Timeline

What makes someone high vs average

All women at risk for cancer due to potential exposure to High Risk HPV through intercourse.

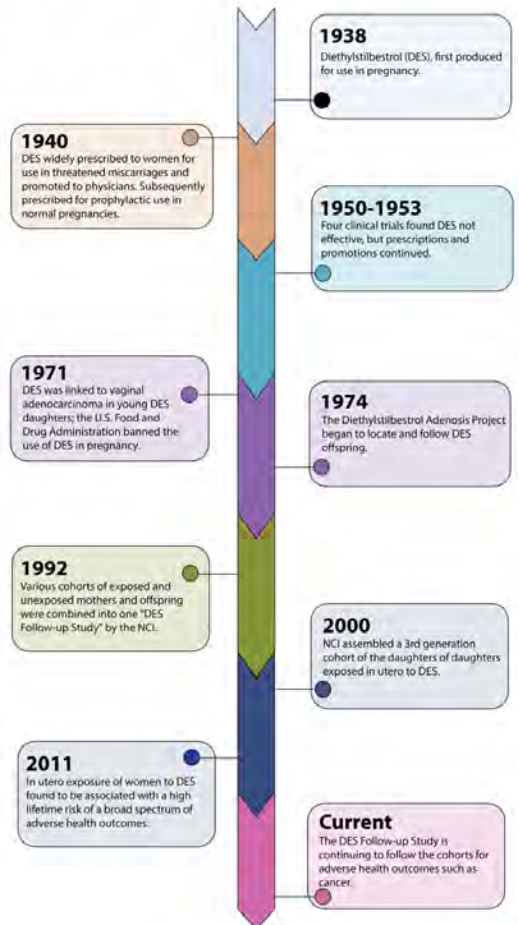
Even Higher risk

HIV

Immunocompromised/suppressed

In utero exposure to DES

Previous treatment - Iatrogenic



Why do I need screening? I would know if I had cancer

Early cancer has no symptoms, and if caught best outcomes

Pt will have symptoms once invasion has happened

Abnormal Bleeding - post coital, post menopausal, metrorrhagia, longer or heavier periods, bleeding after douching

Unusual discharge

Painful sex

Pelvic pain

More advanced cancers can cause

Swelling of legs

Bowel and bladder dysfunction

Blood in urine

Be Cervical Cancer Aware

Are you showing any of these common symptoms of suspected cervical cancer?

- Unusual vaginal bleeding
- Pain and discomfort during sex
- Unpleasant smelling vaginal discharge
- Bleeding after menopause
- Leg pain
- Pelvic pain
- Weight loss
- Constant fatigue

0800 085 6663 www.check4cancer.com

CHECK4CANCER
It could save your life

Financial Concerns



ACA Cervical cancer screening is mandated

Plans in effect prior to ACA do not have to honor this

Medicaid - covers screening and treatment in Illinois

Medicare - q2 years coverage unless prior abnormal or high risk then q 1 year, also covers HPV q 5 years if asx.

National breast and cervical cancer early detection program

Patients with a cervix and/or breasts

without insurance coverage for screening

Yearly income at or below 250% of federal poverty level

Age 21 - 64 or if certain criteria met

[Illinois Breast and Cervical Cancer Program](#)

Office of Women's Health and Family Services

Illinois Department of Public Health

(888) 522 - 1282

Vaccine is covered under VFC and ACA plans, unless short term plan

Abnormal Screening! Where to

**ABNORMAL
LAB RESULT**

— — —

H&P !!!!

May involve

Colposcopy

Biopsies

Colposcopic

Endocervical curettage

Cone biopsy

LEEP

Cold knife

Colposcopy

Colposcopy

Lithotomy position

Speculum insertion

Examination with colposcope

Application of acetic acid - makes abnormalities white

Biopsy from those spots

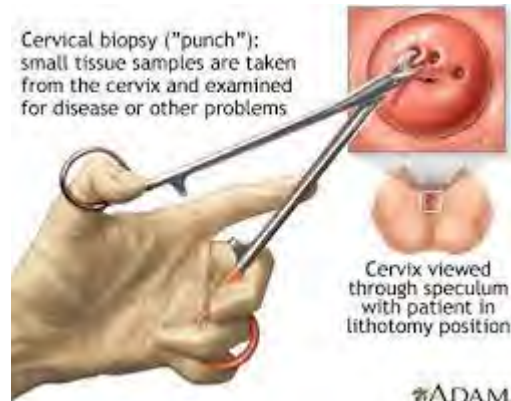
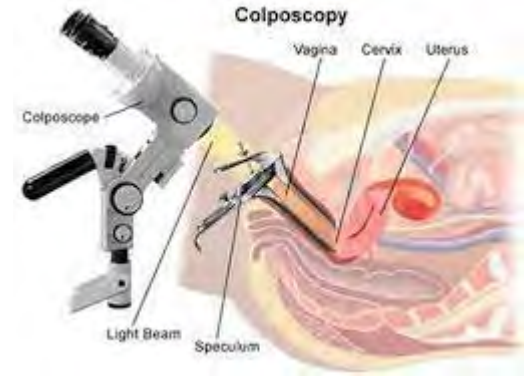
Perform endocervical curettage

Colposcopy Maybe done during pregnancy(no ECC)

Avoid during menstrual cycle



FIGURE 4.8: Cervical punch biopsy forceps with sharp, cutting edges



Colposcopy biopsy side effects

— — —

Mild cramping

Brief pain

Usually very well tolerated with ibuprofen and Tylenol

Slight bleeding afterward.

Warning if excessive bleeding to call or get medical attention

R: bleeding small chance of infection

B better look

A No procedure but if it is precancer run the risk of advancement to cancer.

ECC Endocervical curettage (endocervical scrapin)

Used when colposcopy shows no abnormalities
Transformation zone cannot be seen

How?

Curette inserted into the canal

Scrapes the inner tissue

Side effects

Cramping

Light bleeding

Usually done as part of the informed consent for colposcopy



Endocervical Curettage



Cone Bx

Removal of a cone of tissue

The base is ectocervix

Point is endo cervix

Included is the transformation zone - highest risk for CA

Can be therapeutic for precancer and early cancer

Most commonly done through LEEP AKA LLETZ - loop electrosurgical excision procedure (large loop excision of the transformation zone)

Using thin electrically heated wire to remove tissue

Paracervical block given

In office

Other option is cold knife cone bx

Using surgical scalpel or laser

General anesthesia most of the time - possibly spinal

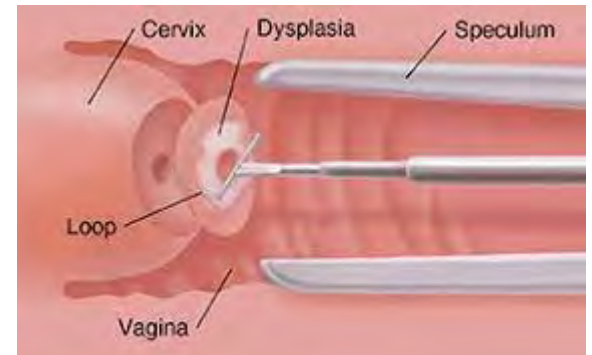
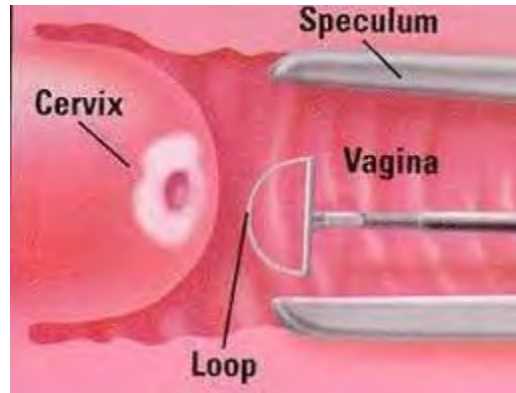
In hospital procedure

Complications with either type: bleeding, infection and narrowing of the cervix.

myth - you can't get pregnant after a cone

Fact - increased risk of premature delivery

Cold cone biopsy:
a large area of tissue around the cervix is excised for examination



Exams after A Cervical Cancer dx

— — —

Will follow with heme/onc and gyne

- onc - FP or general OB

- gyn will likely not be ordering these

Can include any of these to all of these

Cystoscopy, proctoscopy, EUA

CXR

CT

MRI

PET

IV urography

Cystoscopy, proctoscopy, and examination under anesthesia

— — —

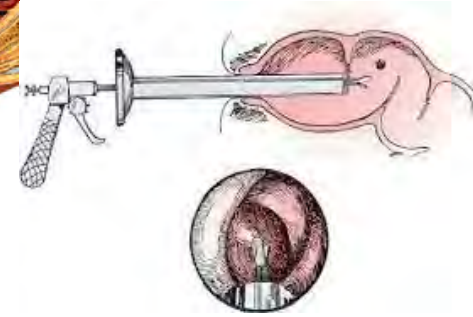
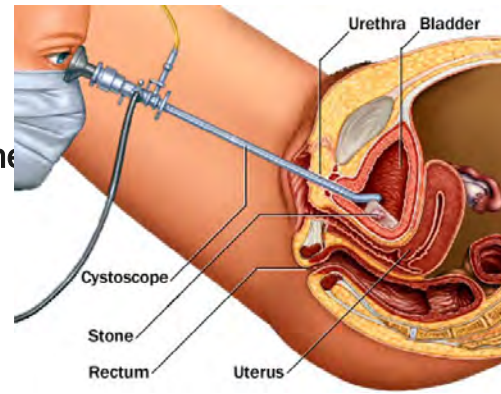
If tumor is large

Check for cancer cells in:

Bladder - cystoscopy likely by urologist

Rectum - proctoscopy maybe done by GI

Further pelvic exam under anesthesia likely done by gynecologist or gyne



- onc

CXR, CT and MRI

CXR

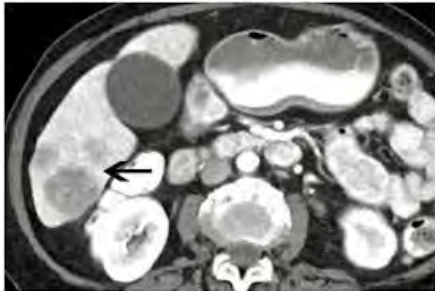
Starting place to look for chest metastasis, lungs most common metastasis after LN

CT

1. Nonreassuring CXR
2. C/f abdominal mets
3. C/f Brain mets
4. Preferred imaging for pretreatment

MRI

More sensitive and accurate however usually not clinically important in pretreatment



Positron emission tomography (PET scan)

— — —

Why do it?

Most often looking for lymphatic spread of cancer cells

Response to treatment .



Is this done in addition to CXR/CT/MRI?

Yes and no PET/CT is a special machine that does the PET and CT together and gives better pictures of high radioactive areas.

What is a PET scan

Specialized scan using slightly radioactive sugar- FDG

This sugar collects in cancer cells due to increased metabolism of cancer cells

IV Urography

IV contrast followed by XR of urinary system

Used to find cervical cancer mets

Most commonly finds blockage of ureters

Older test not done as often since CT and MRI are available



Staging

— — —

FIGO system

International Federation of Gynecology and Obstetrics

Clinical staging system

Exam

BX

imaging / scope results

No surgery

Treatment based on FIGO

Stages 1 - 4

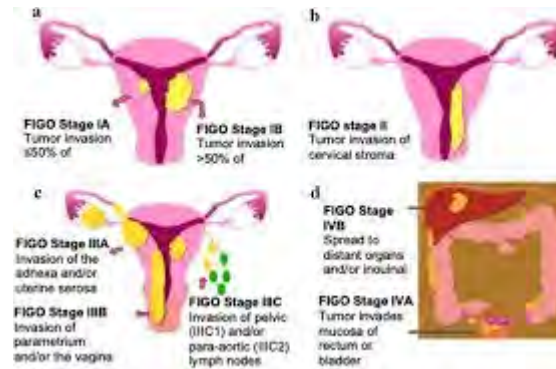
4 is the worst and most widespread

Substaging with a letter a is best

Pathological Staging

Involves surgery

Looks at surgical samples



Survival rate by Stage

SEER Staging - Surveillance, epidemiology and end results summary staging
3 stable groups - localized, regional, distant vs FIGO updated 5
years

- 10

FIGO- treatment
SEER stats and survival rates

What is the survivability of cervical cancer

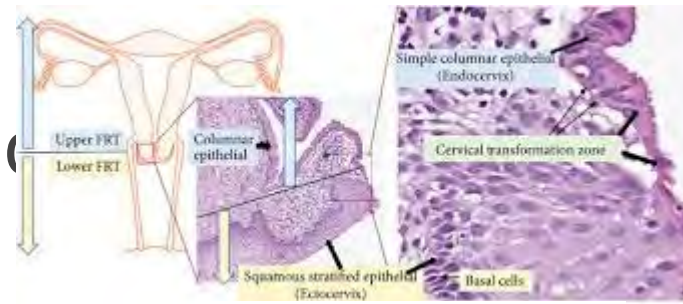
Localized stage 92%

Regional(inside pelvis) 59%

Distant (outside pelvis) 17%

All stages 67%

Types of cervical cancer



Histology

- Endocervix has glandular cells
- Exocervix is made of squamous cells
- Transformation zone squamoglandular
 - a. Where most cancer starts

Precancers seen on pap smear graded 1-3

CIN 1- cervical intraepithelial neoplasia 1

most cells look pretty normal

LSIL Low grade squamous intraepithelial lesion or

CIN 2&3

cells look more abnormal

have higher risk of transformation to cancer

HSIL- high grade squamous intraepithelial lesion

Cancers seen

90% squamous cell

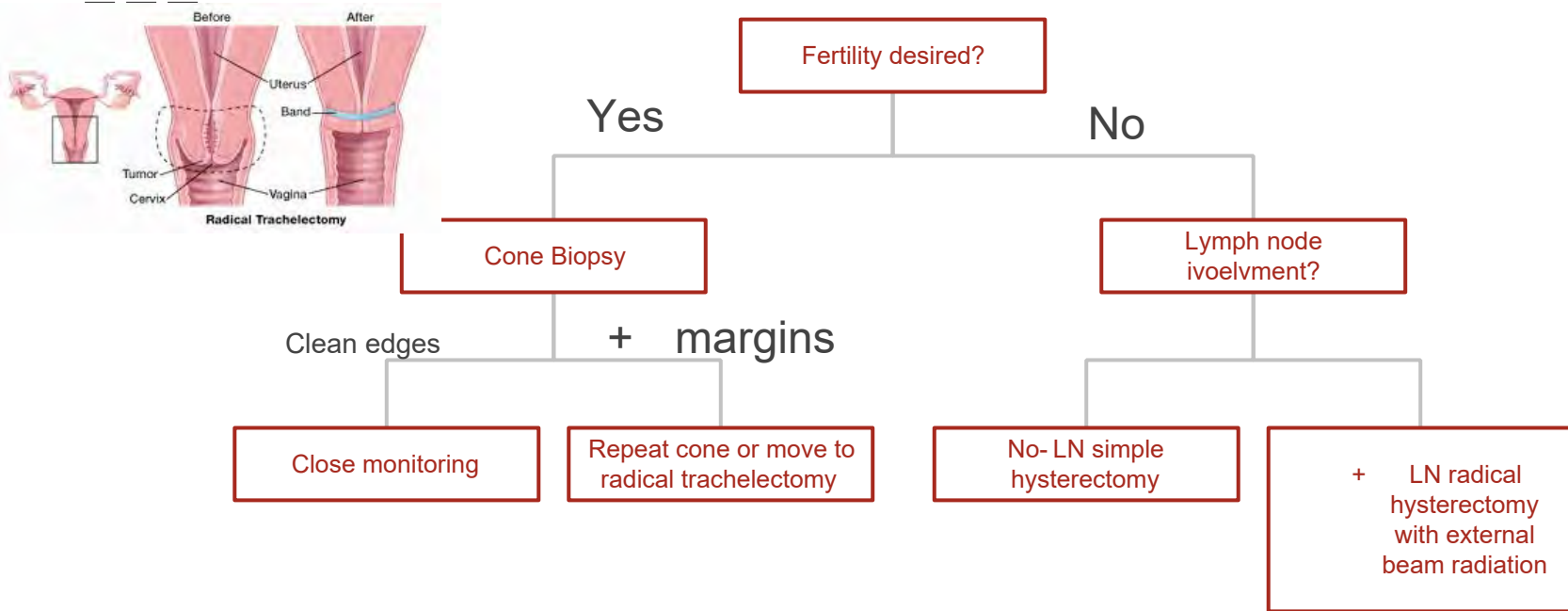
~9% adenocarcinoma

~1% adenosquamous carcinoma

<1 % melanoma, sarcoma, lymphoma

Treatment options

Cancer is only in the cervix and 3mm or less into the tissue



If fertility is desired with + LN will do cone with nodal resection or a radical trachelectomy

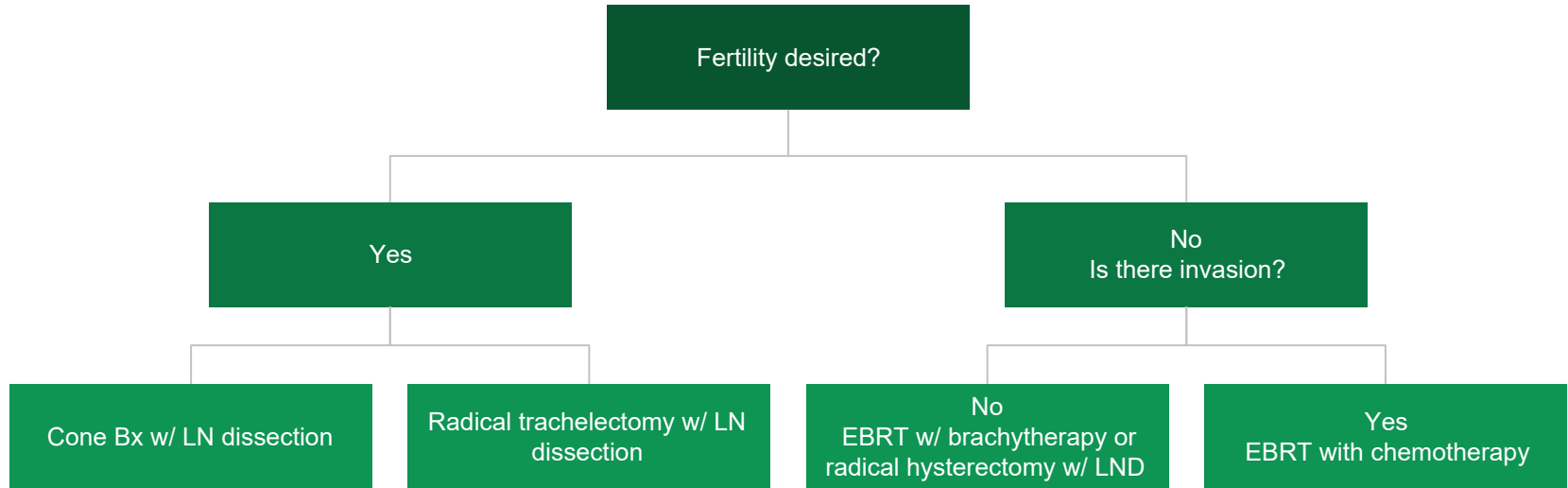
If the tumor is large w/o +LN may undergo radiation prior to hysterectomy

If + margins on hysterectomy start EBRT and chemotherapy

Stage IA2

3-5 MM into tissue

— — —



Stages IB and IIA

— — —

Deeper than 5 mm <2 cm diameter for 1B

Spread into top of vagina but <4 cm in diameter for 2A

If the pt wants to maintain fertility

- Radical trachelectomy with pelvic lymph node dissection w/ or w/o removal of the para-aortic lymph nodes

Pt does not want to maintain fertility

Radical hysterectomy w/ pelvic LND w/ or w/o para - aortic area

If pt is not a good surgical candidate

Radiation or chemo radiation

Larger tumors

Possible radiation

Positive Margins or evidence of lymphatic or haematological spread or spread into CT lymphatic or haematological spread or sp

read to connective tissue

EBRT w/ chemotherapy possible brachytherapy after

More advanced cancers fertility no longer considered

— — —

Stages IIB, III, IVA

2 B grown into other tissues

3 further spread

4 A into nearby organs

Chemoradiation +/-

Radical hysterectomy

Stage IVB

Spread to non - pelvic organs

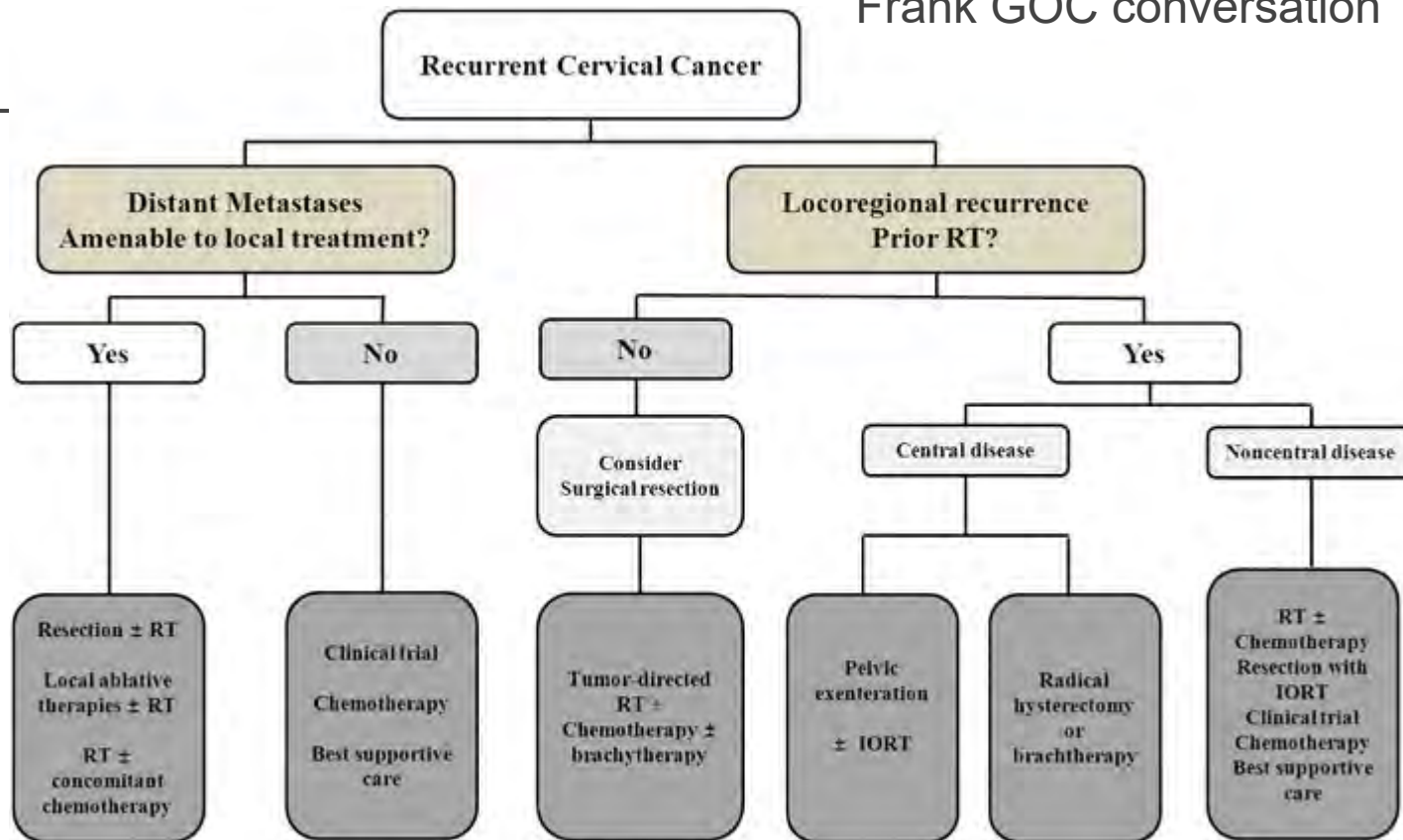
Palliative chemoradiation

Immunologics

Possible clinical trials

What to do when it comes back

Frank GOC conversation



RT=radiotherapy, IORT=Intraoperative RT

Complicated by pregnancy at time of diagnosis

Most often Stage 1 is found

What should I consider

Tumor size

LN involvement

Pregnancy stage

Type of cervical cancer

Stage 1A - continue with pregnancy

Treatment weeks after birth

Hysterectomy, radical
trachelectomy, cone biopsy

Anything more advanced

Shared decision making

Do not continue with
pregnancy radical hysterectomy w/w/o radiation

Would like to continue
with pregnancy

Possible chemotherapy in
2T or 3T and C - section at viability - with pt, gyne
onc, heme - onc

Immunotherapy options

— — —

Immune checkpoint inhibitors

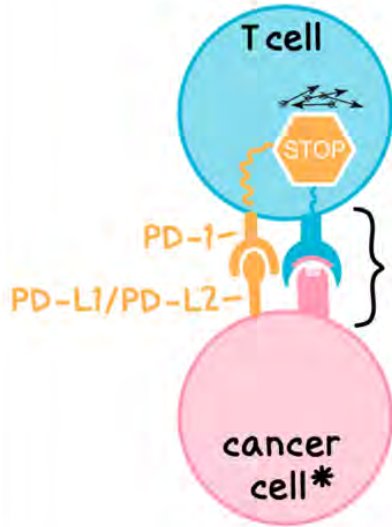
Pembrolizumab PD1 inhibitor for PDL1+ IV q 3 weeks or q 6 weeks

Nivolumab PD1 inhibitor for PDL1 + IV q2 weeks

Cemiplimab PD1 inhibitor for recurrent cervical cancer PD L1 +
or - IV q 3 weeks

Side effects - fatigue, fever, cough, N/V, itching, rash, pain,
constipation, diarrhea, SOB, infusion rxn or autoimmune rxns

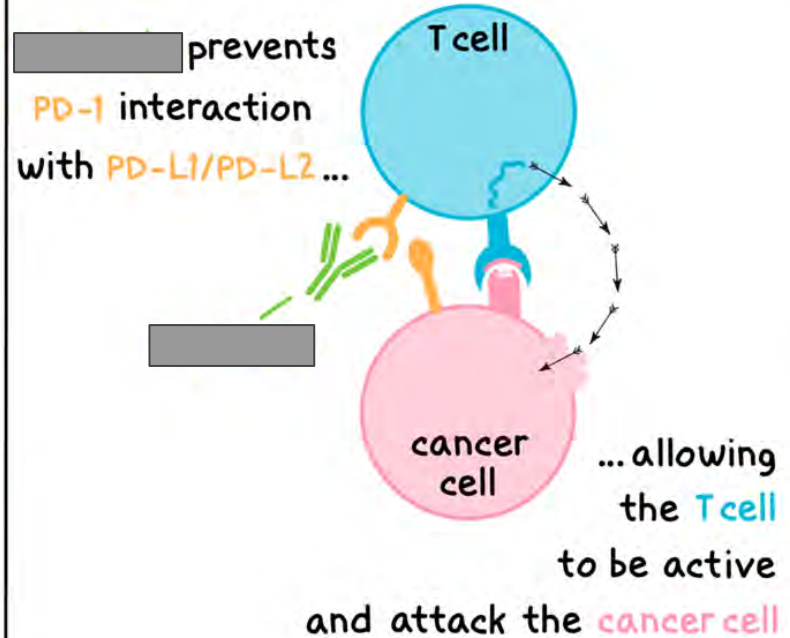
without [redacted]



T cell recognizes the cancer cell but the interaction between PD-1 and PD-L1/PD-L2 makes the T cell inactive and prevents it from attacking the cancer cell

UCIR.org

with [redacted]



*other cells within the tumor mass or elsewhere can also display PD-L1/PD-L2 on their surface and make T cells inactive

Targeted therapies

Cancer cells need a robust blood supply

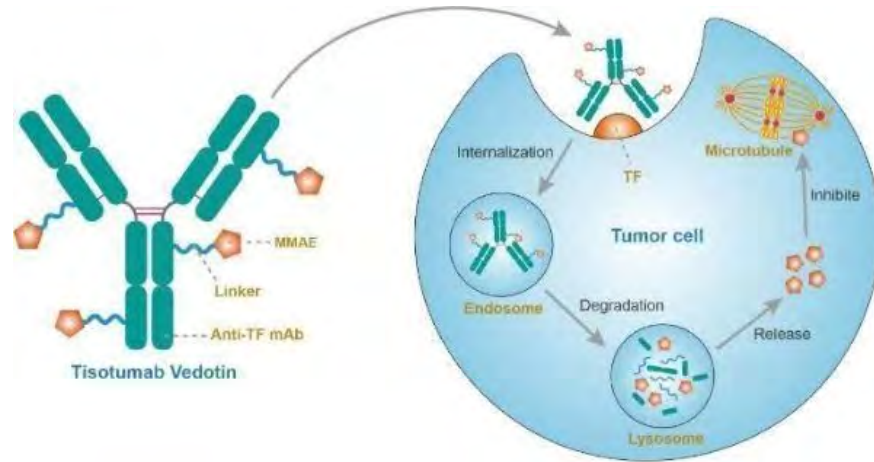
Angiogenesis inhibitors

Bevacizumab-anti-VEGF antibody

HIN, fatigue, N/V, bleeding, MI

Antibody-drug conjugates-Tisotumab vedotin- Antibody against tissue factor and monomethyl auristatin E- cell division inhibitor

Fatigue, N/V, hair loss, bleeding, rash, GI upset, neuropathy, anemia, leukopenia, abnormal kidney function, eye problems



The other therapy options

— — —

Cryosurgery* - compressed liquid nitrogen

Heat ablation - heated metal speculum applied to lesion for 20 - 40 seconds repeated as needed

Focused ultrasound - high frequency ultrasound applied to lesion

Radiofrequency ablation - heat and electricity applied through needle to tumor

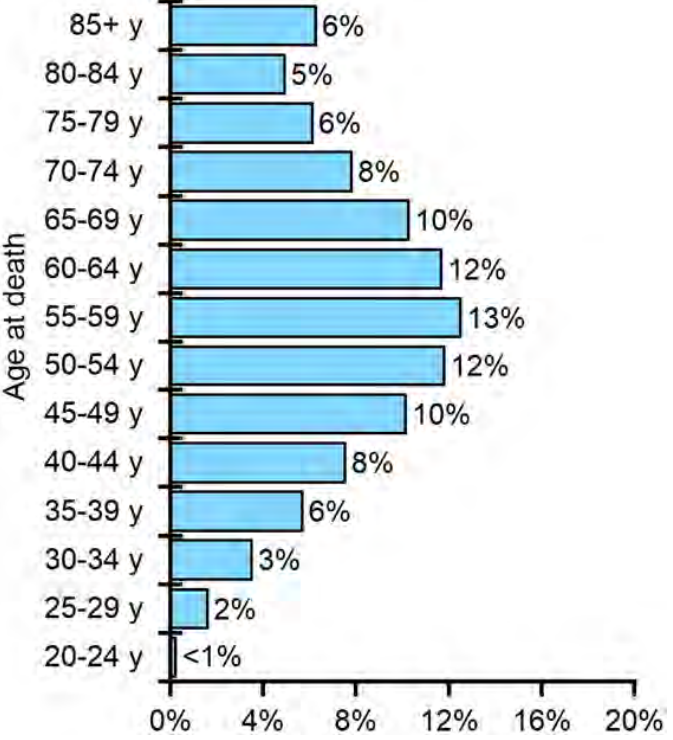
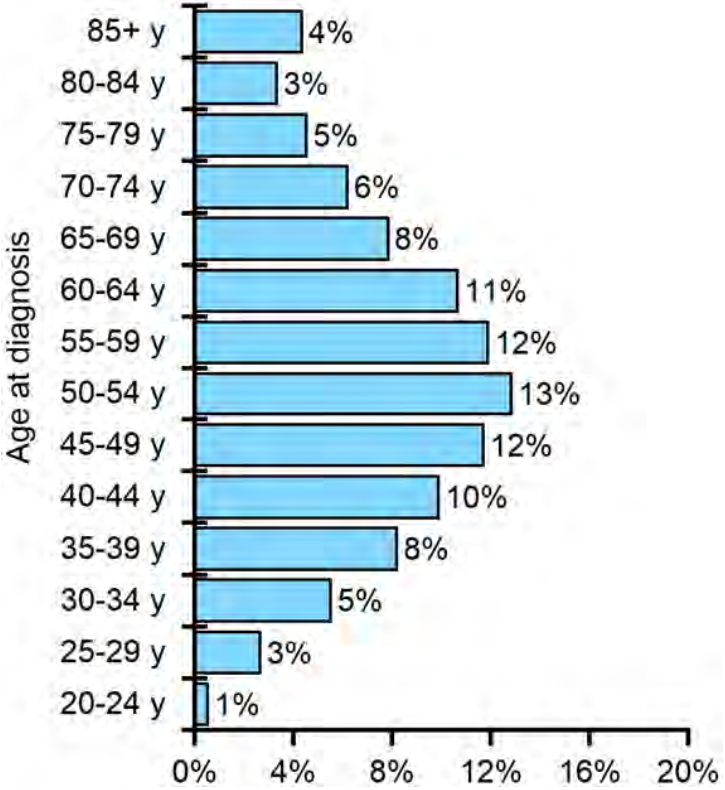
Laser ablation* - laser beam applied to tumor

Photodynamic therapy - creates ROS in tumor to cause destruction by injecting photosensitizers and light

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Pelvic exenteration* - removal of pelvic organs - rectum, bladder, uterus

Cancer Deaths by age vs age of diagnosis



What is HPV

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Human Papillomavirus

150 strains

40+ infect the genital area

Most often self limiting and asymptomatic

16 and 18 high risk oncogenes

6 and 11 cause warts and recurrent respiratory papillomatosis

Every year ~35000 cases of anogenital warts prior to vaccine development

HPV by the numbers

— — —

In 2018 - 43 million infections in US per CDC, with 13 million being new infections

Nearly all sexually active people will get HPV if not vaccinated

Pre - vaccine ~350000 yearly cases of genital warts with 10% of sexually active adults having a case

Each year 12000 people with a cervix will be diagnosed with cervical cancer

Over 4000 will die of cervical cancer

19400 assigned female at birth pts will have a HPV related cancer, other than cervical

12100 assigned male at birth patients will have a HPV related cancer

Other cancers

— — —

Penile

Anal

Throat

Vulvar

Vaginal

Cancer	Cases in Women	Cases in Men
Back of the Throat	2,300	12,500
Cervical	11,100	0
Anus	4,700	2,200
Vulva	2,900	0
Penis	0	900
Vagina	700	0
Total	21,700	15,600

Genital Warts Treatment

External anogenital warts - imiquimod, podofilox, sinecatechins, cryotherapy, surgical removal, Trichloroacetic acid(TCA) and Bichloroacetic acid(BCA)

Urethral meatus warts - cryotherapy or removal

Vaginal warts - cryotherapy, surgery, TCA or BCA

Cervical warts - cryotherapy, surgery, TCA or BCA

Intra - anal warts - cryotherapy, surgery, TCA or BCA

HPV Avoidance

#1 get vaccinated

#2 use condoms every time

#3 mutually monogamous relationship

Vaccine guidance per ACIP

Vaccination 9 - 26

Normally start at 11 can start as young as 9

>26 catch up NOT recommended

26- 45 shared decision making

>45 not licensed

Do not give in pregnancy

Safe during breastfeeding

Vaccines per CDC and ACIP

- 9-14
 - a. 2 doses
 - i. 6-12 months apart
- 15-26/45
 - a. 3 doses
 - i. Dose 1
 - ii. Dose 2 1-2 months later
 - iii. 6 months from initial
- Immunocompromised : 3 doses no matter age

FAQ by parents

Does my kid really need this?

Yes, if you want to do everything in your power to prevent your child from getting a preventable cancer diagnosis.

What diseases are caused by HPV?

Most worrisome cancer

Most common warts

Are you sure it works? How do you know?

The number of cervical cancer cases has greatly declined since the vaccine became available

11 years old is so young, why so early?

Best protection is prior to the immune system seeing it

Doesn't that give my child the idea to have sex? (I have never got this question)

They are being exposed to the idea of sex all the time. I don't make HPV sound like an STI

Would you give this to your child?

My son did receive his first dose this year at 11 years old

I heard vaccines cause infertility, will this make them infertile?

Those claims were against COVID 19 vaccine and have been disproved multiple times

Boosting vaccine rates

1. Bundle recommendations

- a. Today I recommend to give Flu, Meningitis, HPV and Tdap

2. Consistency across your practice

3. Use every opportunity to vaccinate

- a. Kid is here for strep hey I realized they haven't got the HPV vaccine, do you want to talk about that today(Also provided education on HPV Z28.20: Immunization not carried out because of patient decision for unspecified reason and Z71.85: Encounter for immunization safety counseling)

4. Personal examples

5. Answer questions effectively

HPV and Men

HPV is spread by skin to skin or mucous membrane contact

Men can get warts

Men can also get cancer - penile, anal, head and neck (rare but very real)

No testing available for men that is FDA approved

No treatment available

Prevention - Vaccinate and Condoms

Mini quiz

37 YO G1P1001 female presents with no complaints for well woman exam. Last pap smear NILM with Negative HPV @ 32 YO. Pap smear performed without complication. Results came back unsatisfactory cytology with HPV 16+. Next step?

- A. Colposcopy
- B. Cone Bx
- C. Repeat immediately
- D. Repeat in 1 year
- E. Repeat in 2 - 4 months

17 YO G0 Hx of RA on Humira had pap smear done last week.

Sent for cytology with reflex HPV. Results show ASCUS and HPV+ no typing done. What should you advise?

- A. Repeat 6 months
- B. Repeat in 1 year
- C. Send for colposcopy
- D. Send for HPV genotyping
- E. She is too young for screening, restart at 21

— — —

What procedure can be therapeutic and diagnostic?

- A. Colposcopy
- B. Cone Bx or LEEP
- C. ECC
- D. EBRT
- E. PET scan

47 YO G1P0 comes for initial prenatal visit. She has never had cervical cancer screening, pap smear found to have cells consistent with adenocarcinoma. Sent for staging and found to be Stage 1A. What is the recommendation?

- A. Recommend 2T EBRT +/- chemotherapy
- B. Recommend Continuing with pregnancy, treatment postpartum
- C. Recommend delivery at viability
- D. Recommend Late- preterm delivery
- E. Recommend termination and immediate hysterectomy

What is the best treatment option for HPV?

- A. Imiquimod
- B. Cryotherapy
- C. Hysterectomy
- D. Avoidance

What is a recommendation for boosting HPV vaccine rates?

- A. Bundle all recommendations together
- B. Different providers offer different advice within practice
- C. Emphasizing HPV is an STI
- D. Offering condoms with each vaccine
- E. Only discuss risks of the vaccine

Thank you



Resources

— — —
<https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/cervical> - cancer - screening

<https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/cervical> - cancer - screening

<https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/cervical> - cancer - screening

<https://acsjournals.onlinelibrary.wiley.com/doi/full/10.3322/caac.21628>

<https://acsjournals.onlinelibrary.wiley.com/doi/full/10.3322/caac.21628#caac21628> - tbl - 0001

<https://www.cancer.org/cancer/types/cervical> - cancer/detection - diagnosis - staging/prevention - screening - financial - issues.html

<https://www.cancer.org/cancer/types/cervical> - cancer/detection - diagnosis - staging/signs - symptoms.html

<https://www.cancer.org/cancer/types/cervical> - cancer/detection - diagnosis - staging/how - diagnosed.html

<https://www.cancer.org/cancer/types/cervical> - cancer/detection - diagnosis - staging/staged.html

<https://www.cancer.org/cancer/types/cervical> - cancer/detection - diagnosis - staging/survival.html

<https://www.cancer.org/cancer/types/cervical> - cancer/about/what - is - cervical - cancer.html

<https://www.cancer.org/cancer/types/cervical> - cancer/treating/by - stage.html

<https://acsjournals.onlinelibrary.wiley.com/doi/epdf/10.3322/caac.21616>

<https://www.acog.org/clinical/clinical-guidance/practice-advisory/articles/2021/04/updated> - cervical - cancer - screening - guidelines

https://journals.lww.com/jgtd/Fulltext/2019/04000/Guidelines_for_Cervical_Cancer_Screening_in.1.aspx

<https://www.cdc.gov/std/hpv/stdfact> - hpv.htm

Saturday, December 14, 2024

2024 WINTER SCIENTIFIC SEMINAR

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The Science of In Situ Simulations Applied to the Osteopathic Physician Office

Transforming Osteopathic Practices Through Simulation-Based Learning

James Colquitt, PhD, RRT-ACCS, CHSE, CHSOS

Associate Dean for Research and Clinical Simulation

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Disclaimers

- I work for The Chicago School
- I volunteer for the
 - American College of Surgeons as a ATLS Sr. Educator and Senior Educator Advisory Board member
 - North American Simulation and Gaming Association as Board Member
- I have no financial conflicts of interest related to this presentation

Objectives

1. Describe the benefits of in situ simulations for an osteopathic practice.
2. Outline the steps for preparing and conducting effective simulation experiences in the office setting.
3. Explain strategies to maximize the educational and operational benefits of in situ simulations.
4. Discuss how to integrate in situ simulations with medical school clinical rotations to enhance student learning.



Never have I ever...

- Had an emergency occur in your home?
- Walked or drove up on an emergency?
- Had an emergency occur in your office?



Why In Situ Simulation?

Definition:

- **Simulation** - ‘replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully interactive fashion’ (Gaba, 2004)
- **In Situ** – conducted in actual patient care settings

Benefits:

- Tests real environment and equipment
- Identifies latent safety threats
- Enhances team performance in familiar setting
- Minimal additional resource requirements



Definition of Learning

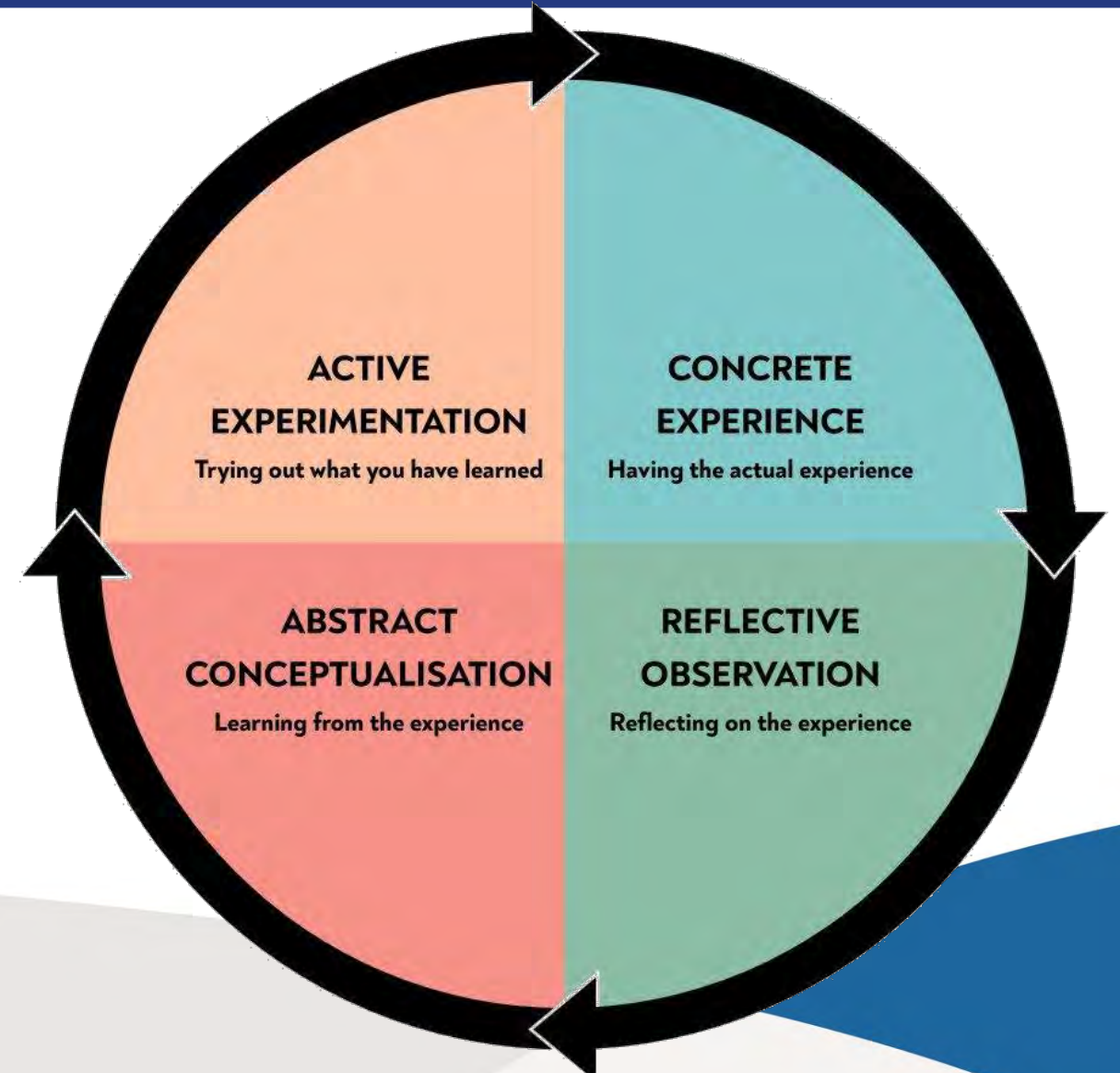
- Learning is a **process** of acquiring attitudes, knowledge, and skills (learning sets) that, together, enable a person to know or do something new or different.
- This process results from the **interaction** of preexisting and new learning sets, and what we know or do as we acquire these new learning sets.

Cox, K.R. et al. (1982). *The Medical Teacher*.



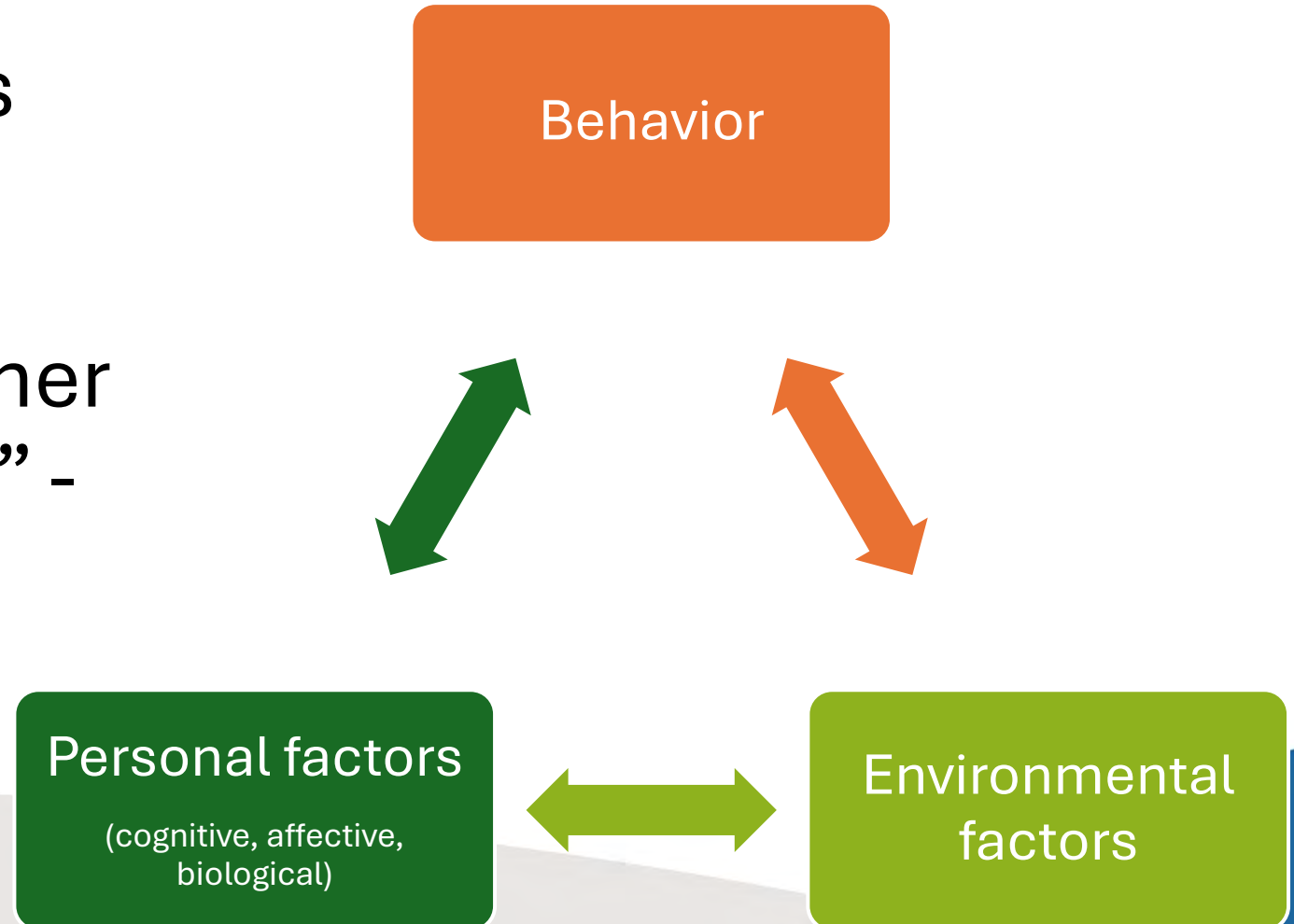
Experiential Learning Cycle

“Learning is the process whereby knowledge is created through the transformation of **experience**” - Kolb



Social Learning Theory

“...learning occurs because people observe the consequences of other people's behaviors.” - Bandura



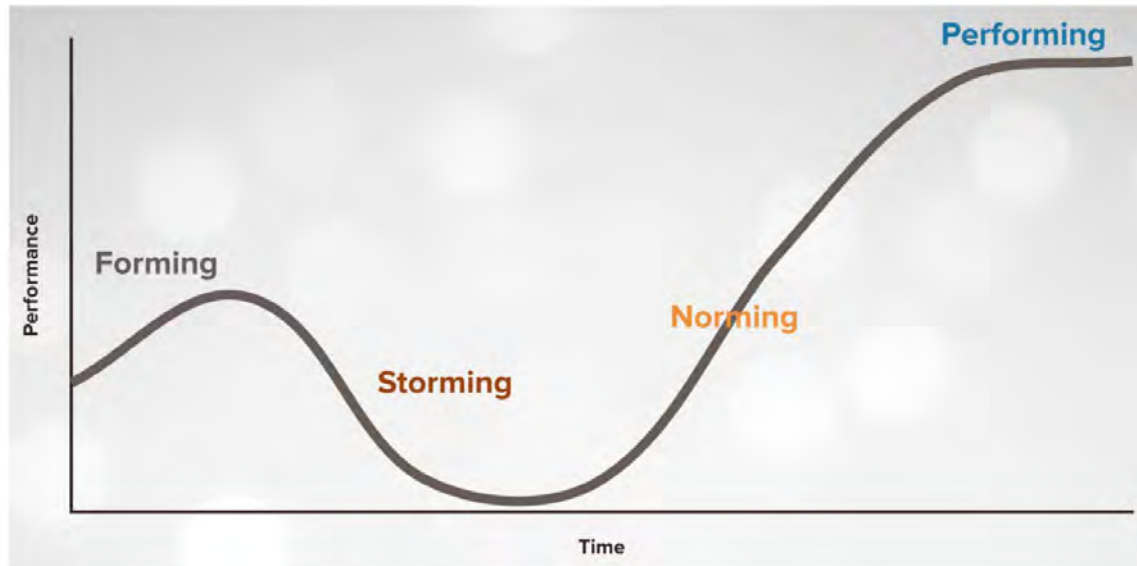
The Office as a Living System

1. The **medical office is a unified healing space** - where physical infrastructure (body), personnel function (mind), and collective healing energy (spirit) merge to serve patients in crisis.
2. The **office environment naturally adapts** during crises through coordinated team responses, spatial reconfigurations, and dynamic workflow adjustments.
3. The physical space design and crisis care delivery **capabilities directly shape each other's effectiveness.**
4. Optimal crisis care emerges from **harmonizing these elements:** the healing space, adaptive team response, and the synergy between environment and care delivery.

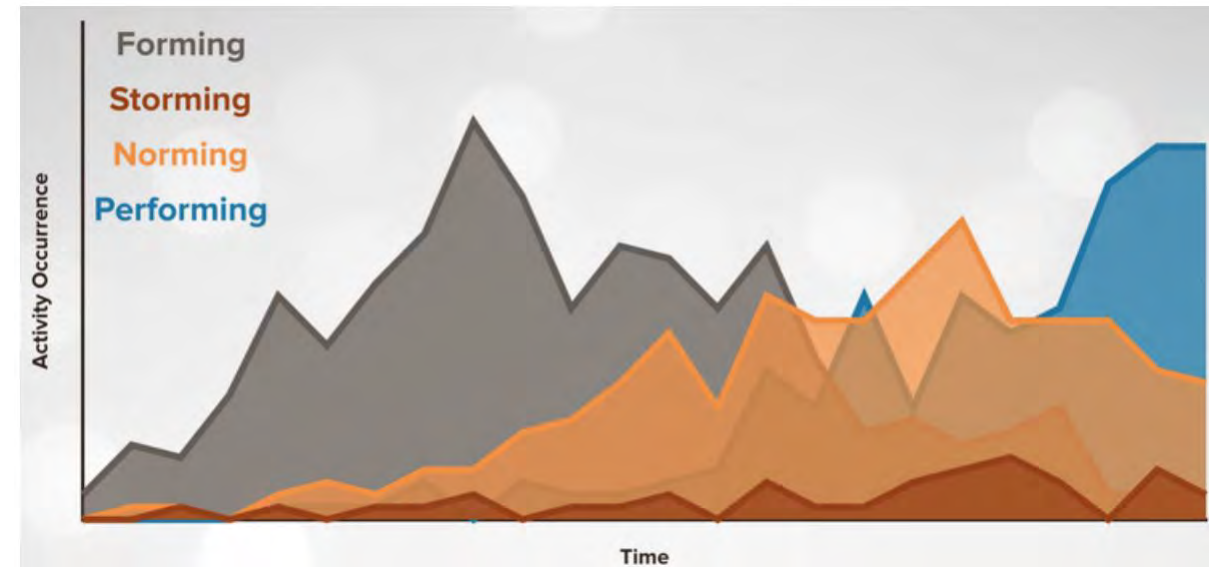


Ad Hoc Team Formation

Tuckman



Norton



The Evidence Base

- Research supports in situ simulation for:
 - Improving emergency response times
 - Identifying system gaps – Latent Safety Threats
 - Increasing provider confidence
 - Reducing medical errors
 - Enhancing team communication – TeamSTEPPS®
- Cost-effective compared to dedicated simulation centers
 - Lower fidelity equipment
 - Shared resources



Pit Crew Resuscitation



Journal for Nurses in Professional Development • Volume 35, Number 1, E1-E7 • Copyright © 2019 Wolters Kluwer Health, Inc. All rights reserved.

Applying the Pit Crew Resuscitation Model to the Inpatient Care Setting

James D. Colquitt Jr., PhD, RRT-ACCS, CHSOS ○ Angela B. Walker, MSN, RN-BC ○
Nancy S. Haney, AAS, NREMT-A

The Pit Crew Resuscitation model for team performance was designed to facilitate emergency team performance. This article documents observations during model implementation to the in-hospital setting. Low-fidelity simulations were evaluated on medical-surgical nursing units. Six significant findings were obtained: finder confusion, first responder chaos, leaderless teams, equipment disorder, limited space, and disjointed integration. Recommendations were developed and tested. Research is needed to develop training methods for in-hospital application.

roles and increasing team response efficiency to improve patient outcomes (Meaney et al., 2013). According to the model, the code team should function much like an automobile racing pit crew where each member has a specific role and responsibility. In an auto race, when a car leaves the track for a pit stop for fueling, tire changes, or other issues, the pit crew members immediately assume their assigned positions and roles. When following this practice, every responsibility is covered as quickly as possible, allowing the team leader to focus on the process and function of the team rather than on filling in missing roles. This “pit crew” model can be adapted for use when training car-

- Latent Safety Threats
- Low fidelity
- Limited Team size



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The Evidence Base

Low-Fidelity

Colquitt et al., *Analg Resusc: Curr Res* 2013, S1
<http://dx.doi.org/10.4172/2324-903X.S1-007>



Analgnesia & Resuscitation : Current Research

Research Article

A SCITECHNOL JOURNAL

Mastery Learning of ACLS among Internal Medicine Residents

James D Colquitt¹, David C Parish^{2*}, Antoine R Trammell³,
Justin McCullough² Leslie Swadener-Culpepper⁴ and Francis
C Dane⁵

fidelity. Technical fidelity refers to the extent to which the simulation equipment represents an actual patient (or aspect thereof), whereas psychological fidelity involves the level of intellectual realism required from the individual using or learning from the equipment [4,5]. The two types of fidelity are neither independent nor synonymous, but among key determinants of effectiveness are the amount of feedback provided and number of opportunities for repetitive practice [4-7]. Rapid declines in exhibited skills following ACLS certification have been consistently demonstrated, and programs which can

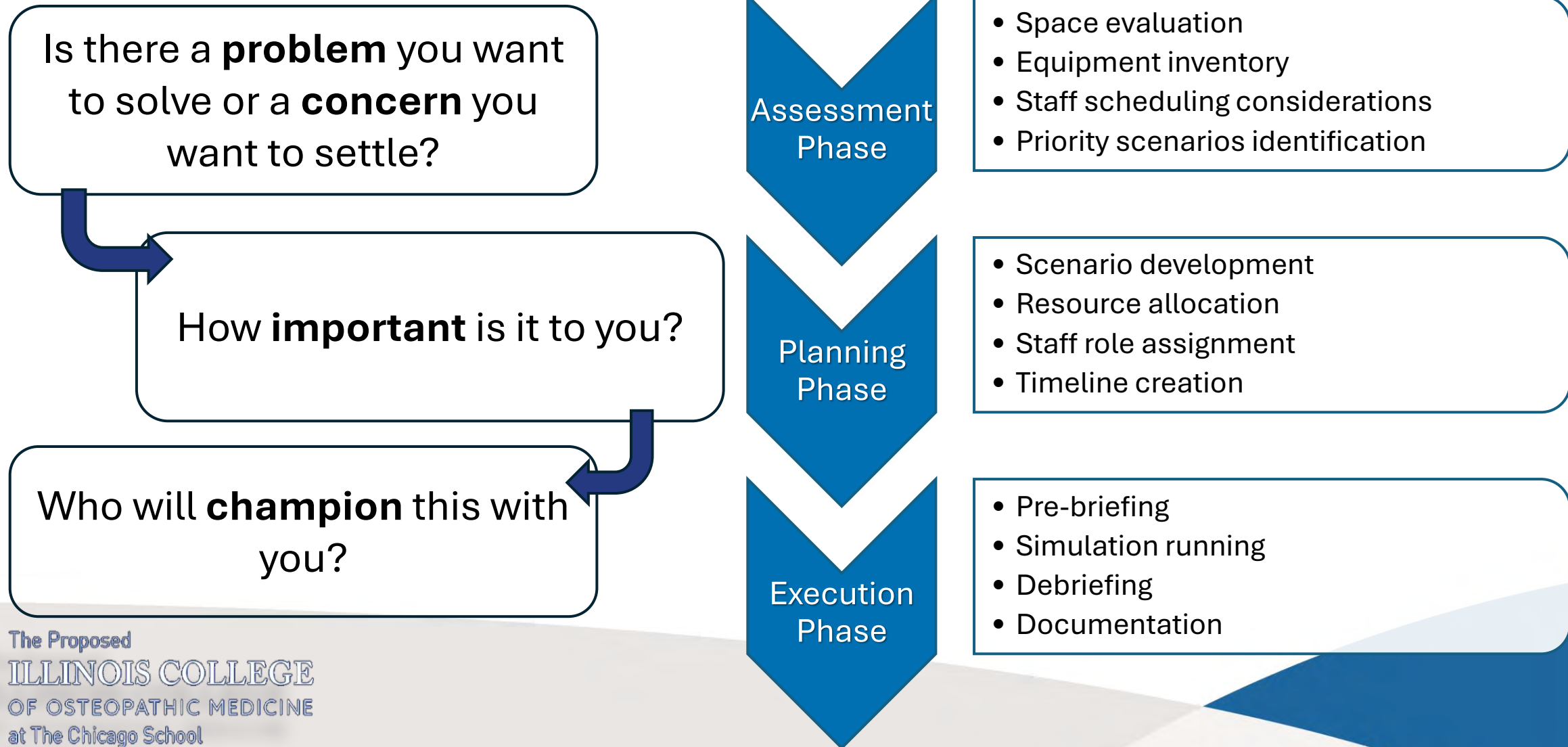
- High psychological fidelity over technical
- Focus on key skills
- Include leadership and team skills
- Interdisciplinary team of instructors



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The Evidence Base

Implementation Framework



Scenario Selection & Design



High-risk, low-frequency events

- Cardiac arrest
- Anaphylaxis
- Respiratory distress
- Seizures



Process improvement scenarios

- Patient flow
- Emergency response
- Communication chains
- Hand-offs



Integration with Clinical Education

- Alignment with rotation objectives
- Student involvement opportunities:
 - Observers
 - Participants
 - Debriefers-in-training




Ethical and Safety Concerns

- Awareness of simulated experience – actual patient consent
- Actual patient care impact – go/no-go decision & STOP plan
- Fake equipment or medications
- Safe word and/or “safety officer”



Open Is in situ simulation in emergency medicine safe? A scoping review

Jennifer Truchot,^{1,2,3,4} Valérie Boucher,^{4,5} Winny Li,⁶ Guillaume Martel,¹ Eva Jouhair,^{1,4} Éliane Raymond-Dufresne,^{1,2} Andrew Petrosoniak,^{6,7} Marcel Emond ^{1,2,4,5}

Balancing Risk

- Pediatric Trauma Activation

Prior 8 y/o trauma event with negative outcome.

CQI and RCA triggered training and follow-up in situ event

Safety steps

- Prior staff notification
- Day of event go/no go
- Special attending notification
- Embedded safety officer (NRP)



Personal Examples

- Code Blue on nursing unit – First responder training
- PICU sessions – New resident/nursing training
- L/D for nurses and residents – Precipitous delivery
- Hyperbaric Medicine and Wound Care Clinic – coding patient in chamber at pressure
- Large Scale Code Blue – new building
- ACLS/BCLS course – plastic surgery office
- Pediatric trauma – follow-up from CQI actions



Example Scenario:

Office Anaphylaxis

- **Setup**

- Patient room setup
- Required equipment
- Role assignments
- Objectives

- **Expected Actions**

- Recognition
- Team activation
- Treatment implementation
- Documentation
- Follow-up

- **Common Findings**

- Equipment access issues
- Communication gaps
- Role confusion
- Documentation challenges



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Example Scenario:

Process Improvement

- **Patient Flow Optimization**
 - Check-in process
 - Room turnover
 - Discharge procedures
 - Communication workflows
- **Measurement Metrics**
 - Time stamps
 - Error rates
 - Staff satisfaction
 - Patient satisfaction



The Power of the Debrief

Definition:

- **Debrief** - deliberate guided discussion following an experience, including feedback and actions for improving in future performance.

Benefits:

- Increased confidence on processes in experience
- Increased knowledge on topics discussed
- Recognize failures in systems (Latent Safety Threats)



Debriefing Strategies

- PEARLS (Eppich and Cheng)
 - Phase 1: Reactions
 - Phase 2: Description
 - Phase 3: Analysis
 - Phase 4: Summary
- Gather-Analyze-Summarize (O'Donnell)
 - Gather – Thoughts and feelings
 - Analyze – Reflection and analysis
 - Summarize – Lessons learned



Overcoming Common Challenges

- Time constraints
 - Solution: Schedule during slower periods
 - “What if” game during lunch
- Staff buy-in
 - Solution: Start small, demonstrate value
- Resource limitations
 - Solution: Use existing equipment creatively
- Schedule disruption
 - Solution: Plan mini-simulations



Measuring Success

- Clinical metrics
 - Emergency response times
 - Error rates
 - Patient outcomes
- Operational metrics
 - Process efficiency
 - Staff satisfaction
 - Cost savings
- Educational metrics
 - Student feedback
 - Competency assessments
 - Learning objective achievement



DANGER
KEEP OFF
BREAK
WALL





Next Steps

1. Immediate Actions (1-2 months)
 - Conduct needs assessment
 - Identify simulation team leads
 - Create initial scenarios
2. Short-term Goals (3-6 months)
 - Implement monthly simulations
 - Develop measurement tools
 - Begin data collection
3. Long-term Vision (6-12 months)
 - Expand scenario library
 - Integrate with QI programs
 - Establish regular training schedule



Recap

1. Describe the benefits of in situ simulations for an osteopathic practice.
2. Outline the steps for preparing and conducting effective simulation experiences in the office setting.
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Navigating Neck Pain: A Neurosurgeon's Guide to the Diagnosis and Management of Cervical Spondylotic Radiculopathy/Myelopathy (CSR/CSM)

M. KAMRAN KHAN, D.O.
Neurosurgeon

Endeavor Health Neurosciences Institute

2024 IOMS Winter Scientific Seminar

Kamran Khan, D.O. – Additional Credentials

- Staff Neurosurgeon at Endeavor Health – Edward Neurosciences Institute
- Fellowship-trained in Complex and Minimally Invasive Spine Surgery

Disclosures

- Consultant for Stryker Spine
- Consultant for MiRus Spine
- Consultant for Kuros Biosciences

Learning Objectives

- 1 Note the natural history of the management of CSR/CSM
- 2 Recognize the clinical presentation of a patient with CSR/CSM
- 3 Evaluate the different surgical options for CSR/CSM

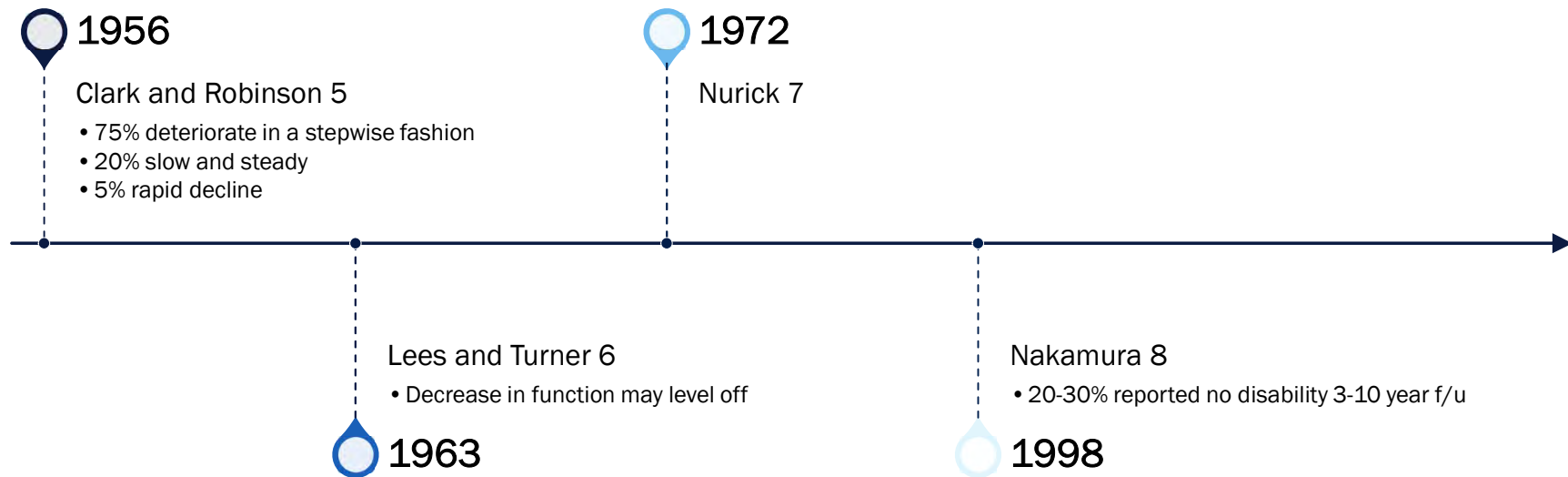


Management of CSR/CSM: Natural History

Introduction

- Cervical spondylosis > 55 y/o
- Incidence of hospitalization
 - 4.04 per 100,000
- Surgical treatment has increased 7-fold
 - Conservative Management Mainstay

Natural History



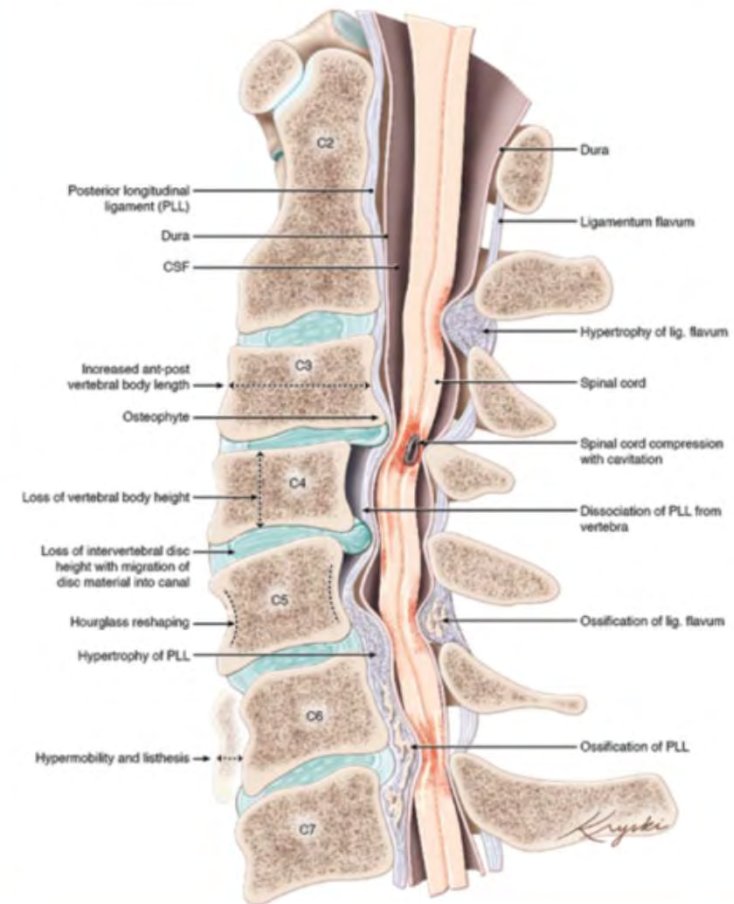
- Prevalence
 - 1.6 per 100,000 (Netherlands)¹
 - 4.04 per 100,000 (Taiwan)²
 - 6.05 per 100,000 (USA)³

Risk Factors

- Advanced Age
- Environmental/Genetic Factors
- Smoking
- Occupation
- Phone Use
 - 12 lbs at neutral
 - 27 lbs at 15 degrees
 - 40 lbs at 30 degrees
 - 50 lbs at 45 degrees

Anatomic Considerations

- Degenerative changes
 - Ligamentum thickening
 - Hypertrophic facet joints
 - Disc disease
- Congenital spinal stenosis
 - $CD/VBD < 0.82$ mm



Stages of Degeneration

Dysfunction

- 15-45 y/o
- Radial and circumferential tears of AF

Instability

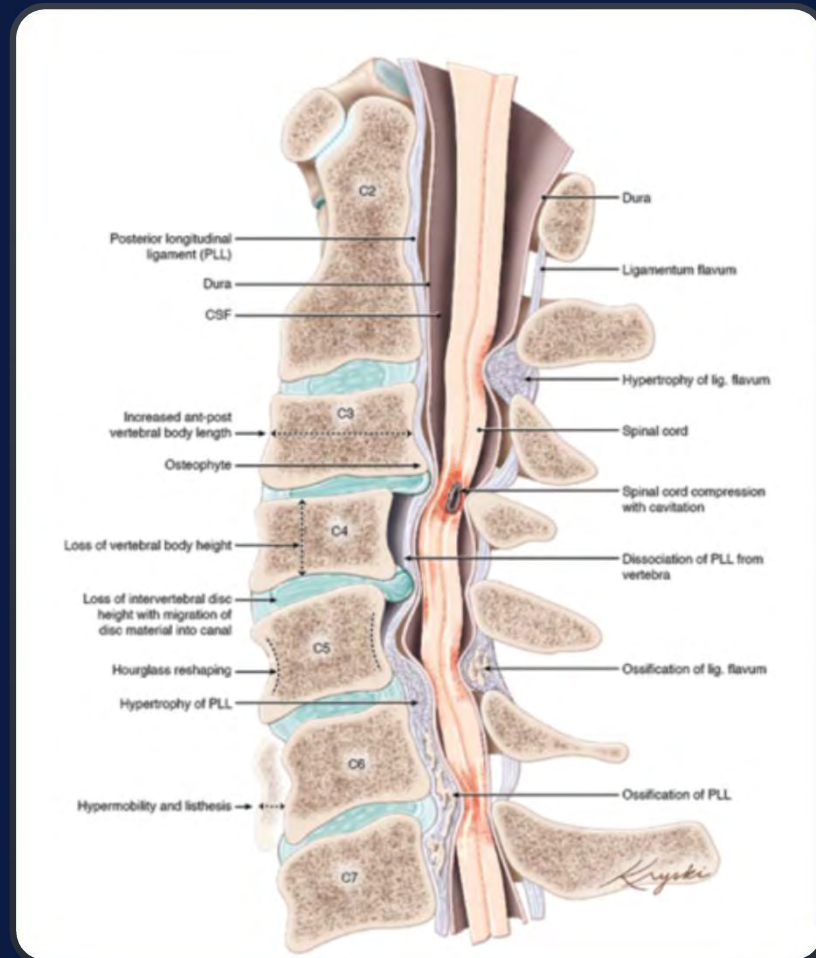
- 35-70 y/o
- Disruption of NP and facet degeneration

Stabilization

- > 60 y/o
- Hypertrophic changes leading to stiffening of spine

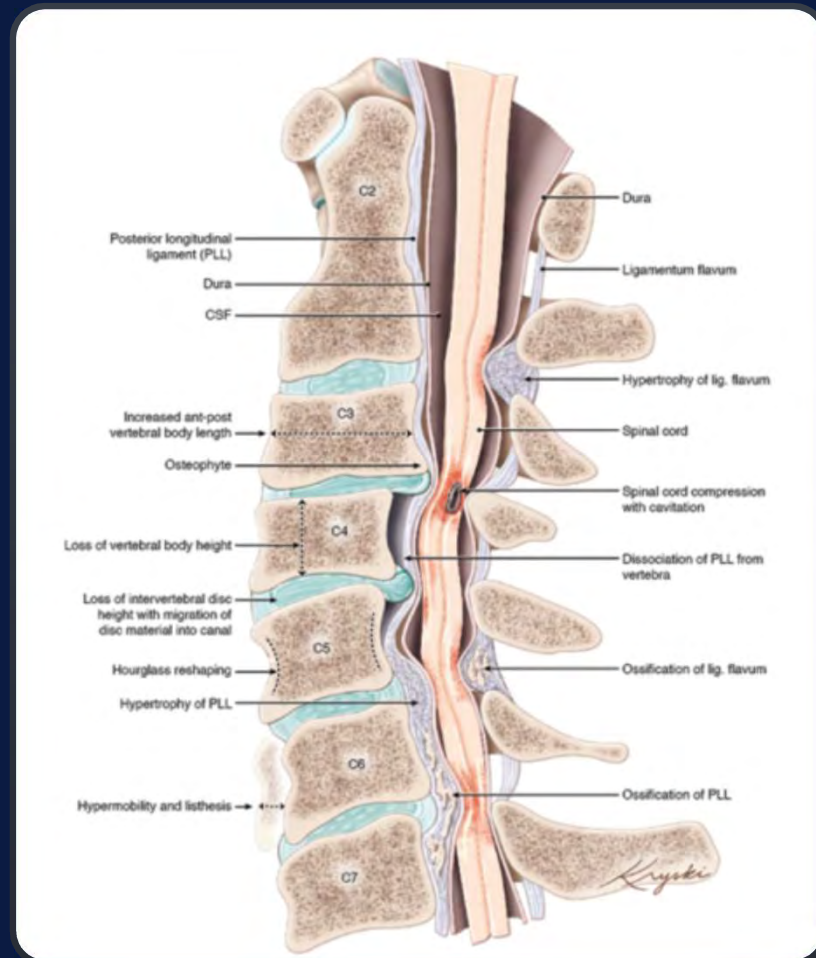
Pathophysiology: Static and Dynamic Compression

- Anatomic standpoint
 - Disc disease
 - Facet joint hypertrophy
 - Osteophytes
 - Ossification of the posterior longitudinal ligament (OPLL)
 - Ligamentum thickening



Pathophysiology: Static and Dynamic Compression

- Molecular level
 - Axonal stretch
 - Spinal cord ischemia
 - Vascular compression/congestion
 - Cellular death via necrosis





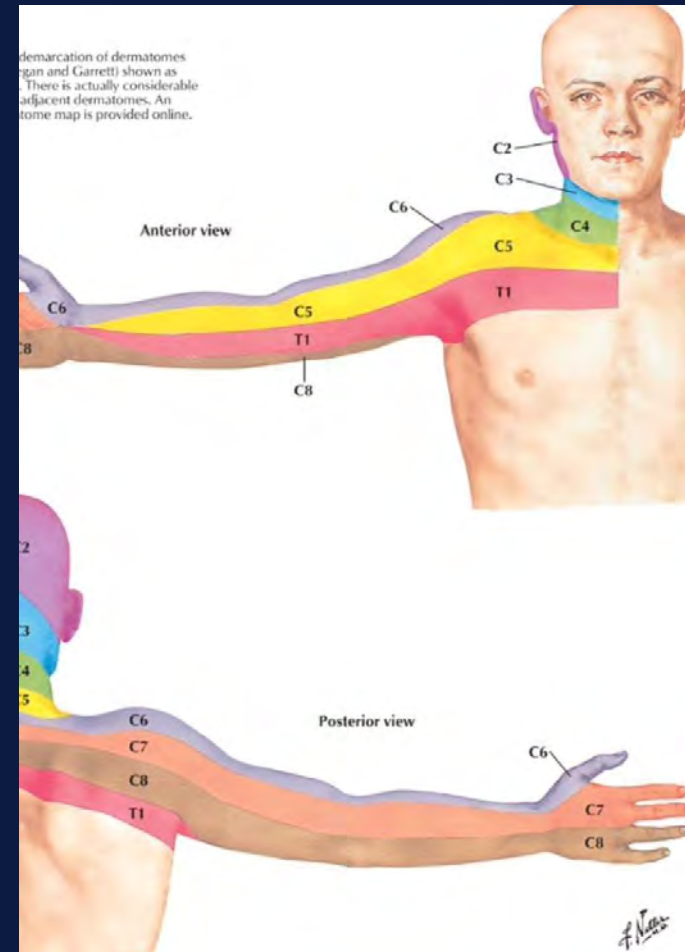
Clinical Presentation of CSR/CSM

Signs & Symptoms

- Axial neck pain
- Unilateral numbness/tingling
- Loss of manual dexterity
- Weakness
- Urinary urgency
- Spasticity
- Gait dysfunction

Clinical Presentation

- C4-5 (most Flex/Ex)
 - C5
 - Deltoid
 - Subscapular pain
- C5-6 (earliest degen)
 - C6
 - "6 shooter"
- C6-7 (most common HNP)
 - C7
 - Forearm and middle finger



Clinical Presentation

- UMN findings
 - Hoffman's
 - Lhermitte's
 - CSM
 - MS

Table 1. Common Clinical Presentation and Examination Tools.

Motor signs

- Weakness in triceps and hand intrinsics
- Atrophy of intrinsic hand muscles
- Clumsiness with fine motor skills
- Proximal weakness of the lower extremities

Upper motor neuron signs

- Hoffman's sign (quick flexion of both the thumb and index finger when the middle finger nail is snapped)
- Inverted radial reflex (flexion of the fingers in response to the brachioradialis reflex)
- Pathological clonus
- Babinski sign

Sensory dysfunction

- Glove-like sensory loss in hands
- Proprioceptive dysfunction

Assessment tools

- Lhermitte sign
- Romberg test
- 9-Hole peg test
- Grip and release test (observe decrease number of cycles)
- Timed gait, 30-m walking test
- Tandem gait
- Triangle step test

Differential Diagnosis

- Brachial plexopathy
- CTS
- Peripheral Neuropathy
- Myofascial Syndrome
- Thoracic Outlet
- ALS
 - Presence of fasciculations
- GBS
 - Absence of reflexes and cn deficits
- NPH
 - Cognitive dysfunction in addition to gait imbalance and bladder dysfunction

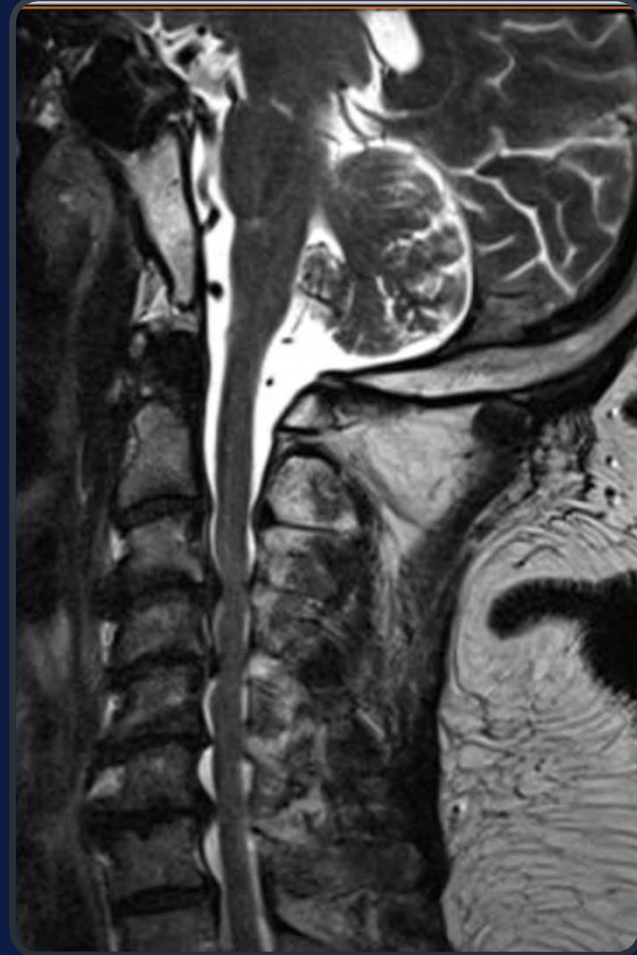
Laboratory testing

- Infection
 - CBC
 - ESR/CRP
 - Blood cultures
- Metabolic disorder
 - Folate
 - B12



Imaging

- X-ray (XR)
- CT
 - Preop planning
 - OPLL
- CT myelography
- MRI (gold standard)
 - High signal change on T2
- EMG
 - Peripheral neuropathy



X-ray



CT



 Endeavor Health™



CT Myelogram



MRI



Conservative



Neck immobilization



Medications

NSAIDs, steroids, muscle relaxants, GABA/Tricyclics



Lifestyle modifications

Active modalities, aerobic conditioning, isometric and ROM exercises



Physical Therapy

Cervical traction, massage, heat



Pain management

ESI, facet ablations, trigger point injections

Decision-making



Duration of symptoms



Degree of spinal cord dysfunction



Patient health



Degree of functional deterioration



Radiographic findings



Surgical Options for CSR/CSM

Surgical Options

Surgical Technique	Main Indications	Pros	Cons	Common Complications	Contraindications
Anterior cervical discectomy and fusion	<ul style="list-style-type: none"> • Anterior pathology • Kyphosis • ≤2 levels 	<ul style="list-style-type: none"> • Less postoperative pain • Lower infection rates • Ability to decompress and correct cervical kyphosis • Address pathologies causing radiculopathy 	<ul style="list-style-type: none"> • When 3 or more levels are involved, the complication rates with an anterior approach rise • Bone graft complications • Swallowing difficulty or hoarseness • Difficulties treating posterior compressive pathologies 	<ul style="list-style-type: none"> • Nerve root injury (C5 nerve root palsy) • Spinal cord injury • Wound hematoma • Hoarseness • Dysphagia • Esophageal perforation • Carotid or vertebral artery injury • Pseudarthrosis 	<ul style="list-style-type: none"> • Previous irradiation to anterior neck • Shin on chest deformity • Posterior pathology • Aberrant vertebral artery • Previous iatrogenic laryngeal nerve injury on contralateral side
Anterior corpectomy	<ul style="list-style-type: none"> • Circumferential decompression of the ventral cervical spinal cord 	<ul style="list-style-type: none"> • More extensive decompression • Fewer graft surfaces to fuse • Provides source of autograft • Can be combined with ACDF 	<ul style="list-style-type: none"> • Greater blood loss • Increased operative time • Higher incidence of complications 	<ul style="list-style-type: none"> • In addition to above • Vertebral artery injury • Durotomy • CSF leak • Adjacent segment degeneration 	<ul style="list-style-type: none"> • Severe osteoporosis • Reconstruction >3 levels • Aberrant vertebral artery • Previous irradiation to anterior neck • Previous iatrogenic laryngeal nerve injury on contralateral side • Shin on chest deformity
Arthroplasty	<ul style="list-style-type: none"> • 1-2 level CSM 	<ul style="list-style-type: none"> • Preservation of segmental motion with maintenance of adequate stability 	<ul style="list-style-type: none"> • Significant degenerative changes at risk for further degenerative changes at the effected regions 	<ul style="list-style-type: none"> • New onset radiculopathy • Subsidence • Implant migration • Ankylosed joint (formation of significant heterotopic bone around the implant) 	<ul style="list-style-type: none"> • Cervical kyphosis • Cervical instability • Cervical ankylosis • Osteoporosis

(continued)

Surgical Options

Surgical Technique	Main Indications	Pros	Cons	Common Complications	Contraindications
Cervical laminectomy only	<ul style="list-style-type: none"> • Posterior pathology • Neutral to lordosis 	<ul style="list-style-type: none"> • Direct approach 	<ul style="list-style-type: none"> • Delayed postoperative kyphosis 	<ul style="list-style-type: none"> • C5 radiculopathy • Durotomy • CSF leak 	<ul style="list-style-type: none"> • Inability to tolerate prone position • Active posterior infection • Previous irradiation to posterior neck • Shin on chest deformity • Significant cervical kyphosis • Significant instability
Cervical laminectomy and fusion	<ul style="list-style-type: none"> • Posterior pathology • Multilevel CSM 	<ul style="list-style-type: none"> • Multilevel stabilization • More expansive decompression of posterior pathology while providing stabilization via instrumentation/fusion 	<ul style="list-style-type: none"> • Dependent on the ability of the cord to drift away from anterior lesions • Complications related to misplaced screws 	<ul style="list-style-type: none"> • Nerve root injury (C5 palsy) • Vertebral artery injury • Wound infection • CSF leak 	<ul style="list-style-type: none"> • Inability to tolerate prone position • Active posterior infection • Previous irradiation to posterior neck • Significant cervical kyphosis
Cervical laminoplasty	<ul style="list-style-type: none"> • "Tissue-sparing" alternative for spinal cord compression 	<ul style="list-style-type: none"> • Posterior elements preserved 	<ul style="list-style-type: none"> • Limited posterior decompression • Late instability • Inconsistent relief of neck pain 	<ul style="list-style-type: none"> • Delayed C5 nerve root injury • Neck pain • Reduced range of motion • New-onset kyphosis 	<ul style="list-style-type: none"> • Inability to tolerate prone position • Active posterior infection • Previous irradiation to posterior neck • Significant neck pain • Significant kyphotic deformity • Cervical spine instability
Combined ACDF and laminectomy and fusion	<ul style="list-style-type: none"> • Significant focal kyphosis and posterior compressive pathology • Multilevel decompression • Instability 	<ul style="list-style-type: none"> • Increased stabilization • Increased decompression 	<ul style="list-style-type: none"> • Technically more challenging • Increased operative time • Often require staging 	<ul style="list-style-type: none"> • Same as above posterior approaches 	<ul style="list-style-type: none"> • Inability to tolerate prone position • Active posterior infection • Previous irradiation to posterior neck

Abbreviations: ACDF, anterior cervical discectomy and fusion; CSF, cerebrospinal fluid; CSM, cervical spondylotic myelopathy.

Anterior approach

- Direct compression
- Muscle sparing
- Lower infection rate
- Ability to correct kyphosis

Posterior approach

- Wider decompression
- Multilevel pathology with good lordosis
 - Requires understanding of CSA to ensure cord migration

Surgical Study Findings

World Neurosurg. 2016 Feb;86:112-9. doi: 10.1016/j.wneu.2015.09.044. Epub 2015 Sep 25.

The Association of Cervical Spine Alignment with Neurologic Recovery in a Prospective Cohort of Patients with Surgical Myelopathy: Analysis of a Series of 124 Cases.

Shamji MF¹, Mohanty C², Massicotte EM³, Fehlings MG³.

- Prospective analysis of 124 pts.
 - Lordotic pts benefits from anterior or posterior
 - Kyphotic pts greater benefit from anterior or combined



Decision-Making

- Sagittal alignment
- Number of pathologic levels
- Degree of compression anterior vs. posterior

Surgical Study Findings

Eur Spine J. 2015 Aug;24(8):1621-30. doi: 10.1007/s00586-015-3911-4. Epub 2015 Apr 4.

Comparison of anterior approach versus posterior approach for the treatment of multilevel cervical spondylotic myelopathy.

Luo J¹, Cao K, Huang S, Li L, Yu T, Cao C, Zhong R, Gong M, Zhou Z, Zou X.

- 10 studies (systematic review of anterior vs. posterior approach for multilevel (> 3) CSM
 - 24 month postop JOA higher in ant group
 - Recovery rate similar
 - Postop complication higher in anterior group
 - Intraoperative blood loss and OR time greater in anterior group
 - LOS less in anterior group
- No difference in neurologic recovery and thus no definitive conclusion
- NCT02076113
 - Dorsal vs. ventral surgery for CSM and SF-36 outcome at 1 year



Methods of Anterior Decompression

ACDF/ACCF/Hybrid/Arthroplasty

- ACDF
 - 92-96% arthrodesis
 - Nonunion with long constructs
 - Wang et al 7 : 82% fusion vs. 63% nonunion without plate for 3 levels
 - Increased incidence of ALD

Patient Case

- 58 y/o AAM who presents with progressive RUE weakness. He has been dropping his pen from his right hand and having difficulty with “buttoning” his shirts. He has had a fall but no significant gait instability is noted upon examination
- PE
 - Motor: 4+/5 B/L D/B/T and L WF/WE/IO and 4-/5 R WF/WE/IO
 - Sensory: intact to LT throughout
 - Reflexes: 2 + throughout, Hoffman's B/L
 - Gait normal



Surgical Outcome



Anterior complications

- Dysphagia (2-48%)
- Hoarseness (temporary 3-11%/permanent < 1%)
- Vert injury (0.03%)
- ALD (3% per year)
- Esophageal perforation
- Airway obstruction

stryker

Arthroplasty

PLoS One. 2016 Feb 12;11(2):e0149312. doi: 10.1371/journal.pone.0149312. eCollection 2016.

Mid- to Long-Term Outcomes of Cervical Disc Arthroplasty versus Anterior Cervical Discectomy and Fusion for Treatment of Symptomatic Cervical Disc Disease: A Systematic Review and Meta-Analysis of Eight Prospective Randomized Controlled Trials.

Hu Y¹, Lv G¹, Ren S², Johansen D³.

- Pooled data from 8 prospective RCT's comparing ACDF vs. CDA 1 to 2-level cervical disease
 - CDA higher success rate
 - Lower NDI
 - Lower pain and better functional outcome
 - Lower incidence of ASD

ADR

- CC: LUE radiculopathy
- HPI: 47 y/o m with LUE radiculopathy and minimal neck pain. Patient has no weakness. He has attempted 6 months of PT and ESI offering little relief.
- PE:
 - Motor: 5/5 throughout
 - Sensory: intact to LT throughout



Imaging





Methods of Methods of Posterior Decompression

Posterior approach (Laminoplasty/LAMI/LAMI with fusion)

- Avoid technical issues
 - Obesity
 - Short neck
 - Barrel chest
 - Prior anterior surgery

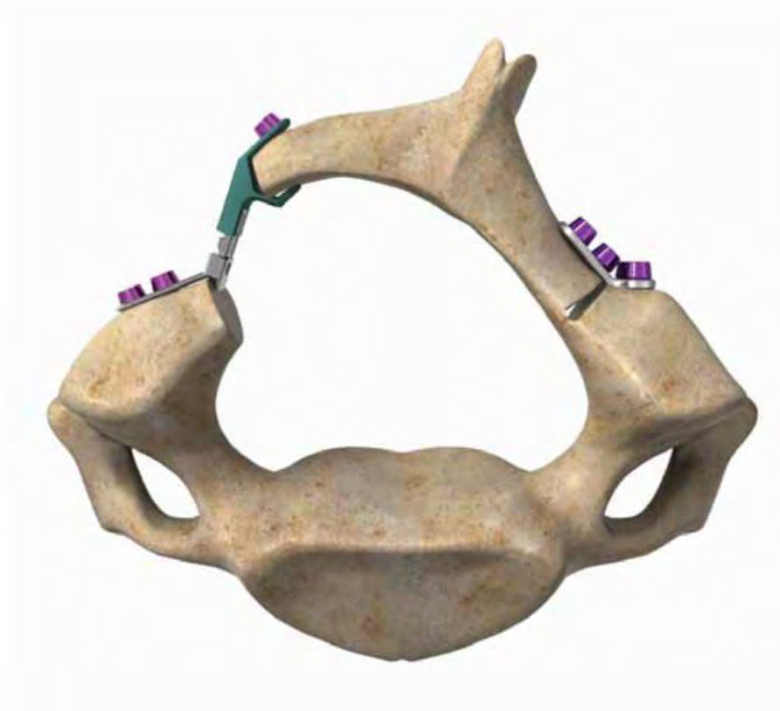
Laminoplasty

- Indications
 - Good spinal stability
 - Good cervical lordosis
 - Minimal neck pain
- Various types
 - Open door
 - Double door
 - Muscle sparing

Laminoplasty

- Complications
 - Delayed C5 palsy (2-13%)
 - Neck pain (40-50%)
 - Decrease ROM (20-50%)
 - New onset kyphosis (2-15%)

Laminoplasty

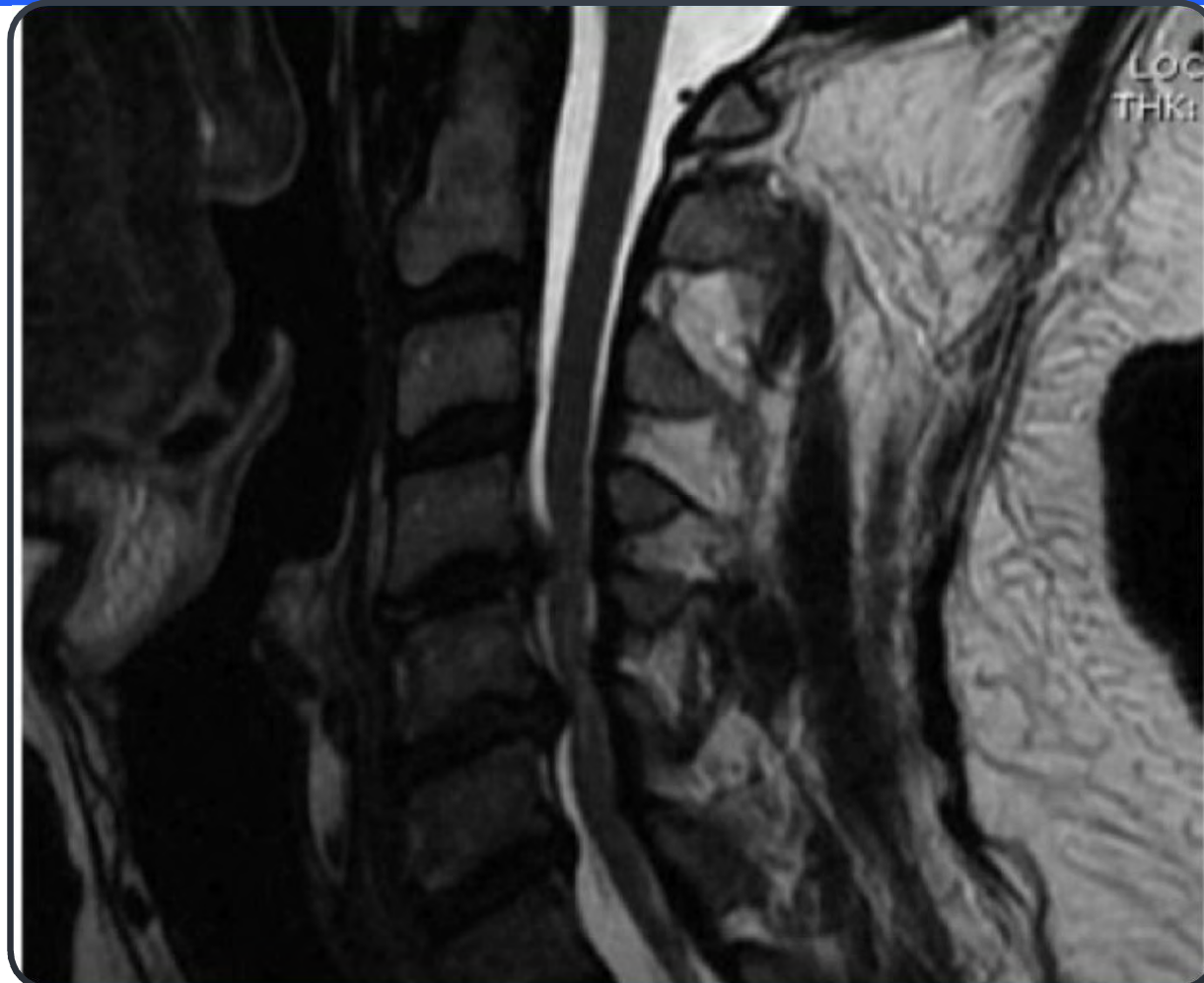


Laminoplasty



Patient Case

- CC: UE weakness
- HPI: 63 y/o with minimal neck pain but B/L UE weakness and numbness/tingling L > R. Patient has no gait instability nor sensory changes.
- PE
 - Motor: 4/5 B/L D/B/T and 4-/5 WF/WE/IO
 - Sensory: intact to LT throughout
 - Reflexes: 2+ throughout
 - Gait: normal



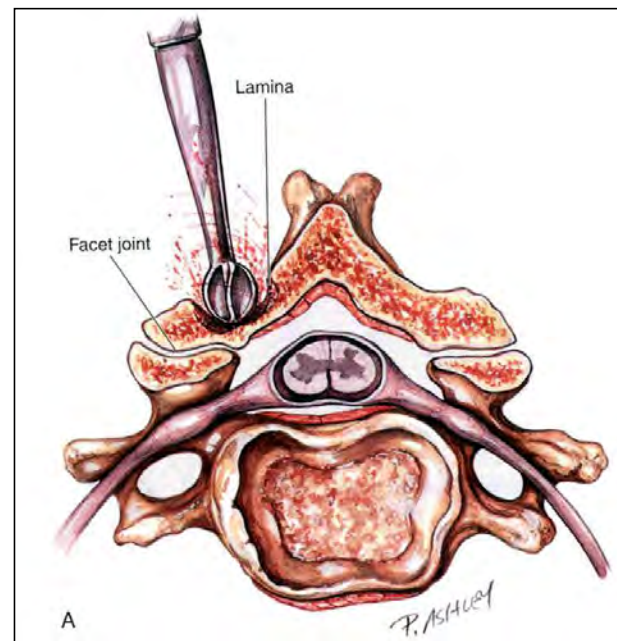
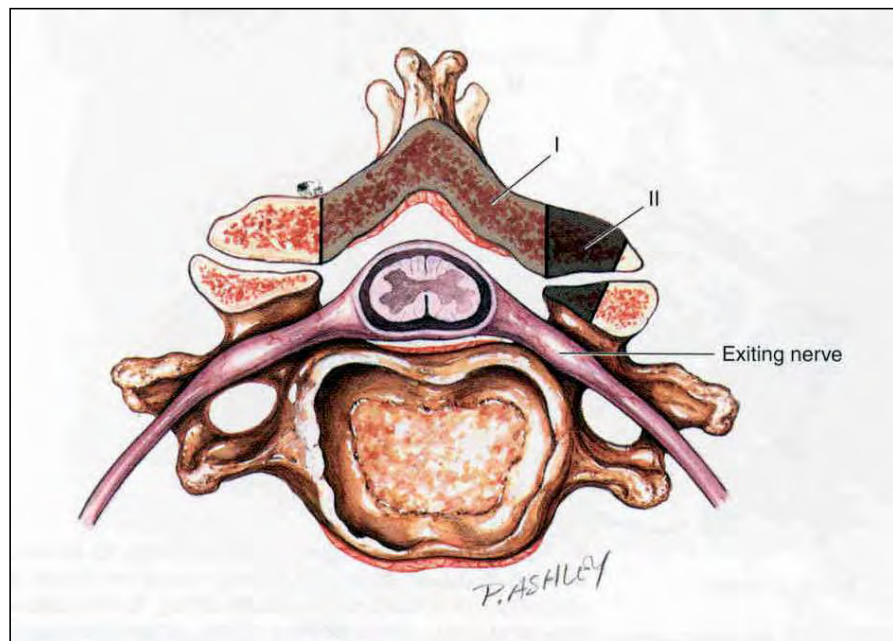
Imaging



Laminectomy w/o fusion

- Complications
 - Postop kyphosis (6-46%)
 - Segmental instability (18%)
 - Extent of facet disruption (>50%)
- Advantage
 - Spinal stabilization with decompression
 - More expansive decompression

Laminectomy



Laminectomy w/ fusion

J Neurosurg Spine. 2015 Jun;22(6):589-95. doi: 10.3171/2014.10.SPINE1498. Epub 2015 Mar 27.

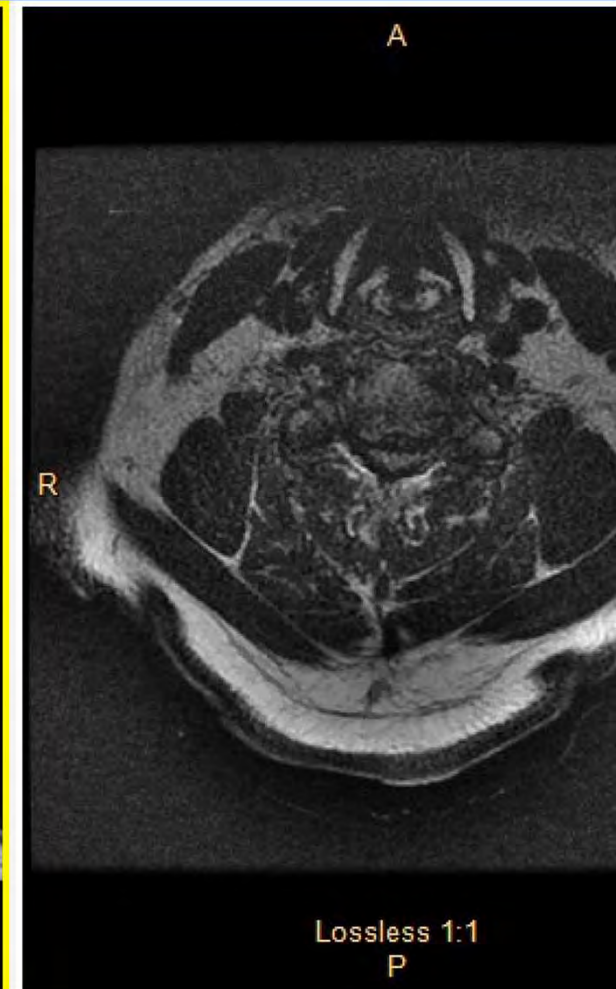
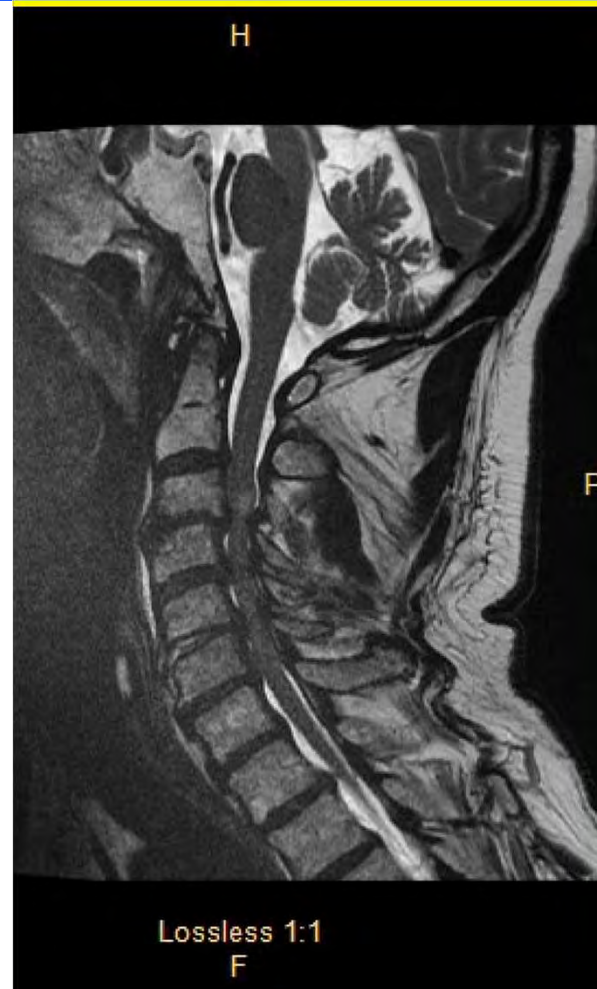
Laminoplasty versus laminectomy and fusion for multilevel cervical myelopathy: a meta-analysis of clinical and radiological outcomes.

Lee CH^{1,2}, Lee J³, Kang JD⁴, Hyun SJ¹, Kim KJ¹, Jahng TA¹, Kim HJ¹.

- 302 pts s/p laminoplasty vs. 290 pts s/p lami w/ fusion
 - Both improved in JOA and VAS
 - Both lost lordosis
 - Overall sagittal alignment progressed to kyphosis
- Subgroup analysis (3 obs studies)
 - Lami with fusion was superior in preserving lordosis long term

Patient Case

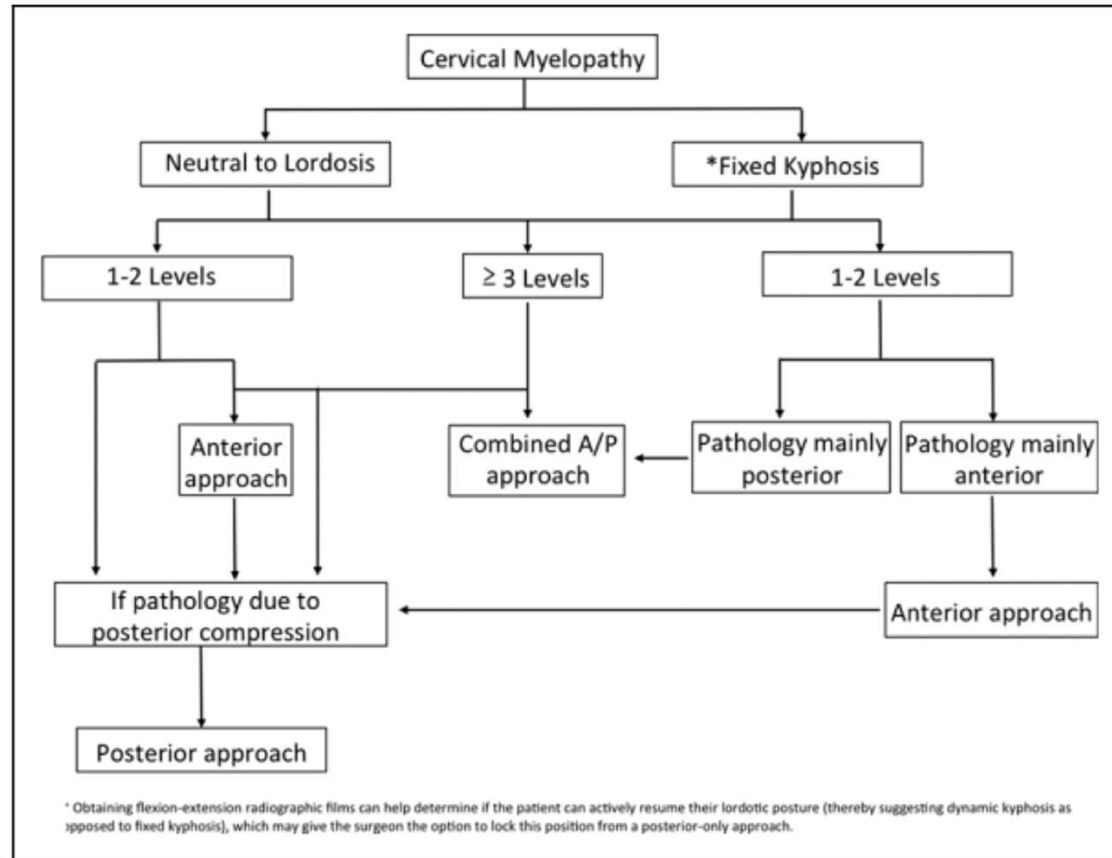
- CC: gait imbalance
- HPI: 66 y/o with history of CAD, HTN, HLD who fell from a standing position. He presented with gait instability and UE weakness greater than LE weakness.
- PE
 - Motor: 3+/5 RUE and 3/5 LUE, 4/5 B/L LE
 - Sensory: intact to lt throughout
 - Reflexes: 3 + throughout
 - Gait: severely ataxic



Imaging



Decision-making



Decision-making

Sagittal alignment	Kyphosis	Fixed → Anterior Flexible → Anterior or posterior with fusion
	Neutral or lordotic	→ Posterior (laminoplasty) > Anterior
Number of levels	≥3	→ Posterior (laminoplasty) > Anterior
	≤2	→ Anterior > Posterior
Age and comorbidities	Elderly, greater comorbidities	→ Posterior > Anterior
	Healthier	→ Anterior > Posterior
Preoperative Pain Levels	Moderate—High	→ Anterior or posterior with fusion
	None—Low	→ Posterior (laminoplasty) or anterior
Instability	Yes	→ Anterior or posterior with fusion
	No	→ Posterior (laminoplasty) or anterior

Concluding Takeaways

- Cervical DDD is an increasingly Morbid condition
- Clinical presentation
 - Quiescent and insidious
 - Stepwise decline or rapid deterioration
- Mild CSR/CSM
 - Conservative
- Moderate to severe
 - Surgery
- Anterior/Posterior
 - Considerations: Location of pathology, levels involved, sagittal alignment, neck pain
 - Risk factors
 - Smokers
 - Co-morbidity

Clinic Locations & Contact Information: Dr. Kamran Khan, D.O.



Clinic Locations

- Naperville
- Woodridge

Contact Information

- Kamran.Khan@eehealth.org
- (630) 527-7730

Questions?



Staying Connected Online – Neurosciences Institute





Endeavor
HealthSM

Thank You

Saturday, December 14, 2024

2024 WINTER SCIENTIFIC SEMINAR

December 12-15, 2024

The Westin, Chicago-Lombard, IL



Illinois Osteopathic Medical Society



Regenerative Medicine:

Prolotherapy for the Treatment of Chronic Pain

BRIAN RALSTON, M.D.

MACNEAL FAMILY MEDICINE

DECEMBER 15, 2024

Disclosures

Brian Ralston, MD has no relevant financial relationships with commercial interests to disclose

Objectives

- Describe the background and mechanisms of dextrose prolotherapy
- Review evidence supporting the safety and efficacy of dextrose prolotherapy
- Describe an example of prolotherapy in the treatment of low back pain
- Discuss translational research: implementing prolotherapy in clinical practice

What is Prolotherapy?

- Injection of substances into tissue to stimulate body's healing response, reduce pain and increase function



Prolotherapy History



HACKETT HEMWALL PATTERSON
FOUNDATION



George S. Hackett, M.D.




Gustav Hemwall, M.D.



Jeff Patterson, D.O.

George S. Hackett, MD



Joint stabilization
through induced
ligament sclerosis.
*Ohio State Medical
Journal*
1953, 49, 877-884.

George S. Hackett, M.D.
(1/14/1888 –
8/17/1969)

**Ligament and Tendon
Relaxation**
Treated by
Prolotherapy

George Stuart Hackett, M.D.
Gustav A. Hemwall, M.D.
Gerald A. Montgomery, M.D.

Gus Hemwall, MD - 1995



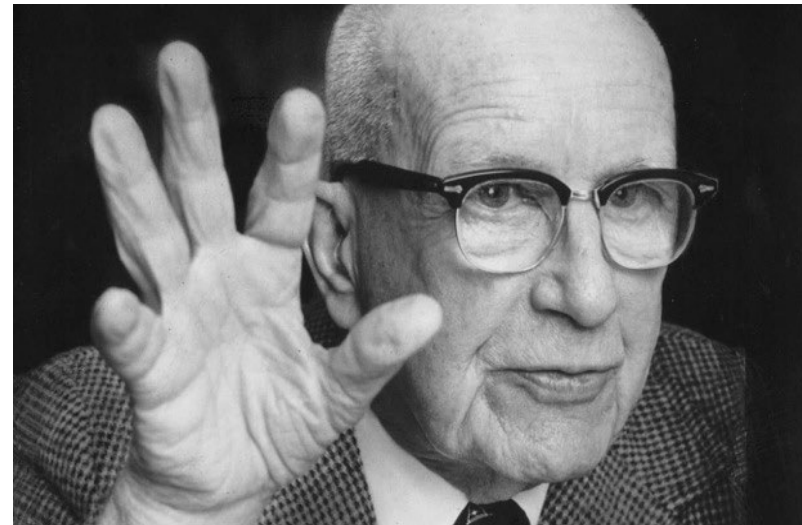
Jeff Patterson, DO



“Safe, simple, elegant, effective”

“Tensegrity” - Buckminster Fuller

- A structural principle of isolated components in compression inside a net of continuous tension
- Compressed members (such as bars or struts) do not touch each other
- Tensioned members (cables or tendons) delineate the system spatially.



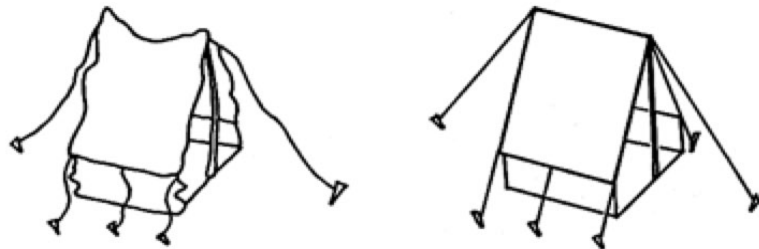
Tensegrity = tension + integrity



Islands of compression
floating in a balanced sea of tension

“Biotensegrity”

- Muscles, tendons and fascia provide continuous pull
- Bones float



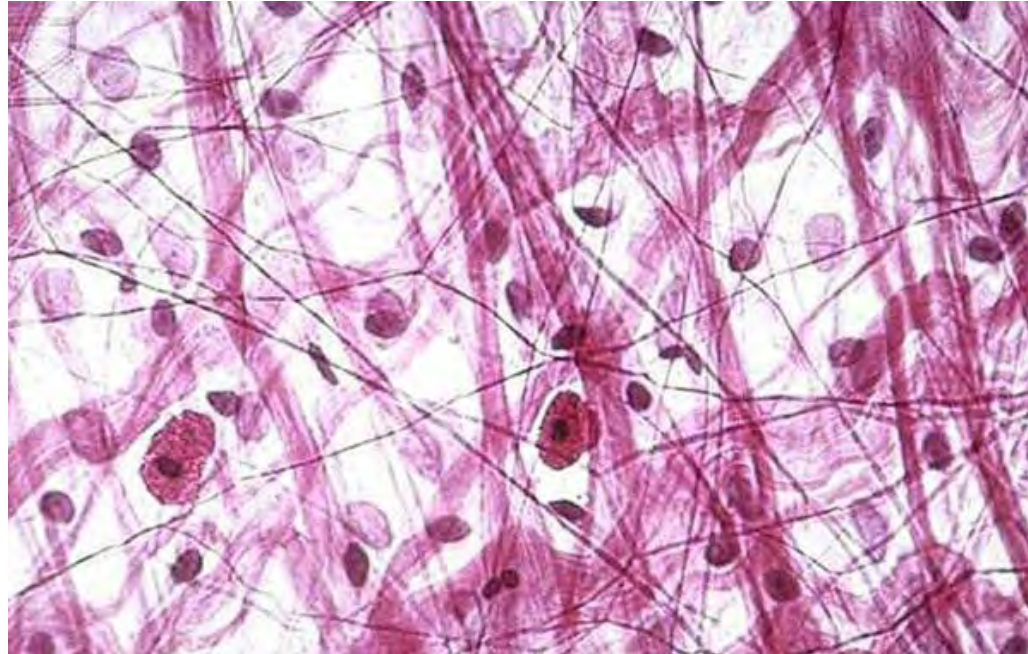
Fascia

- *Do we have 600 muscles?*
- *Or one muscle and 600 fascial pockets?*



Connective Tissue Targets

- Ligaments
- Tendons
- Cartilage
- Capsules
- Intra-articular

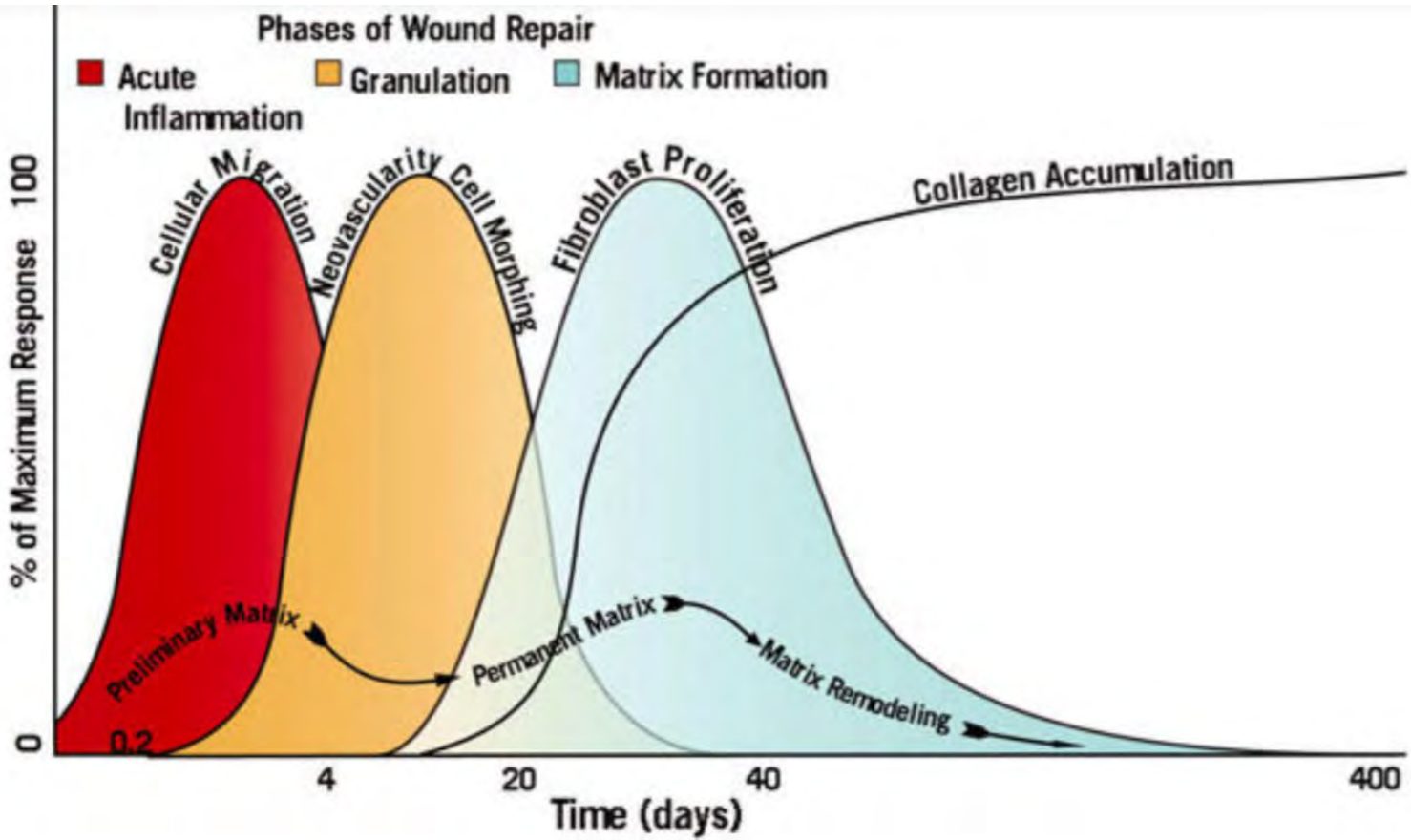


Connective Tissue Healing

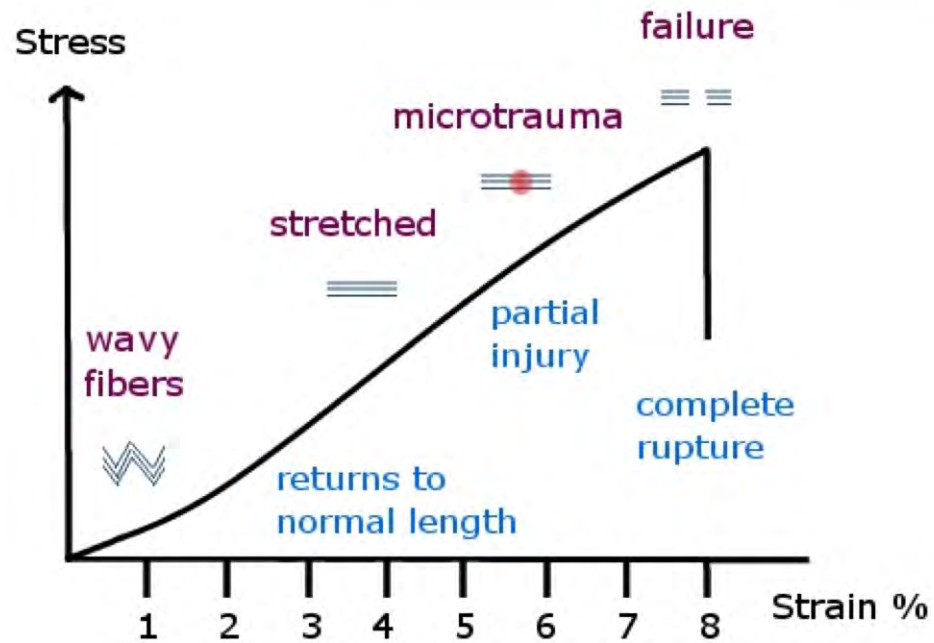
- Phases
 1. Inflammation
 2. Granulation
 3. Remodeling
- Inflammation necessary for healing



Healing Cascade



Acute Injury



Tendon Stretching Capability



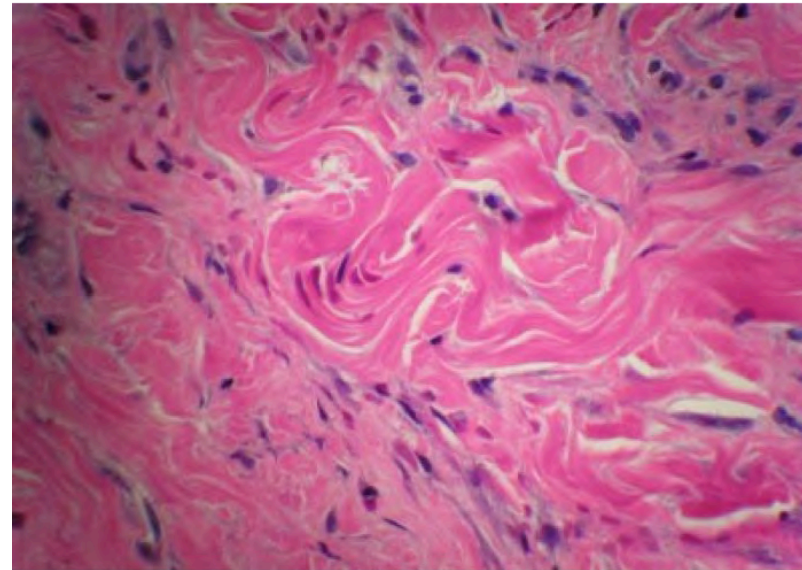
Chronic Injury

- Gradual
- Tissue microtrauma, initially asymptomatic
- Progressive tissue damage without adequate healing
- Weakness causes pain, alteration in motion and function



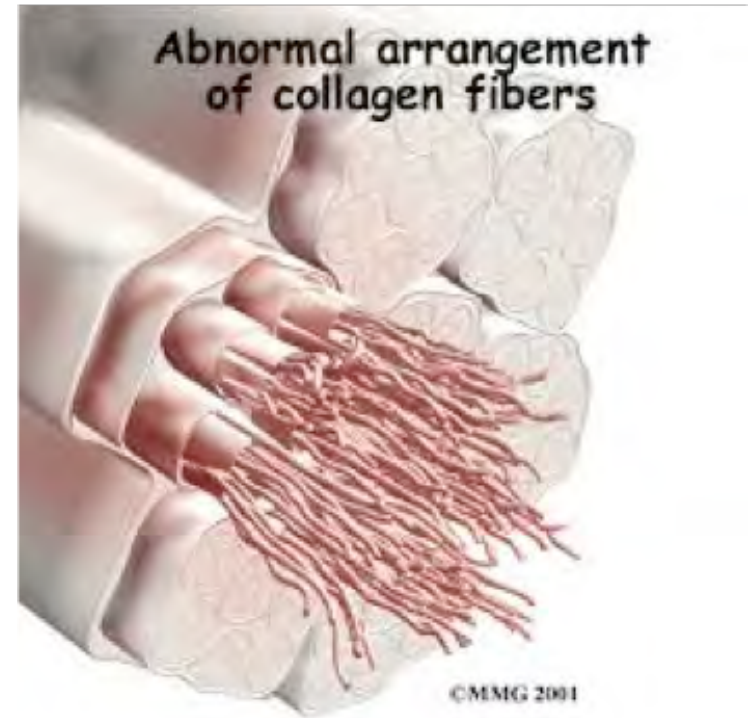
Tendinosis vs. “itis”

- No inflammatory cells
- Fragile, thin tendon fibrils
- Disorganized capillary proliferation (neovascularization)



Connective Tissue Insufficiency

- Decreased tensile strength, increased laxity
- Increased firing of mechanoreceptors
- Pain



Risks for Inadequate Healing

- Age, poor nutrition, smoking
- Chronic illness
- Decreased blood supply
- Overuse
- Steroids, NSAIDS



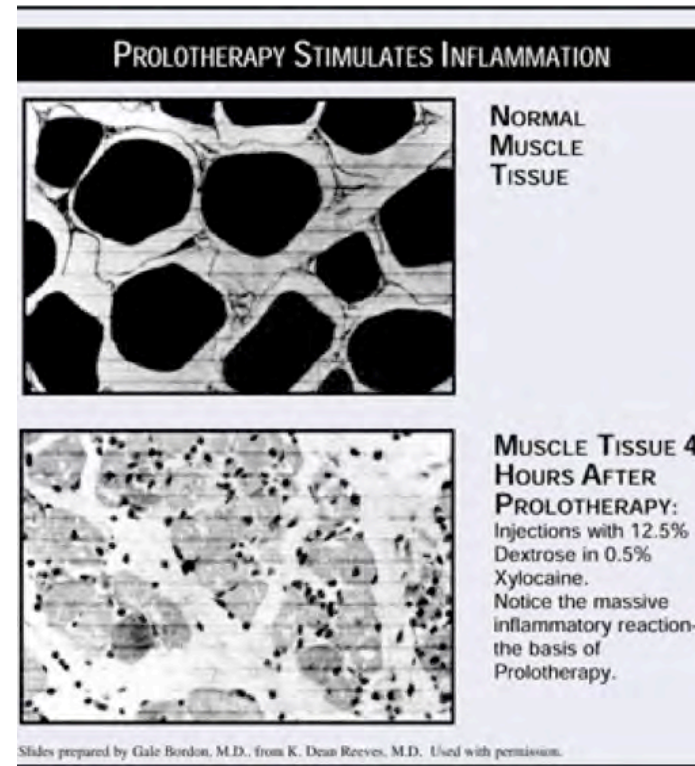
Enthesis

- Site of insertion of connective tissue into bone
- Superficial fibers attach to periosteum
- Deep fibers penetrate bone

“The weakness is in the weld.”
- George S. Hackett, MD

Prolotherapy Treatment

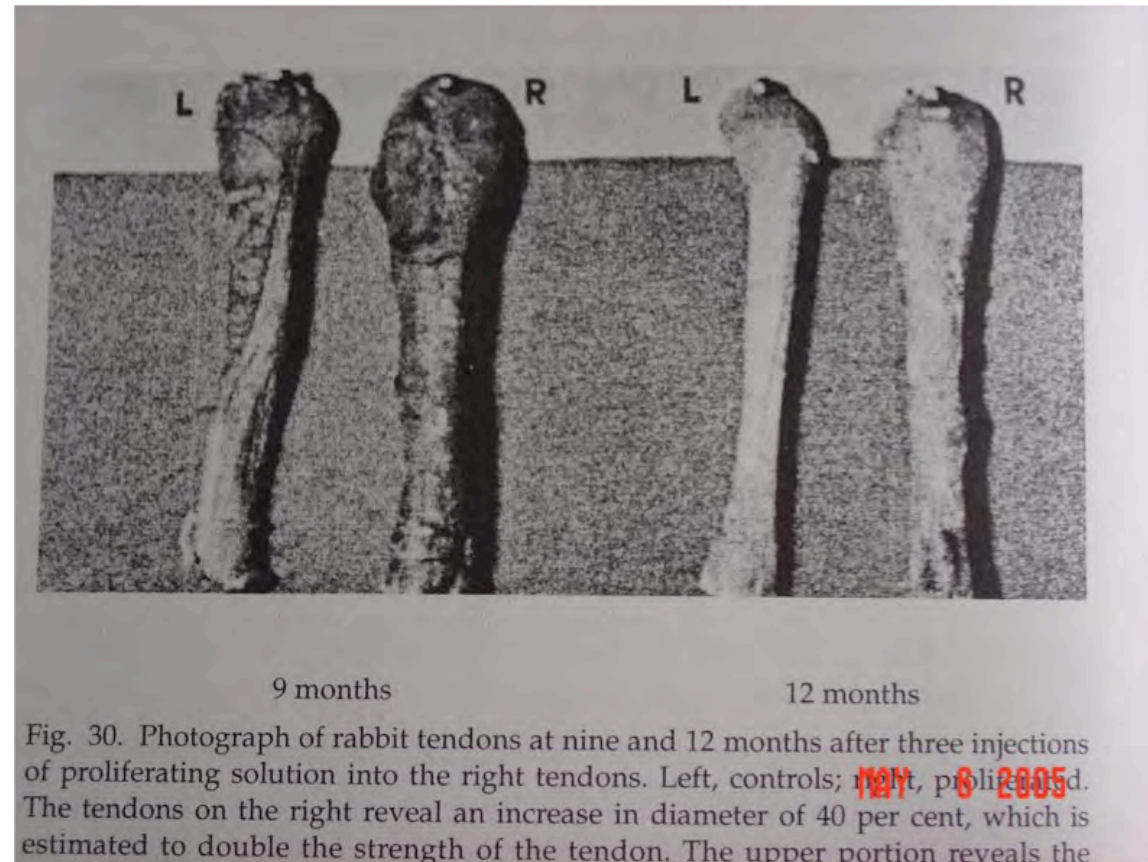
- Solution: hyperosmolar dextrose (12-25%)
- Osmotic gradient initiates local aseptic inflammatory response
- Focus on entheses and joints to increase ligament and tendon strength, reduce pain



Prolotherapy Mechanisms

- Inflammation stimulates fibroblast formation to repair connective tissue
- Decreases neovascularization
- Decreases pain (ligaments rich in nerves)
- Reconstruct “tensegrity”

Connective Tissue Growth

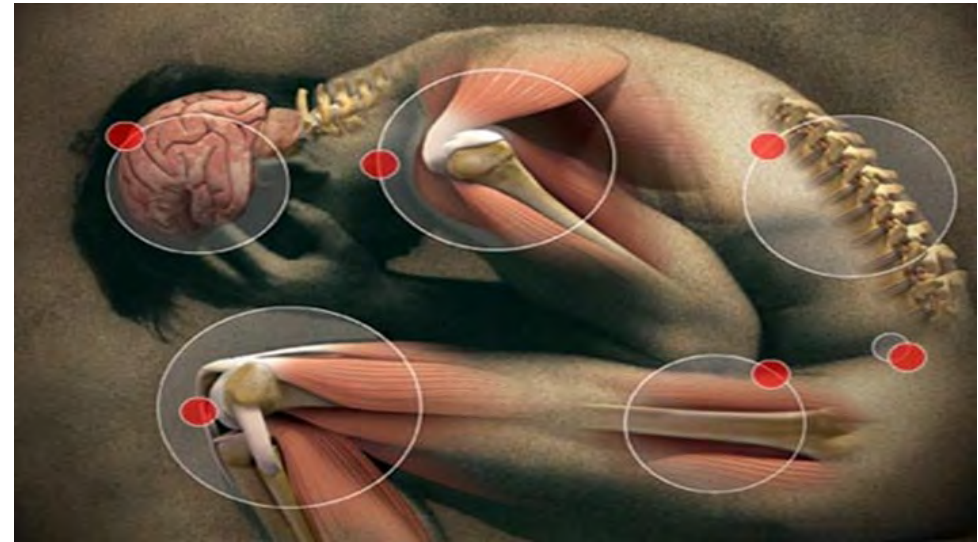


Role of Prolotherapy in MSK Medicine

- Repair soft tissue/joint injuries or laxity
 - Acute or chronic
 - Any accessible ligament, tendon, joint
- Shorten rehabilitation time
- Prevent or delay surgery

Indications - Examples

- Cervical, thoracic, lumbar pain
- Rotator cuff injuries, instability
- Tennis elbow (epicondylitis)
- Carpal tunnel, wrist pain
- Hip and knee arthritis and pain
- Achilles tendinosis
- Plantar fasciosis



Procedure



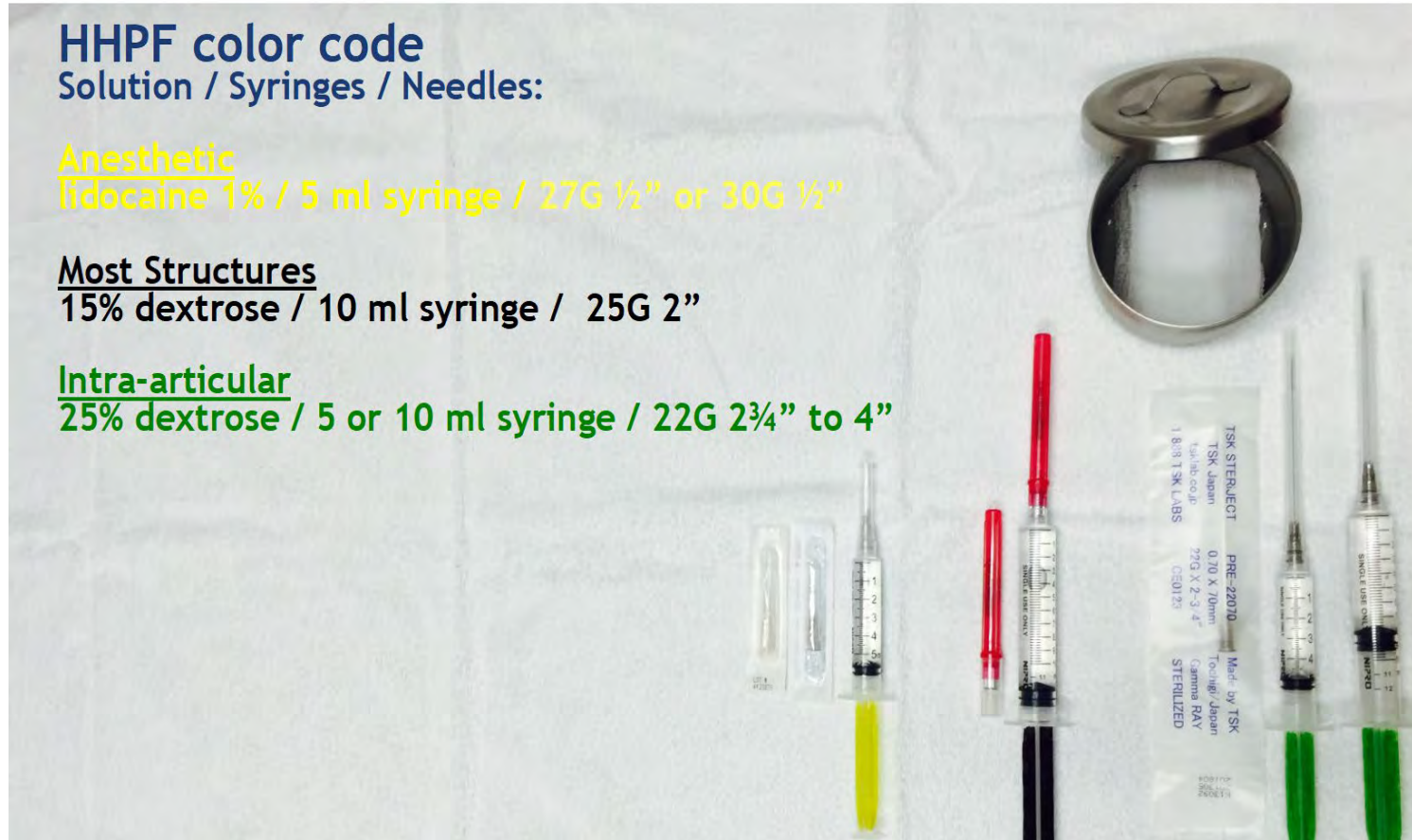
Supplies

HHPF color code
Solution / Syringes / Needles:

Anesthetic
lidocaine 1% / 5 ml syringe / 27G ½" or 30G ½"

Most Structures
15% dextrose / 10 ml syringe / 25G 2"

Intra-articular
25% dextrose / 5 or 10 ml syringe / 22G 2¾" to 4"



Clinical Evaluation

“The best diagnostic tools are at the tips of our fingers.”

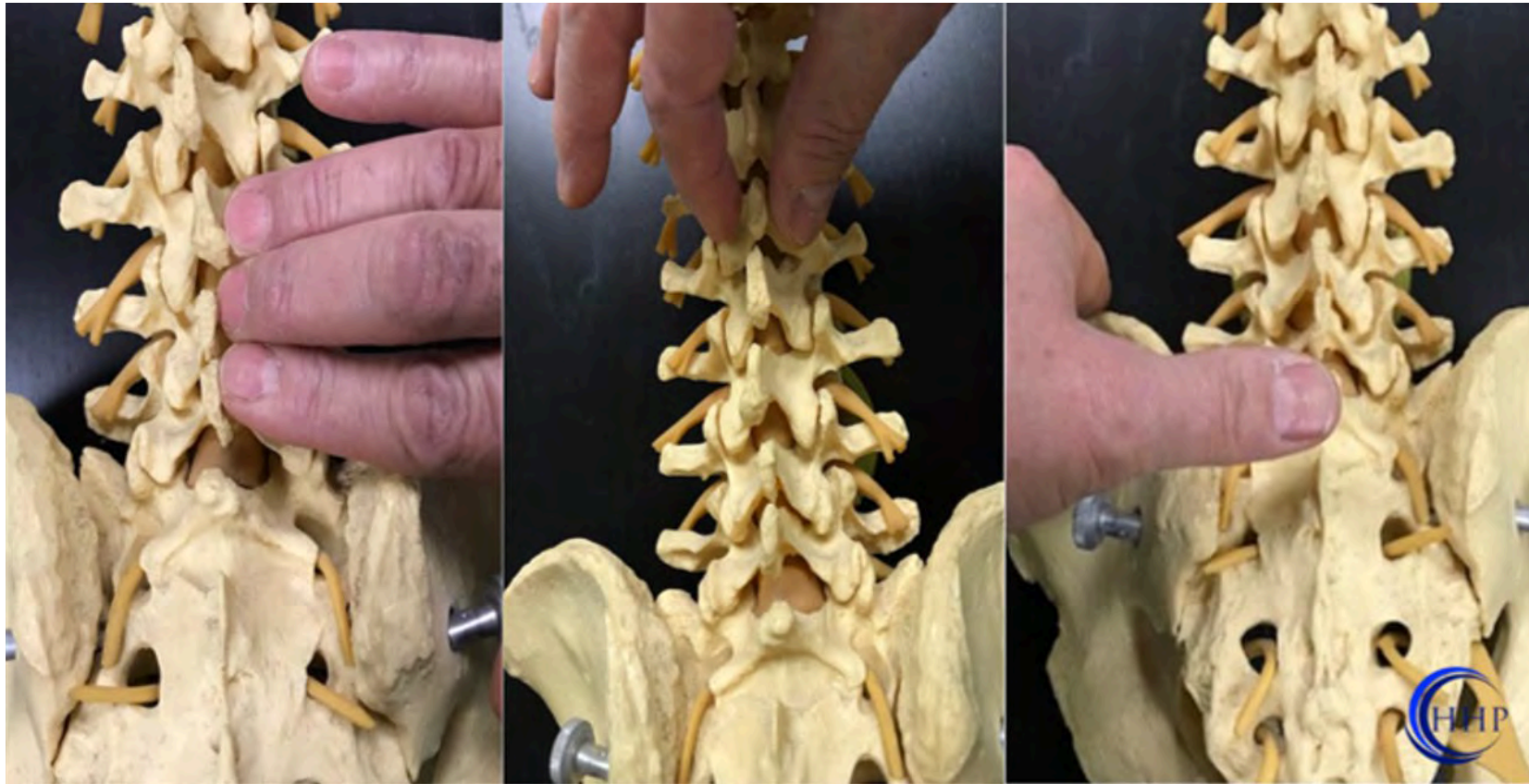
- Jeff Patterson, DO



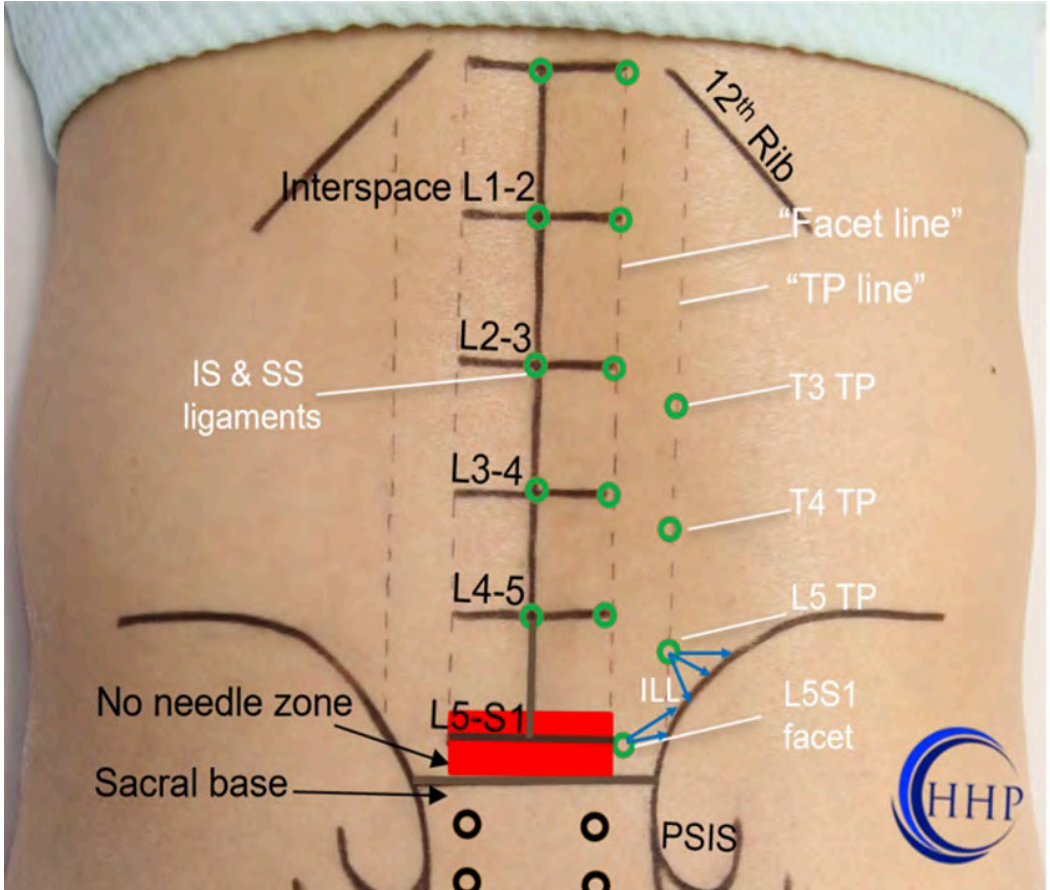
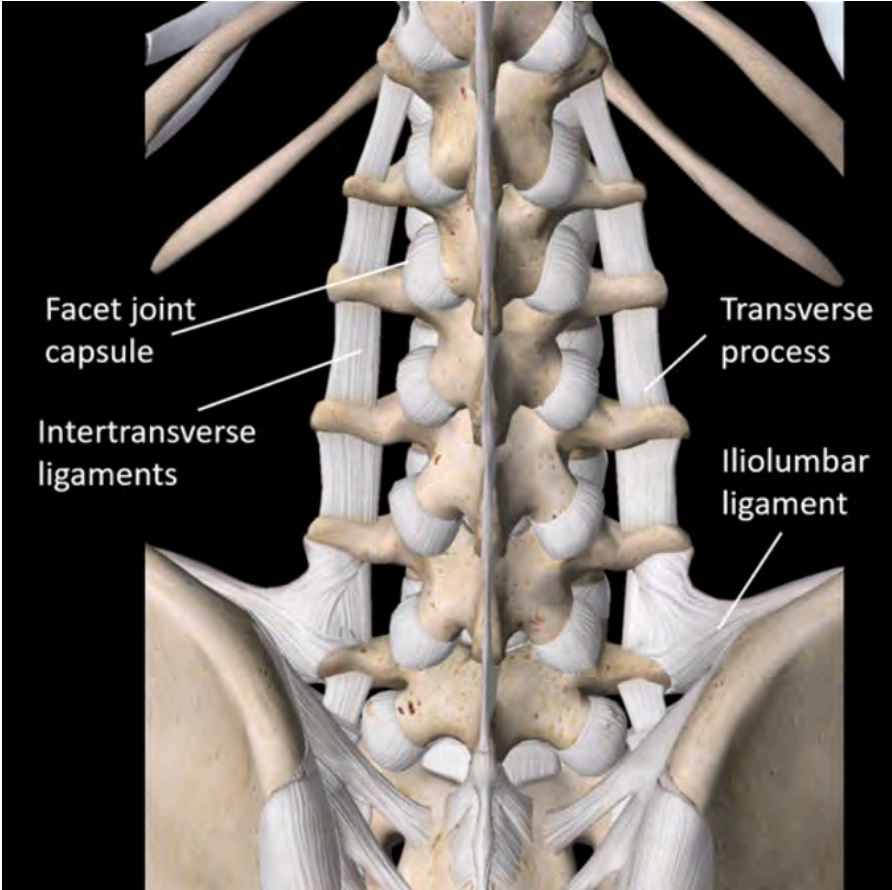
Position



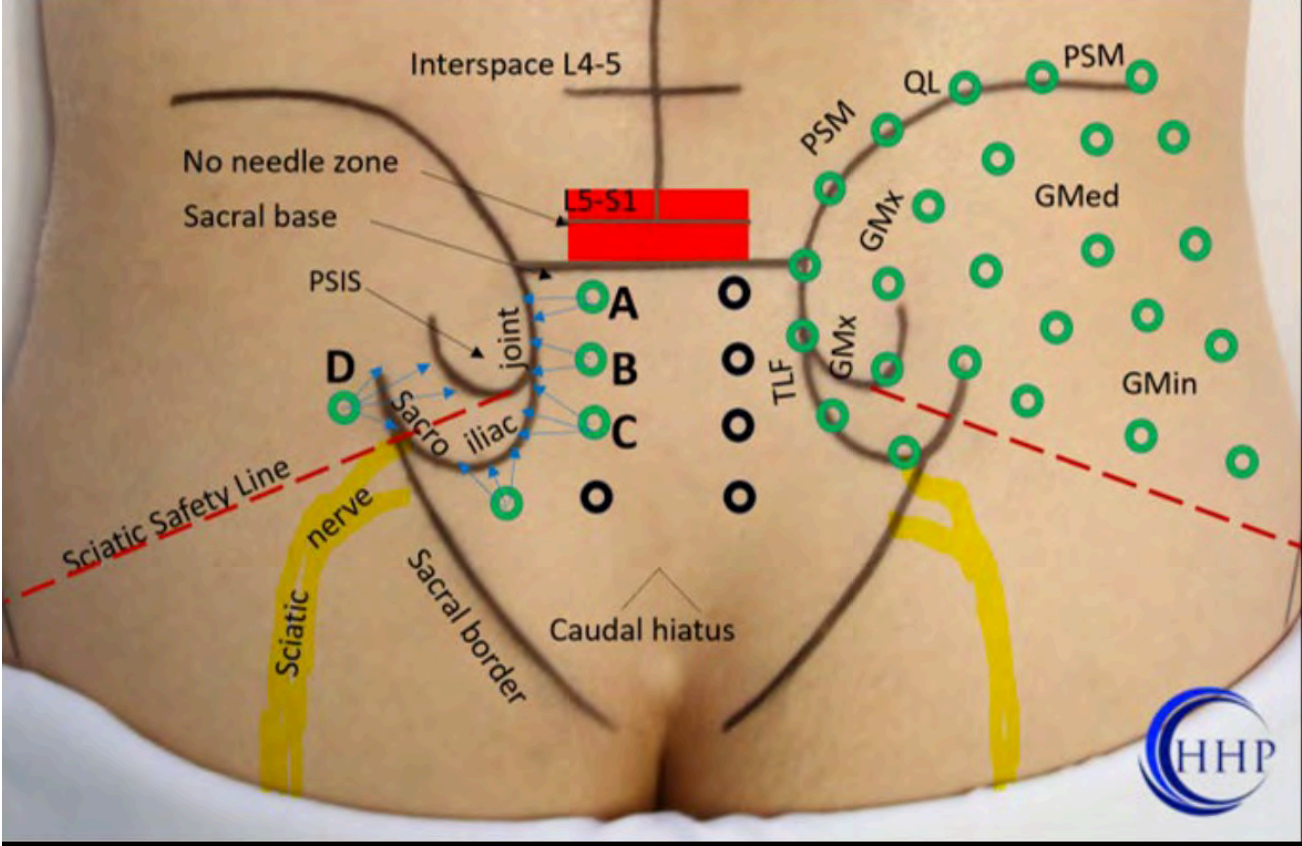
Palpation



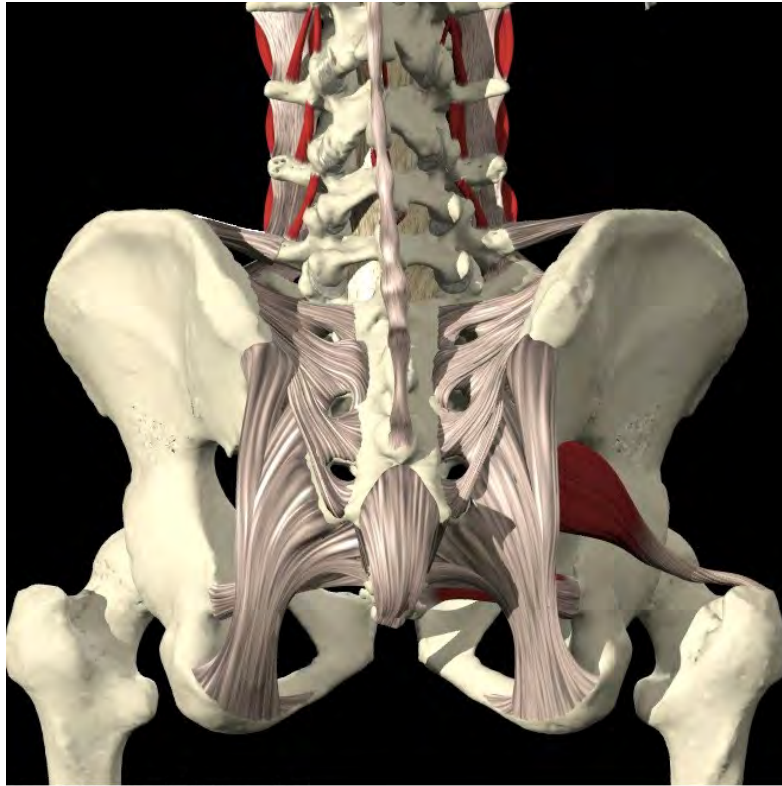
Marking - Lumbar



Marking - Sacral



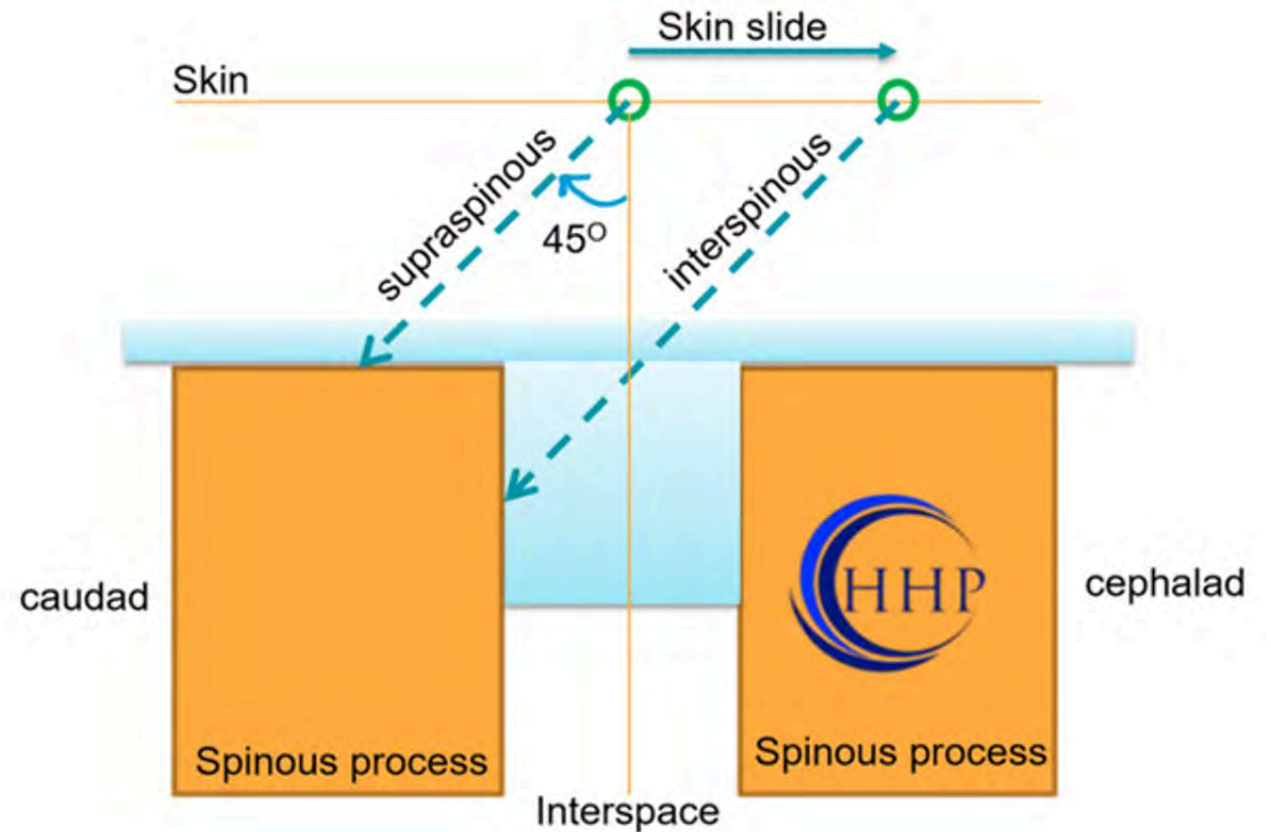
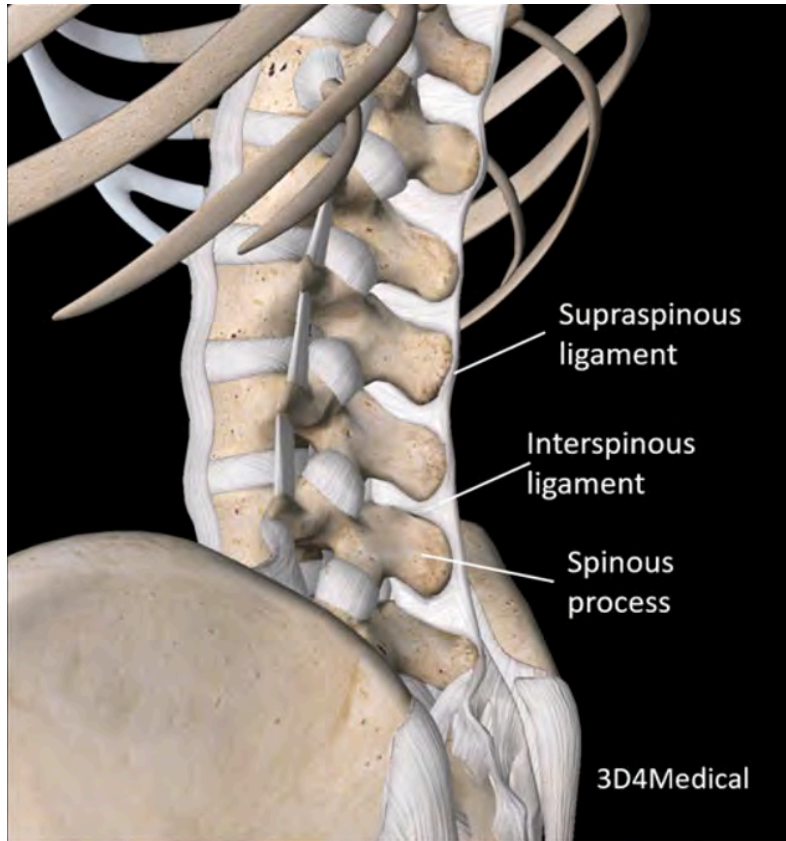
Injections



© 2003 Primal Pictures Ltd.



Technique Example – Skin Slide



Treatment Course

- Average trial: 3 treatments, 2-6 weeks apart
- Medications
 - No NSAIDS or corticosteroids
 - Use acetaminophen, other non-NSAIDS prn
- Post-injection
 - Soreness 2-4 days
 - Gradual rehabilitation

Safety

- Standard precautions
 - Hand hygiene, PPE
- Needle safety
 - No recapping, sharps disposal
- Skin prep
 - Extra-articular: 70% isopropyl alcohol
 - Intra-articular: chlorhexidine-alcohol
- Post-exposure plan
 - Test source and exposed persons
 - HIV, HCV, HBV
 - Consider HIV PEP – 3-drug regimen started in 1-2 hours

Risks

- Generally safe
- Infection rare @ 1:50,000 (dextrose is bacteriostatic)
- Needle induced trauma
- Allergic reactions

Contraindications

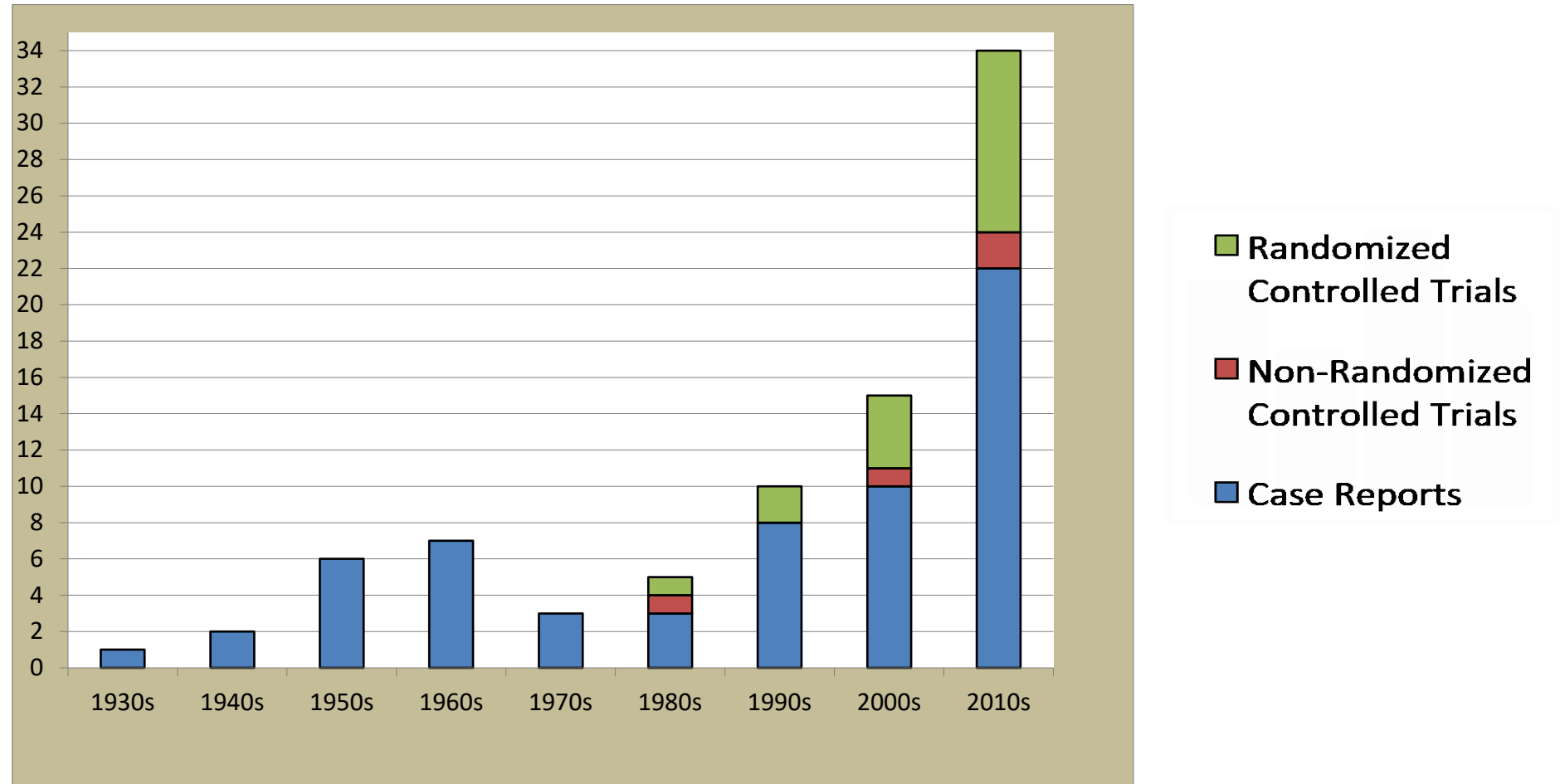
- Acute infection or inflammatory disease
- Acute non-reduced subluxations, dislocations, fractures
- Allergies to solution(s)
- Prosthetic joints
- Relative Contraindications
 - NSAIDs within 48 hours
 - Local injection or systemic corticosteroids within 2 weeks
 - Anticoagulation w/high INR
 - Cancer



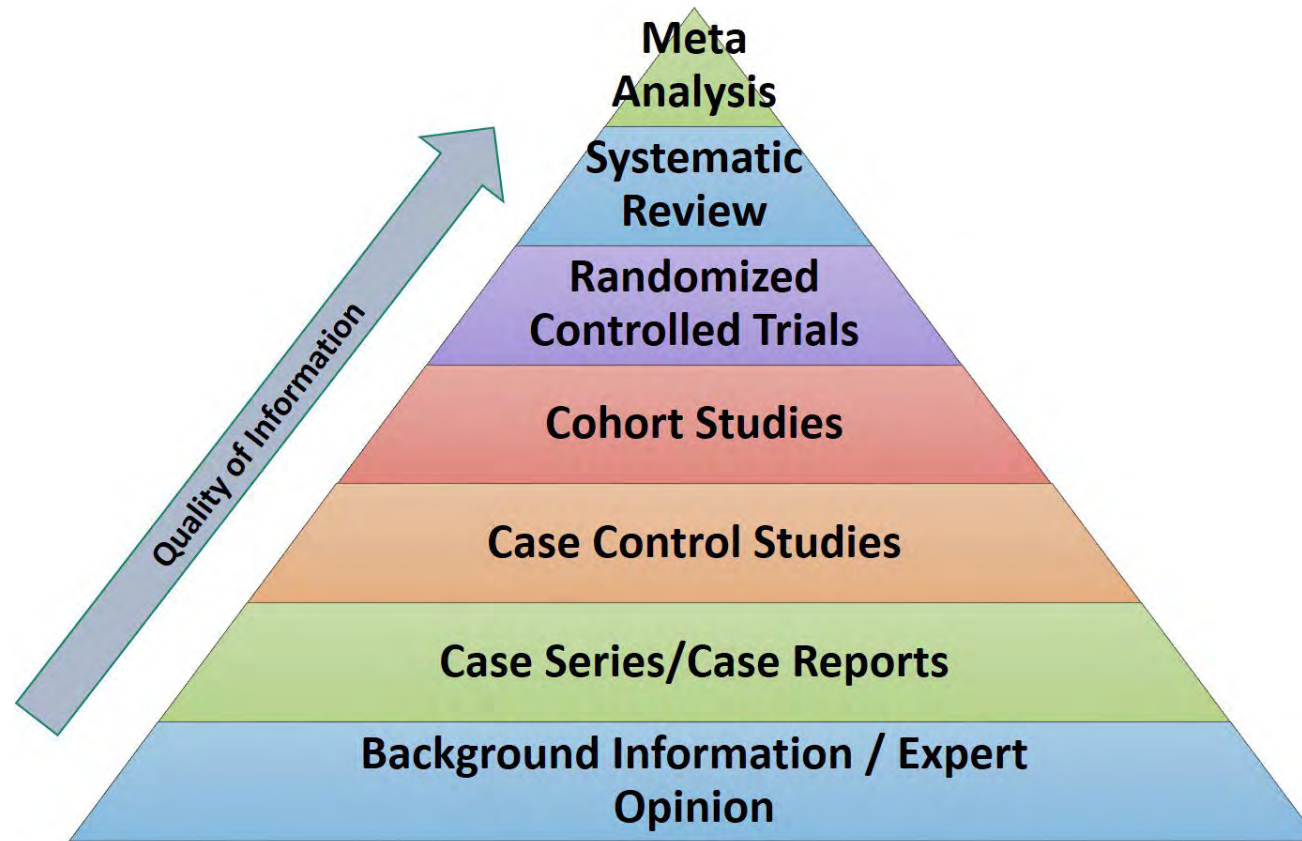
Research



Prolotherapy Research Publications by Decade



Strength of Evidence



Research

- Rábago et al, CJSM, 2005
 - Systematic review
 - >3609 patients, 12-88 years old
 - Pain from months to decades, refractory to multiple prior interventions
 - Multitude of diagnoses, e.g., cervical pain, LBP, elbow, shoulder
- Conclusions
 - General clinical success in all studies ranging from 51-82%
 - Minimal adverse events from injections
 - Mixed quality, potential for bias but overall positive outcomes

Prolotherapy for Knee Osteoarthritis

Dextrose prolotherapy for knee osteoarthritis: a randomized controlled trial.

Ann Fam Med. 2013; 11(3):229-37 (ISSN: 1544-1717)

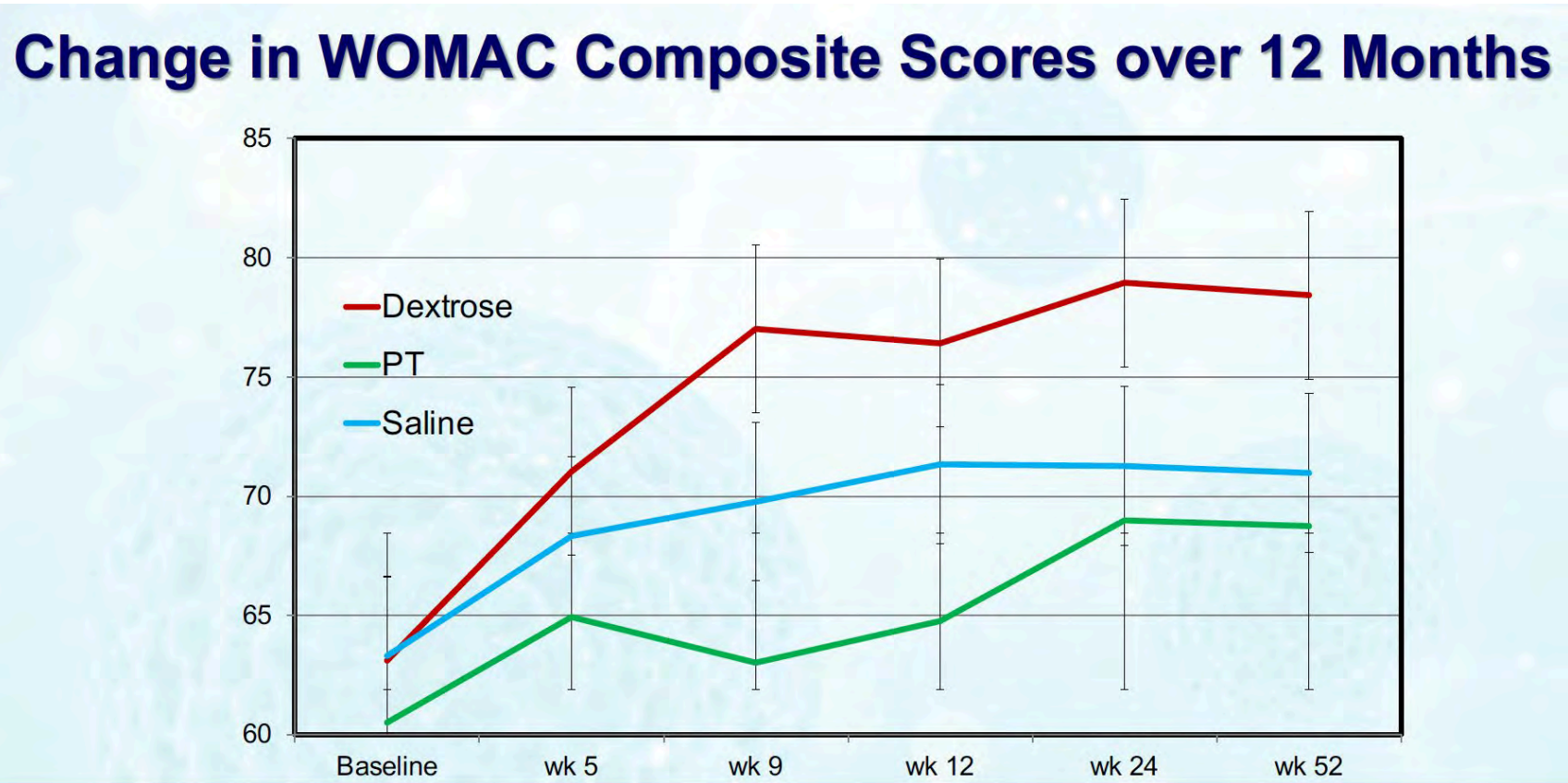
Rabago D; Patterson JJ; Mundt M; Kijowski R; Grettie J; Segal NA; Zgierska A



Design and Outcome Measure

- Double-blind RCT
- 3 Groups – statistically similar demographics
 1. Injection: Prolotherapy
 2. Injection: Saline control
 3. At-home exercise
- Western Ontario and McMaster University Osteoarthritis Index (WOMAC)
 - Pain, stiffness, function

Results: Rábago et al



Results: Rábago et al

- 15.3 point average improvement from baseline in prolo group
- Safe, well tolerated, high satisfaction
- **“Prolotherapy resulted in clinically meaningful sustained improvement of pain, function, and stiffness scores for knee osteoarthritis compared with blinded saline injections and at-home exercises.”**
- **Dextrose is doing part of the work**

Prolotherapy for Low Back Pain

- Yelland M, et al. Prolotherapy injections, saline injections, and exercises for chronic low back pain: a randomized trial. *Spine*. 2004;29(1):9-16
- 110 subjects over 14 years
- Dextrose vs. saline w and w/o exercise PT
- Outcomes: pain, disability, 50% pain reduction

Results: Yelland et al

Results at 12 months by Injection Group

	<u>Pain</u> 50% Improvement	<u>Disability</u> 50% Improvement
Dextrose/ Lidocaine	46%	42%
Saline	36%	32%

Conclusions: Yelland et al.

- Saline control and dextrose injection subjects both improved
- Safe, satisfactory to patients
- Illustrates methodological challenge of saline or other injection controls: they are active therapy!
- Clinical trial evidence for the efficacy of prolotherapy for low back pain is substantial but is less strong than for knee osteoarthritis.

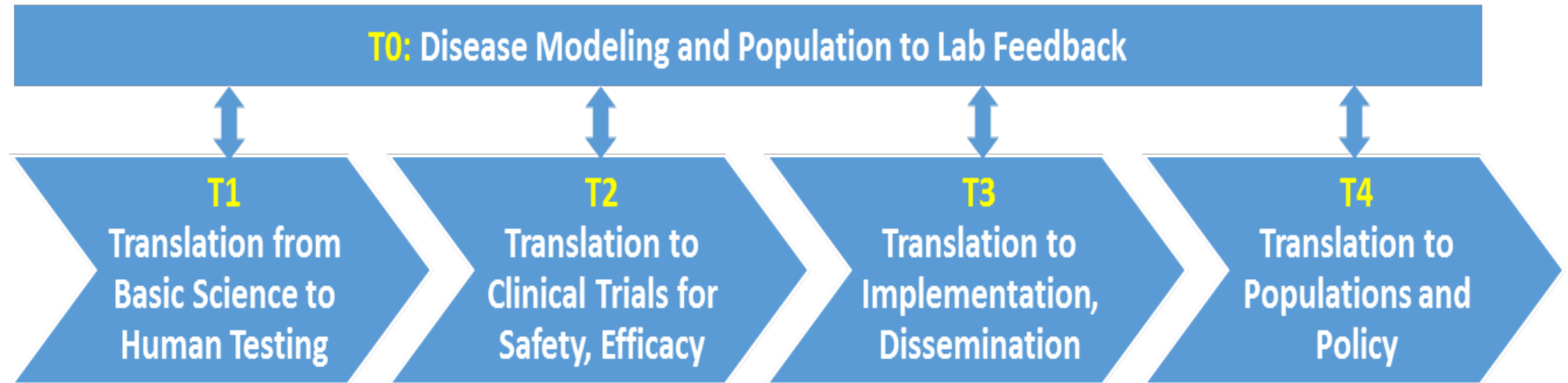
MacNeal Family Medicine QA

- Prolotherapy in a Family Medicine Clinic: A Quality Assessment Study
 - Brian Ralston, MD
 - Joe Crisman, MD
 - David Rábago, MD
- Assess the feasibility of including prolotherapy in a primary care practice
- Evaluate whether prolotherapy will reduce pain and improve function
- Evaluate whether prolotherapy is acceptable and satisfying to patients

Purpose of QI Project – Why do this?

- Important to measure what we do
 - e.g., HTN management – how many patients reach BP goal?
- Stakeholders need to know whether prolotherapy works
 - Patients
 - Colleagues
 - Payers
- Demonstrates how to bridge research and applied knowledge
- Implementation of a good idea: Translation to care

Translational Medical Research



MacNeal Hospital

- 374 licensed beds
- ~13,000 annual discharges
- ~48,000 annual ED visits



MacNeal Family Medicine Residency



Privileges

- Created qualifications to practice prolotherapy
 - Completion of training course
 - Five supervised procedures by a provider with privileges
 - Case log of 20 cases per 2-year period to maintain
- Reviewed and approved at MacNeal Hospital
 - Credentials Committee
 - Medical Executive Committee (MEC)
 - Added as special privilege to Ambulatory Family Medicine “Privilege Card”

Operational Considerations

- Scheduling
- Coding and Billing
- Supplies
- Documentation



Scheduling

- “Prolotherapy Clinic” ½ day per week
- Reserved appointments for prolotherapy
- Unfilled appointments open to other patients



Coding and Billing

- 1st appointment for evaluation (E&M coding)
- Treatment appointments: self-pay, collected before visit
- Treatment categories
 - Small: hand/wrist, elbow, ankle/foot
 - Large: spine, shoulder hip/pelvis, knee



Coding and Billing

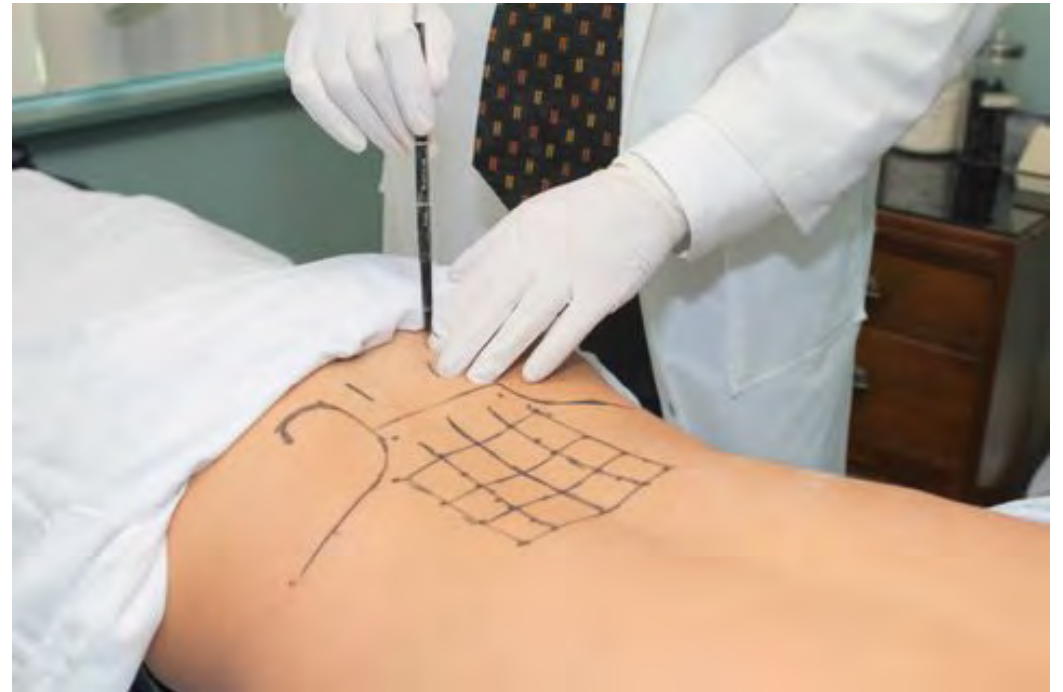
- RVU (Relative Value Units)
 - Prolotherapy “small” = 1.7
 - Prolotherapy “large” = 2.9
 - Comparisons:
 - 99214 visit (est. patient, moderate) = 1.5 RVU
 - 20610 (injection, large joint) = 0.79 RVU

Supplies



Methods

- Record average + highest pain score before treatment (0-10)
- Consent (procedure and QI project)
- Treatment protocol
 - IART procedural guide, clinical judgment
 - Record solution volumes and locations injected
- Total # of treatments per condition variable



Results: Acceptance of Therapy

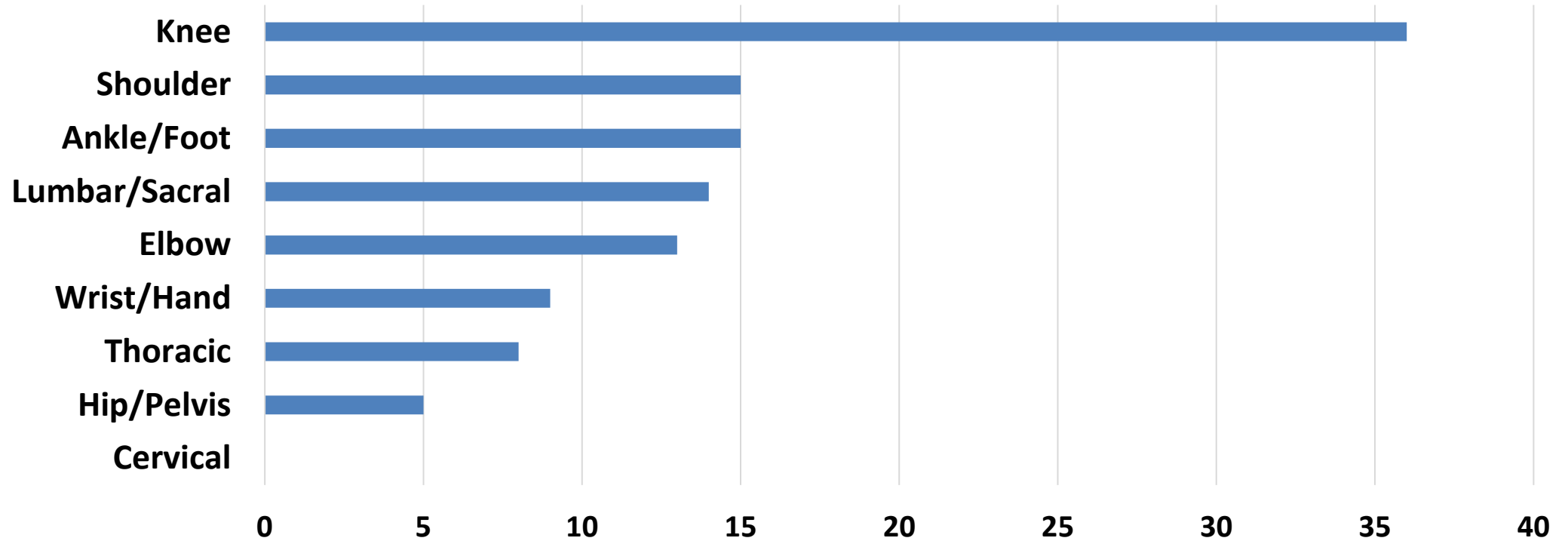
- Number of patients offered: 61
- Number of patients treated: 36
- **Acceptance: 59%**
- Limitation: unclear denominator (underreporting of patients offered Tx)

Treatment Statistics

- Number of patients treated: 36
- Average patient age: 59 (range 38 – 88)
- Sex ratio
 - 45% Male
 - 55% Female
- Total number of treatments: 115
- Average number of treatments per patient: 3.2 (range 1-10)

Body Areas Treated

Number of Treatments (Total = 115)



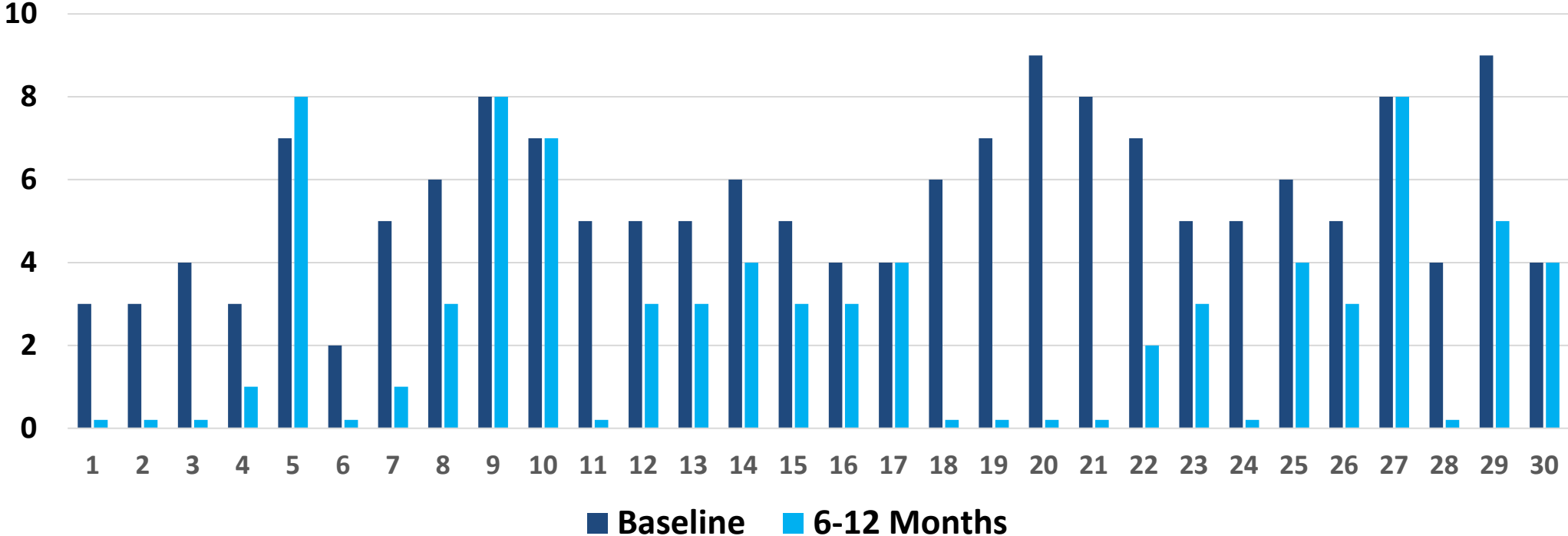
Interim Results: Outcomes Assessment

- 18 patients completed survey
- Data
 - **Pain Score (0-10)**
 - **Improvement Score**
 - **Satisfaction Score**
 - **Willingness to Recommend Score**



Interim Results: Pain (0–10)

Pain – Baseline and 6-12 Months Post Treatment



Interim Results: Average Pain Scores

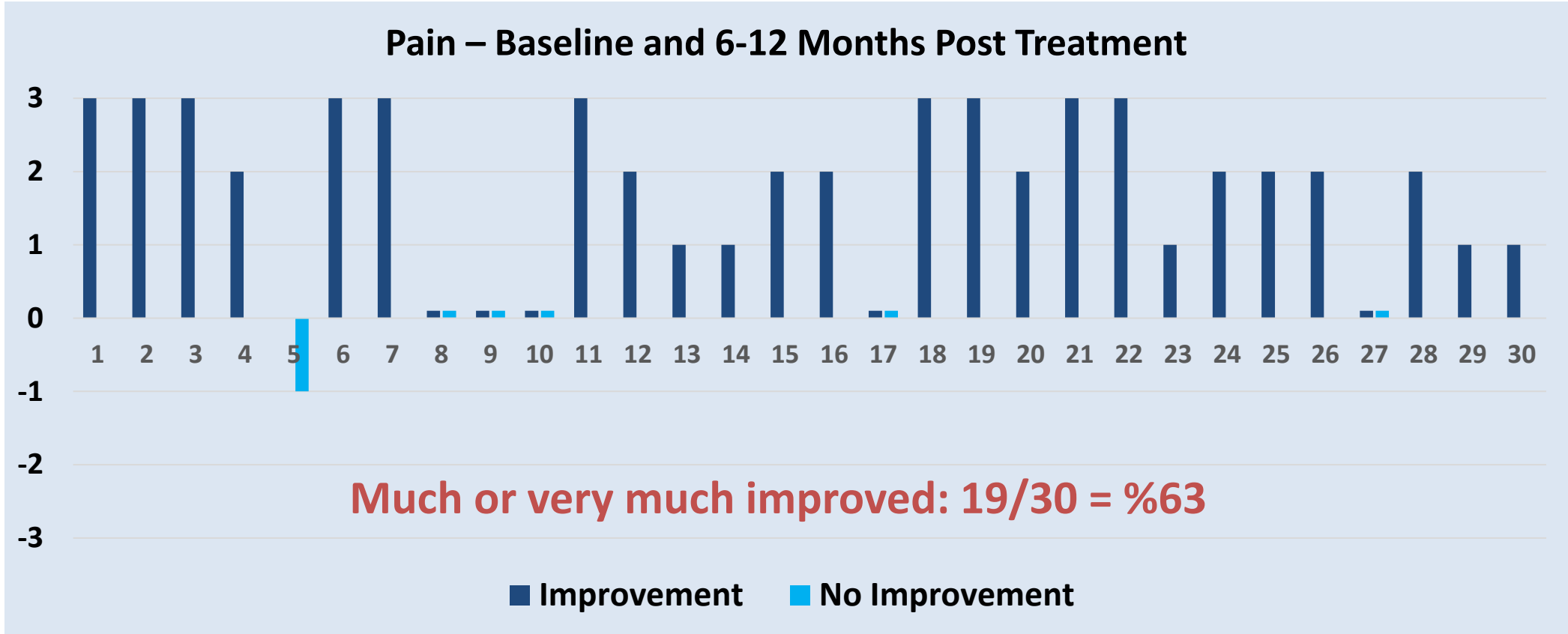
- Average pain (30 patients, 0-10 scale)
 - Before treatment: 5.5
 - After treatment 6-12 months: 2.6
- **Pain difference: 2.9**
- Minimum Clinically Important Difference (MCID)
 - Used to interpret the relevance of treatment effects
 - For pain, 1.5-2 considered meaningful and beneficial

Interim Results: Overall Improvement - 7-Point Scale

- +3: very much improved
- +2: much improved
- +1: minimally improved
- 0: no change
- -1: minimally worse
- -2: much worse
- -3: very much worse



Interim Results: Improvement

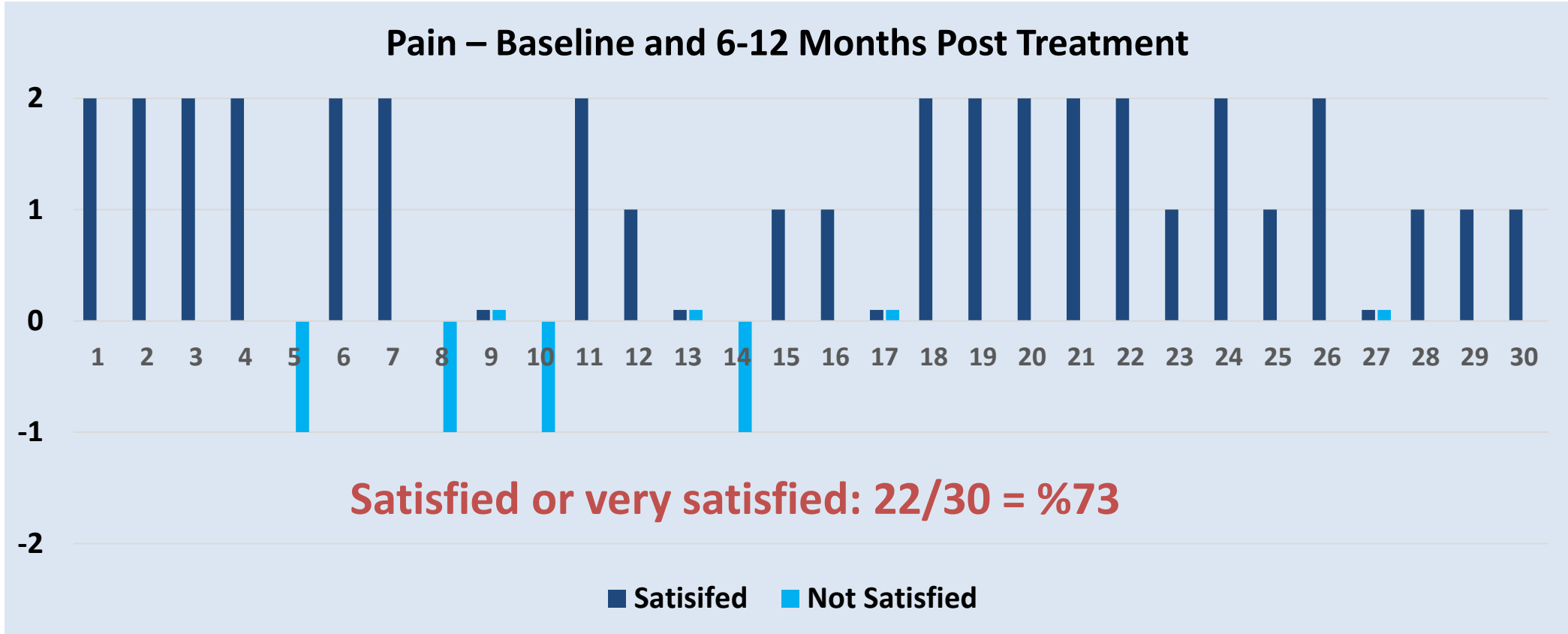


Interim Results: Satisfaction – 5-Point Scale

- +2: very satisfied
- +1: satisfied
- 0: neutral
- -1: unsatisfied
- -2: very unsatisfied



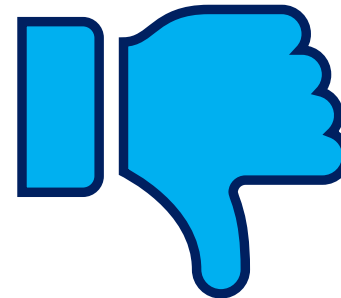
Interim Results: Satisfaction



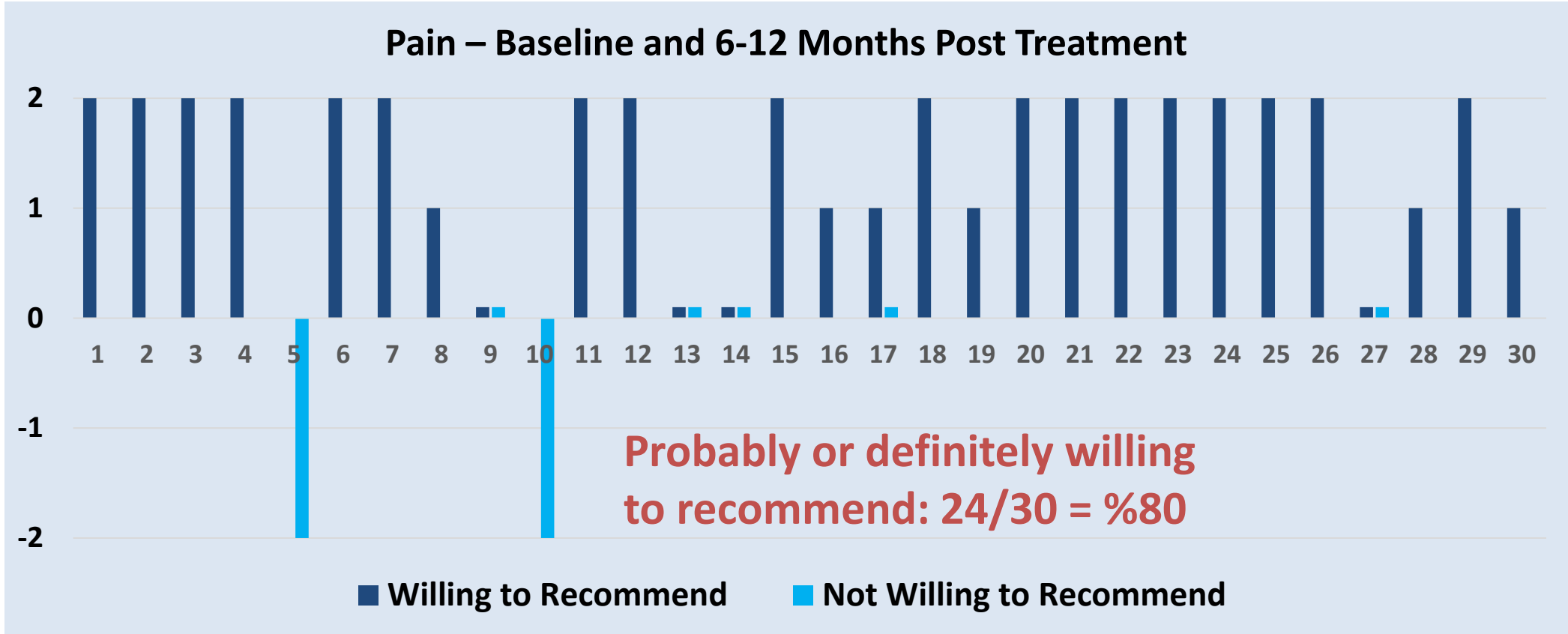
Interim Results:

Willingness to Recommend: 5-Pt Scale

- +2: definitely yes
- +1: probably yes
- 0: neutral
- -1: probably no
- -2: definitely no



Interim Results: Satisfaction



QI Study Conclusions

- Feasible to integrate prolotherapy into primary care practice
- Initial results from this QI project indicate
 - Acceptance of the therapy by the institution and patients
 - Clinical effectiveness based on pain reduction and overall improvement
 - High patient satisfaction, strong willingness to recommend
- Interim data suggests prolotherapy is acceptable and effective in primary care

HHPF Service-Learning Trips



HACKETT HEMWALL PATTERSON
FOUNDATION



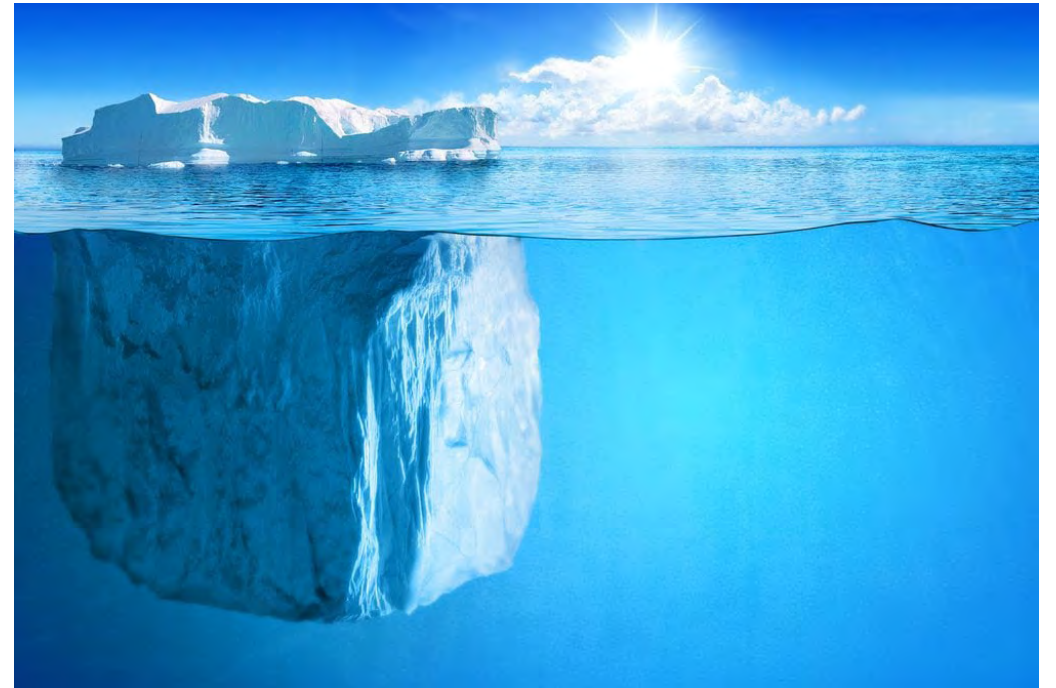






Summary

- Prolotherapy is a safe, effective treatment option for MSK injuries and chronic pain
- Cost-effective, non-opioid, non-surgical
- Increasing use and research in MSK



Thank you!

Saturday, December 14, 2024

2024 WINTER SCIENTIFIC SEMINAR

December 12-15, 2024

The Westin, Chicago-Lombard, IL



Introduction To The Clinical Application Of Functional Pathology Of The Musculoskeletal System (FPMSS)

Illinois Osteopathic Medical Society 2024 Winter Scientific Seminar

M. SHANE PATTERSON DO

Director Of Osteopathic Education Henry Ford Wyandotte and Henry Ford Macomb Hospitals

Private Practice

Osteopathic Health Care Associates

Utica, Mi

OHCMEDICINE.COM

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Disclosure

- This Lecture is based on Dr. William Brook's lifetime of accumulated intellectual knowledge as well as my personal clinical approaches to FPMSS
- Dr. Brooks has been a mentor to me for the past 25 years
- I Served as a table trainer in his most recent Seminar in Tucson Arizona in August and September of this year

William Brooks, DO

Dr William Brooks began his practice in 1981 devoted to Osteopathic Manipulative Medicine (OMM) alongside Robert Fulford, DO, his primary professional mentor. Since then, he has continued to refine his creative work: the ***"Functional Pathology of the Musculoskeletal System"*** (FPMSS) paradigm. In both private practice and academic settings, Dr. Brooks' clinical foci have been caring for patients with multiregional, chronic, tertiary MSS pain syndromes including headache as well patients with persistent post-concussion syndrome and children with developmental delays.

- Doctor of Osteopathy, Chicago College of Osteopathic Medicine, Chicago, IL 1980; Psychiatry Fellowship 1997-1980
- Internship, Tucson General Hospital, Tucson, AZ 1980-1981
- Osteopathic Manipulative Medicine; American Osteopathic Board of Neuromusculoskeletal Medicine, 1991
-

M. Shane Patterson, DO

Dr M. Shane Patterson is a Board Certified Internist and is fellowship trained in OMT. Since 2003 he has been providing comprehensive primary care including MS pain management utilizing OMM based on the FPMSS paradigm at Osteopathic Health Care Associates which he is founder and CEO. His patient population includes patients with multi-regional, chronic, tertiary musculoskeletal pain syndromes including headache, Long COVID, post concussive syndrome and other acute and chronic pain symptoms. He regularly mentors Henry Fords' Osteopathic Medical Students and Residents in OMM.

- Doctor of Osteopathy, Kansas City University College of Osteopathic Medicine, Kansas City, MO 1998; Osteopathic Principles and Practice Fellowship 1997-1998
- Internship, Bi-County Community Hospital/Henry Ford Hospitals, Warren MI 1998-1999
- Family Medicine, Saint John West Shore Hospital, Westlake, OH 1999-2000
- Internal Medicine, Bi-County Community Hospital/Henry Ford Hospitals, Warren MI 2000-2002; American Osteopathic Board of Internal Medicine, Board Certified 2008
-

Goals of FPMSS

- Improve efficiency of diagnosis and treatment
- Improve intra and inter examiner reliability
- Improve objectivity of documentation
- Improve communication between professionals
- More accurately identify dysfunctional motion patterns
- Provide improved rationale for why patients have chronic pain

Critique and Revision of Historical Definition of “Somatic Dysfunction

“**somatic dysfunction. *Inefficient function*** (posture and movement) of the musculoskeletal system and related vascular, lymphatic and neural systems. It is characterized by disproportionately restricted range of available mobility and motility in relation to proportionate whole system potential motion and further characterized as distorted posture resulting from disproportionate motion. “It is treatable using”

Restorative Care

Restorative care of a musculoskeletal pain complaint is directed toward restoring *capacity* to the musculoskeletal *SYSTEM* (improving the functional biomechanical *context* in which symptoms persist or recur), whether there is reversible or irreversible structural pathology as the proximate cause of the pain.



Primary features of FPMSS

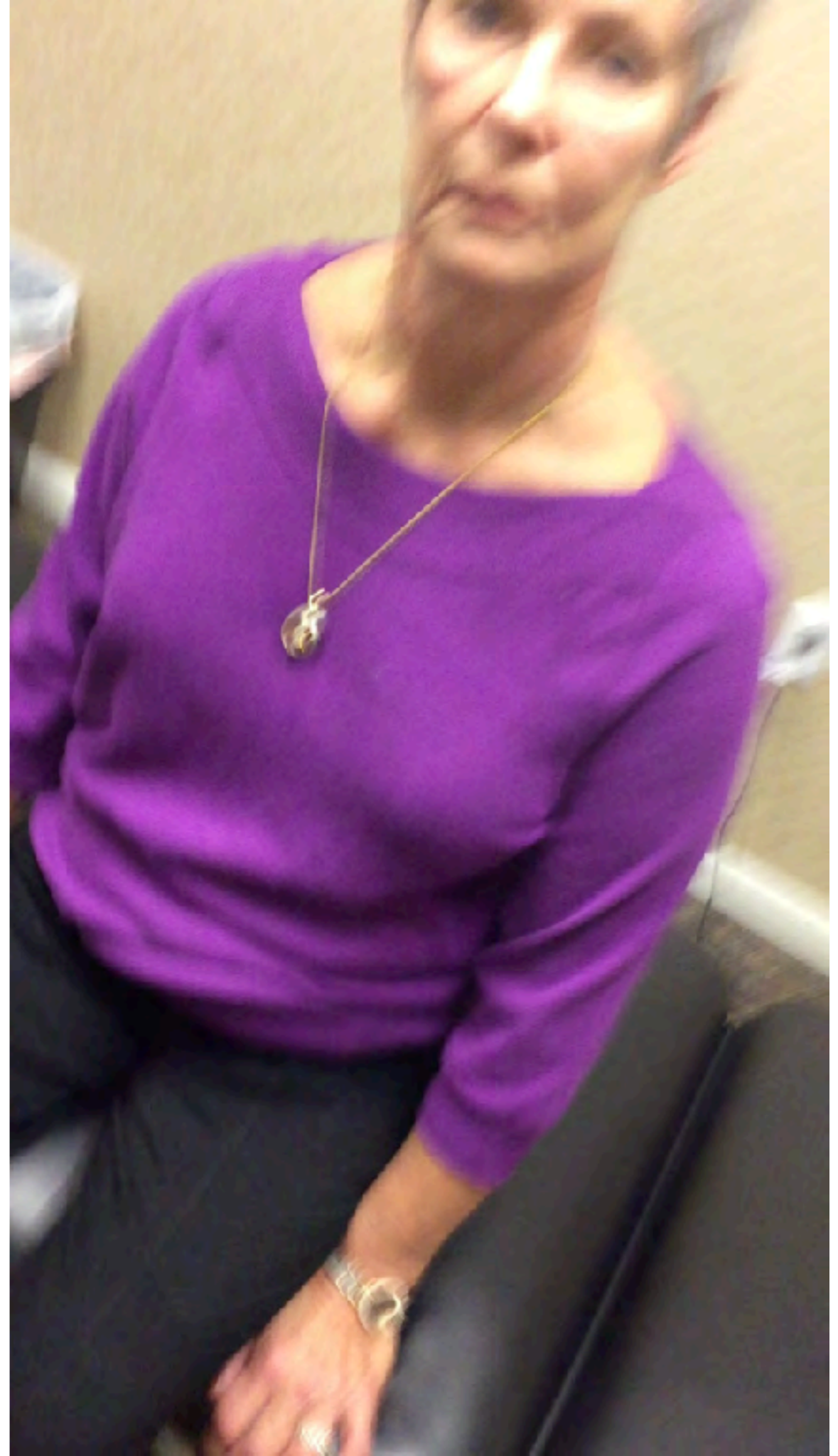
- Integrated Concept
 - Treats the MSS as a cohesive system and NOT isolated structures
- Differentiates Functional Pathology vs Structural Pathology
 - Inefficient function (negative static imaging) vs distorted anatomy (positive static imaging)
- Movement-Centric Assessment
 - Shifts focus to whole body dynamic movement analysis from static postural and alignment analysis
- Motion profiling
 - Introduces the concept of documentable motion phenotypes which enables personalized biomechanical treatment strategies

FPMSS VS “Postural Structural Diagnostic Model?”

- Physiology cannot be validly inferred from anatomy
 - Function can NOT be understood by merely understanding structure
- Functional pathology cannot be validly inferred from physiology
 - Malfunction can NOT be understood by merely understanding function

FPMSS VS “Postural Structural Diagnostic Model?”

- Motion loss cannot be validly inferred from positional changes
- Active motion testing cannot validly evaluate the potential ROM
- Motion loss in one direction cannot be validly inferred from motion changes in other directions



SEATED:

GROSS POSTURE: -2 ROM -50% THORACIC REGION, TENSE, BILATERALLY, LUMBAR REGION, TENSE, BILATERALLY

SEATED TWIST LEFT: -1 ROM -25%

SEAT TWIST RIGHT: -1 ROM -25%

KNEES: -

ROTATION RIGHT: -2 ROM -50%

ROTATION LEFT: -2 ROM -50%

FEET: -

DORSI FLEX LEFT: -2 ROM -50%

PLANTAR FLEX LEFT: -1 ROM -25%

MID LEFT: -2 ROM -50%

DORSI FLEX RIGHT: -2 ROM -50%

PLANTAR FLEX RIGHT -1 ROM -25%

MID RIGHT -2 ROM -50%

ANKLES: -

EVERSION LEFT: -2 ROM -50%

INVERSION LEFT: -1 ROM -25%

EVERSION RIGHT -2 ROM -50%

INVERSION RIGHT -1 ROM -25%

SUPINE:

KNEES: -

LAT GLIDE LEFT: -1 ROM -25%

LAT GUIDE RIGHT: -1 ROM -25%

BACK BENDING LEFT: -2 ROM -50%

BACK BENDING RIGHT: -2 ROM -50%

HIPS: -

KNEE-CHEST LEFT: -2 ROM -50%

KNEE- CHEST RIGHT: -2 ROM -50%

EXT ROT LEFT: -1 ROM -25%

EXT ROT RIGHT: -1 ROM -25%

INT ROT LEFT: -2 ROM -50%

INT ROT RIGHT: -2 ROM -50%

SUPINE:

KNEES: -

LAT GLIDE LEFT: -1 ROM -25%

LAT GUIDE RIGHT: -1 ROM -25%

BACK BENDING LEFT: -2 ROM -50%

BACK BENDING RIGHT: -2 ROM -50%

HIPS: -

KNEE-CHEST LEFT: -2 ROM -50%

KNEE- CHEST RIGHT: -2 ROM -50%

EXT ROT LEFT: -1 ROM -25%

EXT ROT RIGHT: -1 ROM -25%

INT ROT LEFT: -2 ROM -50%

INT ROT RIGHT: -2 ROM -50%

ADDUCT LEFT: -2 ROM -50%

ADDUCT RIGHT: -2 ROM -50%

ABDUCT LEFT: -1 ROM -25%

ABDUCT RIGHT: -1 ROM -25%

PRONE:

NEUTRAL: -

THORAX PSM: TIGHT LT RT

LUMB PSM: TIGHT LT RT

SACRUM -3 ROM -75%

BACK BENDING: -

THORAX -2 ROM -50%

LUMBAR: -2 ROM -50%

SACRUM: -2 ROM -50%

SCAP RIGHT -2 ROM -50%

SCAP LEFT: -2 ROM -50%

BACK BEND:

HIPS LEFT: -2 ROM -50%

HIPS RIGHT -2 ROM -50%

DEFINING AVAILABLE MOTION: PRINCIPALS

- CONFINE MOTION TO SINGLE JOINT
- USE PASSIVE MOTION FROM THE EVALUATOR ONLY.
 - ACTIVE ROM EVALUATION CAN BE HELPFUL, BUT IS USUALLY NOT NECESSARY OR TIME EFFECTIVE IN THESE SETTINGS.
- USE ENOUGH PRESSURE TO MOVE TO THE ENDPOINT OF MOTION WITHOUT INVOLVING OTHER JOINTS
- SPRINGINESS OF SMALLER AND TIGHTER JOINTS IS HEAVILY SUBJECTIVE.

- A. Define the fundamental question. *“Are posture and movement efficient?”*
- B. Define the data which are necessary and sufficient to answer the fundamental question.
- C. Describe a method to collect the data such that
 1. The data is quantified.
 2. The data is reproducible.
 3. The exam can be standardized.

- D. Standardize the necessary and sufficient method and criteria to analyze the data.
- E. Demonstrate good reproducibility.
- F. It must have clinical value.

- First find the *% variance* from reference range by quadrants
 - % loss of ROM at specified joint

<SP

Starting Position (SP) -10% to +10%

-4 10% to 30%

-3 30% to 50%

-2 50% to 70%

-1 70% to 90%

Reference Range (RR) -10% to +10%

1>SP +10% to +30%

2>SP +30% to +50%



Formulate a treatment plan for restoring proportionate available motion of the whole MSS based on three stages of interpretation – grading, profiling, prioritizing

Perform the 5 (primary care) minute exam

Formulate a treatment plan for restoring proportionate available motion of the whole MSS based on three stages of interpretation – grading, profiling, prioritizing

Perform the 5 (primary care) minute exam

Systems Analysis: Proportionality

Available motion: <GP, GP, SL (-4, -3), ML (-2, -1), RP, >RP

Profiling

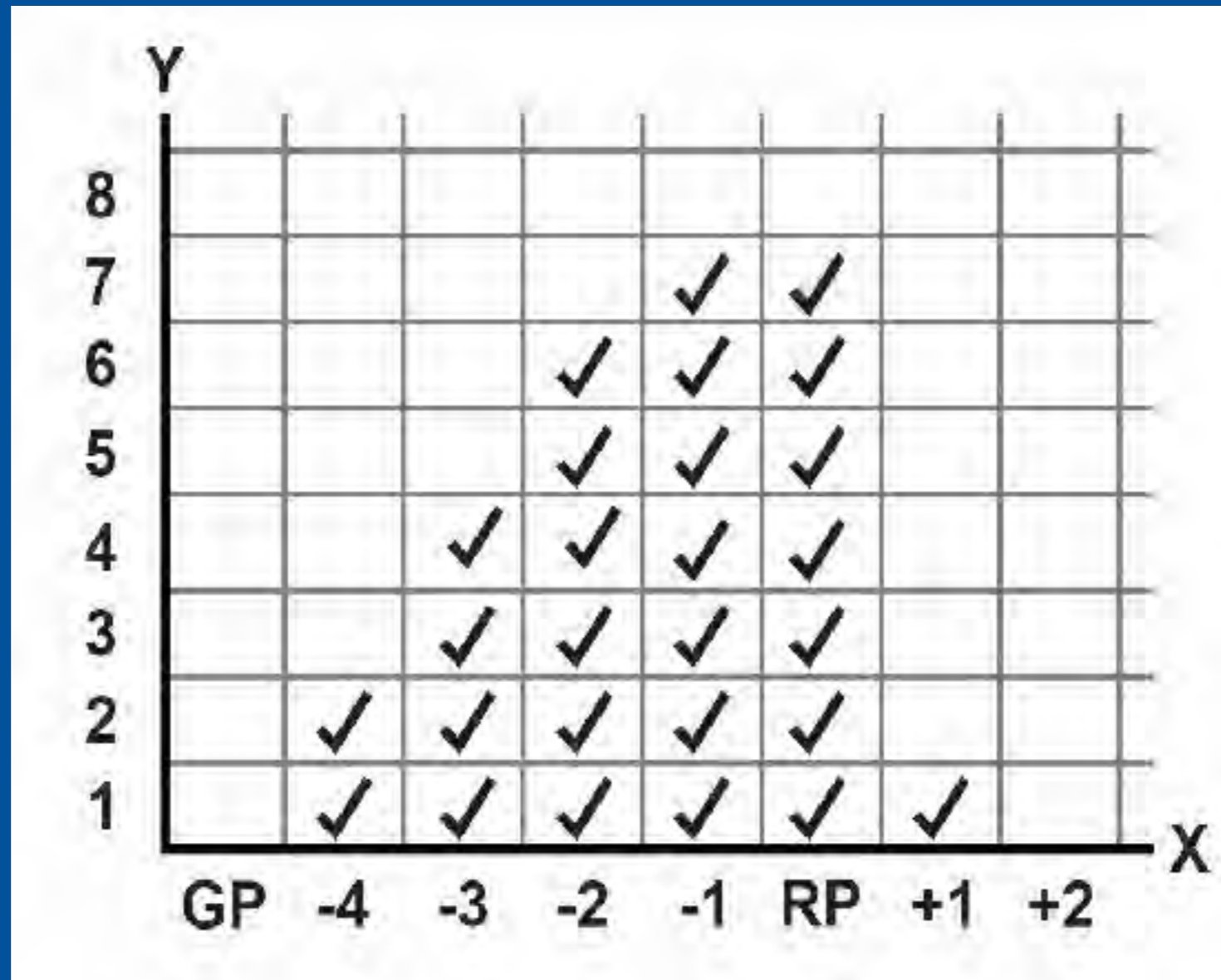
Wide variation of “healthy available motion between individuals.

What is ideal available motion for a unique individual?

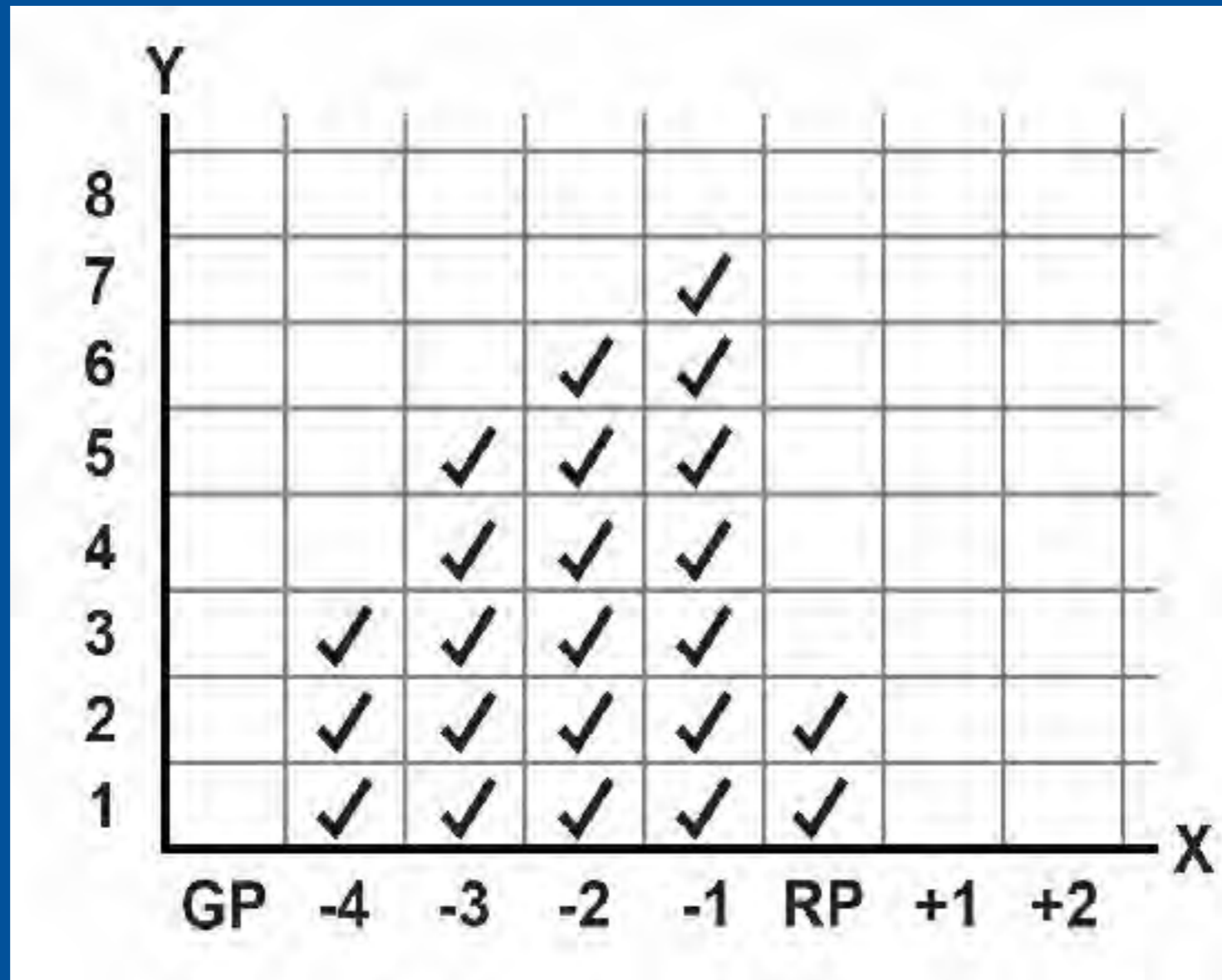
Prioritizing

What are the most severe restrictions of available motion?

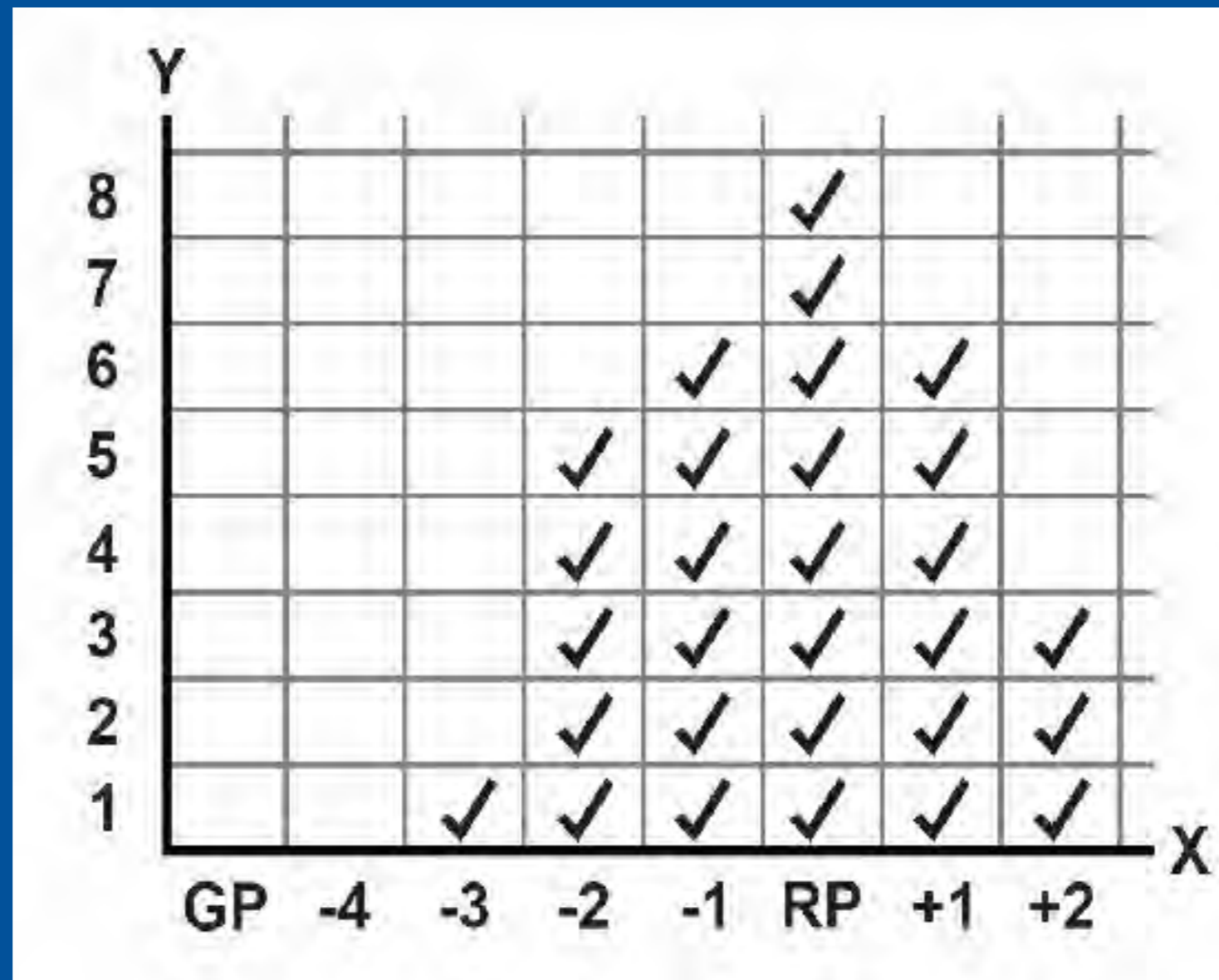
Profiling: “Common”



Profiling: “Tight”



Profiling: “Loose” (Hypermobility Syndromes)



Clinical Application: chronic MSS pain syndromes

- To “stabilize” or to “mobilize”? . . . “that is the question!”
- Mechanisms of chronic / recurrent biomechanical pain
- Maintenance vs restorative care
- General principles of restorative care
- Specific principles of restorative care: SPMSS
- Specific principles of restorative care: FPMSS





TAKE AWAY

- PAIN IS A PERCEPTION
- MS SYSTEM IS AN ORGAN SYSTEM WHICH IS INTEGRATED WITH ALL OTHER SYSTEMS IN THE BODY
- DIAGNOSTICS ARE PARAMOUNT
- PATHOLOGY AND DYSFUNCTION ARE OFTEN DIFFERENT ENTITIES
- CHECK THE WHOLE SYSTEM NO MATTER WHERE THE PATIENT SAYS THE PAIN IS LOCATED... THE PATIENT IS THE ONLY ONE WHO CAN RELATE THEIR PAIN, BUT RARELY CORRECT ABOUT WHERE THE PROBLEM IS LOCATED

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A photograph of several overturned pill bottles with white pills scattered on a dark surface. The bottles are made of clear plastic and are lying on their sides. The pills are small, white, and oval-shaped. The background is dark and textured.

SAFE OPIOID PRESCRIBING

Camille Dunkley MD, MHA, MS

DISCLOSURES

- I have no relevant financial relationships to disclose.



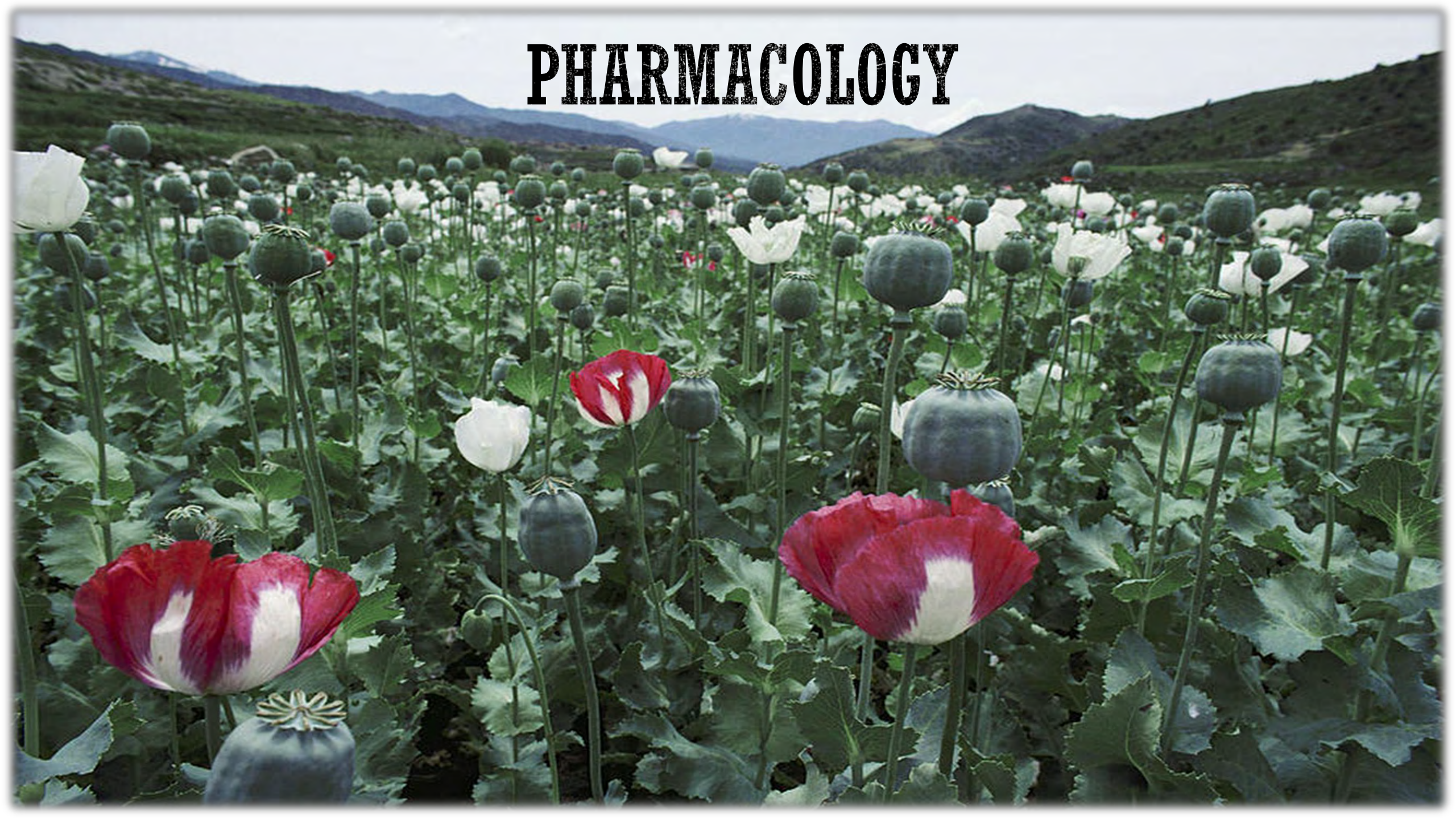
OBJECTIVES

Review
pharmacology of
opioids.

Review current
CDC safety
recommendations
for prescribing
opioid.



PHARMACOLOGY



PHARMACOLOGY

- Opioids act on three major receptors.
 - Mu (μ)
 - Kappa (κ)
 - Delta (δ)
- The individual receptors have distinct distribution patterns within the central and peripheral nervous system.



PHARMACOLOGY

- Mu (μ) receptor

Conventional Name	IUPHAR Name	Clinical Effects of Receptor Agonist
$\mu 1$	MOP1	<ul style="list-style-type: none">- Spinal analgesia- Peripheral analgesia- Sedation- Euphoria
$\mu 2$	MOP2	<ul style="list-style-type: none">- Spinal analgesia- Respiratory depression- Physical dependence- Gastrointestinal dysmotility- Pruritus- Bradycardia



PHARMACOLOGY

■ Kappa (κ) Receptor

Conventional Name	IUPHAR Name	Clinical Effects of Receptor Agonist
K1	KOP1	- Spinal analgesia - Miosis
K2	KOP2	- Psychotomimetic - Dysphoria
K3	KOP3	- Supraspinal analgesia



PHARMACOLOGY

- Delta (δ) receptor

Conventional Name	IUPHAR Name	Clinical Effects of Receptor Agonist
δ	DOP	<ul style="list-style-type: none">- Spinal analgesia- Modulation of μ-receptor function

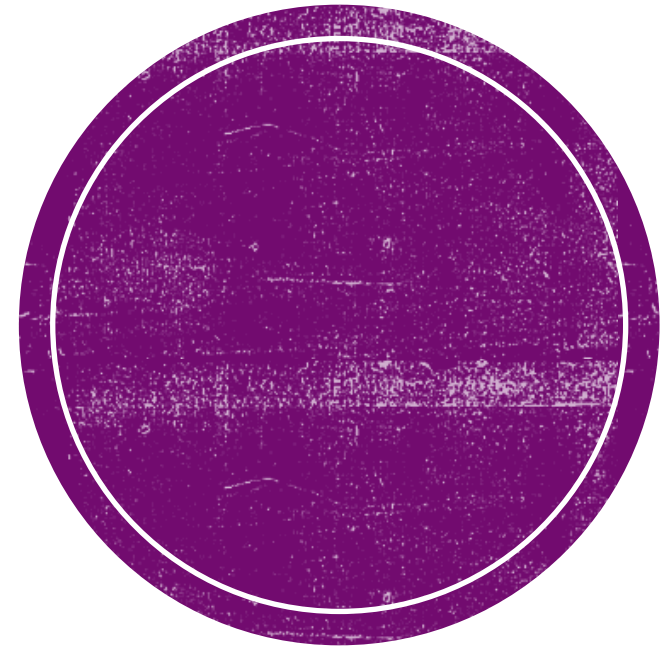


CLINICAL EFFECTS OF OPIOIDS

Cardiovascular	Bradycardia, vasodilation
Dermatological	Flushing, pruritus
Endocrinology	Reduced ADH and gonadotrophin release
Gastrointestinal	Increased biliary tract pressure, reduced gastric acid secretion and motility
Neurological	Analgesia, antitussive, euphoria, sedation, coma, seizures
Ophthalmic	Miosis
Pulmonary	ARDS, Bronchospasm



CDC RECOMMENDATIONS



RECOMMENDATION 1

- **Nonopioid therapies are at least as effective as opioids for many common types of acute pain.**
 - Neck and low back pain
 - Musculoskeletal injuries (sprains, strains, bursitis)
 - Mild postoperative pain (e.g., simple dental extraction),
 - Dental pain
 - Kidney stone pain
 - Headaches including episodic migraine



RECOMMENDATION 1

- **Clinicians should maximize use of nonpharmacologic and nonopioid pharmacologic therapies.**
 - Topical or oral NSAIDs
 - Acetaminophen
 - Ice or heat
 - Elevation, rest, immobilization
 - Exercise therapies



RECOMMENDATION 1

- **Consider opioid therapy for acute pain if benefits outweigh risks. Opioids have an important role for acute pain related to:**
 - Severe traumatic injuries (crush and burns injuries)
 - Moderate to severe postoperative pain
 - Severe acute pain when NSAIDs and other therapies are contraindicated or ineffective.



RECOMMENDATION 2

- **Nonopioid therapies are preferred for subacute and chronic pain and before starting opioid therapy for subacute or chronic pain, clinicians should discuss the benefits and risks.**
 - Providers should work with patients to treatment goals for pain and function.
 - Providers should review how opioid therapy will be discontinued if benefits do not outweigh risks.

Treatment Plan

Enter Practice Name Here Therapist Name, Credentials Here Date of Plan: _____
Patient Name: _____ Date of Birth: _____

Diagnosis

Code: _____ Description: _____
Code: _____ Description: _____

Presenting Problem

Treatment Goals Estimated Completion: _____

Objective #1 Estimated Completion: _____

Treatment Interventions: _____

Objective #2 Estimated Completion: _____

Treatment Interventions: _____

Objective #3 Estimated Completion: _____

Treatment Interventions: _____

Objective #4 Estimated Completion: _____

Treatment Interventions: _____

Treatment

Prescribed Frequency of Treatment: _____

Treatment Modality: Individual Family Marriage/Relationship

Referral for Additional Services: No Yes:

I declare that these clinical services are delivered in accordance with medical necessity and are appropriate to the patient's diagnosis and needs.

I declare this information is accurate and complete.

Therapist's Signature: _____ Date: _____

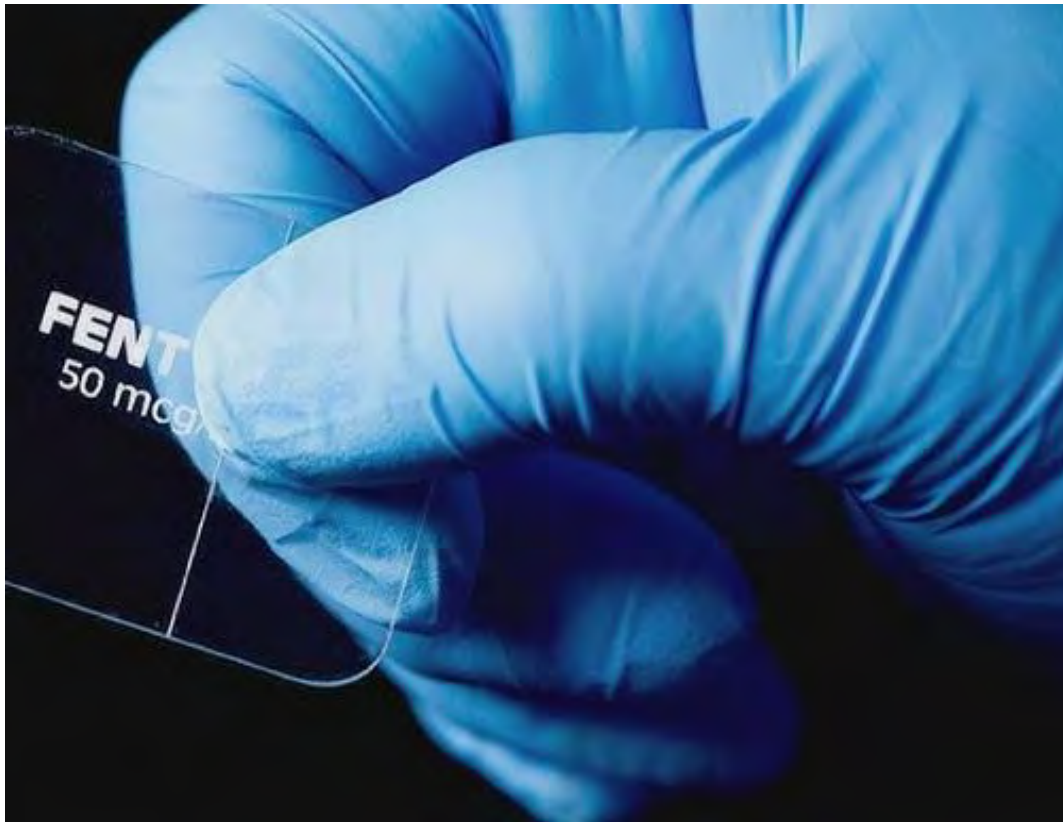


RECOMMENDATION 3

- **When starting opioid therapy for acute, subacute, or chronic pain, clinicians should prescribe immediate-release opioids instead of extended-release and long-acting (ER/LA) opioids.**
 - Providers should not prescribe ER/LA opioids for intermittent/PRN use.
 - ER/LA opioids should be set aside for severe and constant pain.
 - Providers should be aware of the potential for incomplete opioid cross-tolerance when transitioning to an ER/LA opioid for patients previously prescribed a different immediate-release opioid.



TRANSDERMAL FENTANYL



- FDA approval for patients with moderate to severe chronic non-cancer and cancer-associated pain.
 - It is 100 times more potent than morphine.
 - It has low molecular weight, high potency, and lipid solubility make it ideal for delivery via the transdermal route.
 - It can be detected in serum approx. 1-2 hrs after first administration but does not reach the therapeutic index until 12-16 hrs.
 - Transdermal route eliminates the first-pass metabolism, increasing bioavailability to 90%.
 - The elimination half-life after patch removal is 13-22 hrs; because of slow release from the skin depot.



RECOMMENDATION 4

- **When opioids are initiated for opioid-naïve patients with acute, subacute, or chronic pain, providers should prescribe the lowest effective dosage.**
 - They should also use caution when prescribing opioids at any dosage and risks when considering increasing dosage.



RECOMMENDATION 4

- **Patient education and discussion before starting outpatient opioid therapy are critical.**
 - Patients should be aware of benefits, common risks, serious risks of, and alternatives to opioids before starting or continuing opioid therapy.
 - Patients should be advised that short-term opioid use can lead to opioid dependency and the importance of working towards discontinuation as soon as feasible.



PATIENT EVALUATION: RISK STRATIFICATION

- Opioid Risk Tool (ORT)
- Screener and Opioid Assessment for Patients with Pain Revised (SOAPP-R)
- Screening Instrument for Substance Abuse Potential (SISAP)
- Diagnosis, Intractable, Risk, Efficacy (DIRE) Score



Opioid Risk Tool

This tool should be administered to patients upon an initial visit prior to beginning opioid therapy for pain management. A score of 3 or lower indicates low risk for future opioid abuse, a score of 4 to 7 indicates moderate risk for opioid abuse, and a score of 8 or higher indicates a high risk for opioid abuse.

Mark each box that applies	Female	Male
Family history of substance abuse		
Alcohol	1	3
Illegal drugs	2	3
Rx drugs	4	4
Personal history of substance abuse		
Alcohol	3	3
Illegal drugs	4	4
Rx drugs	5	5
Age between 16—45 years	1	1
History of preadolescent sexual abuse	3	0
Psychological disease		
ADD, OCD, bipolar, schizophrenia	2	2
Depression	1	1
Scoring totals		



SOAPP-R

Item ("In the past 30 days...")

1. How often do you have mood swings?
2. How often have you felt a need for higher doses of medication to treat your pain?
3. How often have you felt impatient with your doctors?
4. How often have you felt that things are just too overwhelming that you can't handle them?
5. How often is there tension in the home?
6. How often have you counted pain pills to see how many are remaining?
7. How often have you been concerned that people will judge you for taking pain medication?
8. How often do you feel bored?
9. How often have you taken more pain medication than you were supposed to?
10. How often have you worried about being left alone?
11. How often have you felt a craving for medication?
12. How often have others expressed concern over your use of medication?
13. How often have any of your close friends had a problem with alcohol or drugs?
14. How often have others told you that you had a bad temper?
15. How often have you felt consumed by the need to get pain medication?
16. How often have you run out of pain medication early?
17. How often have others kept you from getting what you deserve?
18. How often, in your lifetime, have you had legal problems or been arrested?
19. How often have you attended an AA or NA meeting?
20. How often have you been in an argument that was so out of control that someone got hurt?
21. How often have you been sexually abused?
22. How often have others suggested that you have a drug or alcohol problem?
23. How often have you had to borrow pain medications from your family or friends?
24. How often have you been treated for an alcohol or drug problem?

Total score



SISAP

1. If you drink, how many drinks do you have on a typical day?

If less than 5 for men/less than 4 for women, then ask question 2.

If 5 or more for men/4 or more for women, then you may stop here *Use caution when prescribing opioids.*

2. How many drinks do you have in a typical week?

If less than 17 for men/less than 13 for women, then ask question 3.

If 17 or more for men/13 or more for women, then you may stop here *Use caution when prescribing opioids.*

3. Have you used marijuana or hashish in the last year?

If no, then ask question 4.

If yes, then you may stop here. *Use caution when prescribing opioids.*

4. Have you ever smoked cigarettes?

If no, then you may stop here *Probably a low opioid abuse risk.*

If yes, then ask question 5.

5. What is your age?

If under 40 years of age, then you may stop here *Use caution when prescribing opioids.*

If 40 years of age or older, then you may stop here *Probably a low opioid abuse risk.*



D.I.R.E

Score	Factor	Explanation
	Diagnosis	<p>1 = Benign chronic condition with minimal objective findings or no definite medical diagnosis. Examples: fibromyalgia, migraine headaches, headaches, abdominal pain, chronic back pain in young adults, chronic pelvic pain, phantom limb pain, RSD.</p> <p>2= Slowly progressive condition concordant with moderate pain, or fixed condition with moderate objective findings. Examples: failed back surgery syndrome, back pain with moderate degenerative changes, neuropathic pain.</p> <p>3= Advanced condition concordant with severe pain with objective findings. Examples: severe ischemic vascular disease, advanced neuropathy, severe spinal stenosis</p>
	Intractability	<p>1 = Few therapies have been tried and the patient takes a passive role in his/her pain management process.</p> <p>2 = Most customary therapies have been tried but the patient is not fully engaged in the pain management process, or barriers present (insurance, transportation, medical illness).</p> <p>3 = Patient fully engaged in a spectrum of treatments but with an inadequate response.</p>
	Risk	
	Psychological	<p>1 = Serious mental illness or personality dysfunction interfering with care. Examples: personality disorder, severe affective disorder, significant personality issues.</p> <p>2 = Personality or mental health interferes moderately. Example: depression, anxiety disorder.</p> <p>3 = Good communication with clinic. No significant personality dysfunction or mental illness.</p>
	Chemical Health	<p>1 = Active or very recent use of illicit drugs, excessive alcohol or prescription drug abuse.</p> <p>2 = Chemical coper (uses chemicals to cope with stress) or hx of CD in remission.</p> <p>3 = No CD hx, not chemically focused or reliant.</p>
	Reliability	<p>1 = Hx of numerous problems: medication misuse, missed appts, rarely follows through.</p> <p>2 = Occasional difficulties with compliance but generally reliable.</p> <p>3 = Highly reliable patient with meds, appts & treatment.</p>
	Social Support	<p>1 = Life in chaos, little family support, few close relationships. Loss of most normal life roles.</p> <p>2 = Reduction in some relationships and life roles.</p> <p>3 = Supportive family/close relationships. Involved in work or school or no social isolation.</p>
	Efficacy Score	<p>1 = Poor function or minimal pain relief despite mod to high doses.</p> <p>2 = Moderate benefit with function, improved in a # of ways. Or insufficient info (hasn't tried opioids, low doses, too short a trial).</p> <p>3 = Good improvements in pain, function, and quality of life. Stable doses over time.</p>

Score 7-13: Not a suitable candidate for long-term opioids.

Score 14-21: May be a suitable candidate for long-term opioid treatment.



RECOMMENDATION 5

- **Providers should discuss risk and benefits with patients when changing the opioid dosage and exercise care.**
 - Nonopioid therapies should be optimized while continuing opioid therapy.



EQUIANALGESIC OPIOID DOSING

OPIOID PRODUCTS	ORAL ROUTE	IV/SC/IM ROUTES
Morphine	30 mg	10 mg
Codeine	130 mg	75 mg
Hydromorphone	7.5 mg	1.5 mg
Methadone	5 - 15 mg	2.5 - 10 mg
Meperidine	300 mg	75 mg
Levorphanol	4 mg	2 mg
Oxymorphone	10 mg	1 mg
Pentazocine	50 mg	30 mg
Hydrocodone	20 mg	N/A
Oxycodone	20 mg	N/A



MORPHINE MILLIGRAM EQUIVALENTS

OPIOID (doses in mg/day except where noted)	CONVERSION FACTOR
Codeine	0.15
Fentanyl transdermal (in mcg/hr)	2.4
Hydrocodone	1
Hydromorphone	4
Methadone	
1-20 mg/day	4
21-40 mg/day	8
41-60 mg/day	10
≥ 61-80 mg/day	12
Morphine	1
Oxycodone	1.5
Oxymorphone	3



RECOMMENDATION 6

- **When opioids are needed for acute pain, they should not be prescribed in greater quantity than the expected duration of severe pain.**
 - For nontraumatic, nonsurgical pain opioids prescribed a few days or less are often sufficient.
 - Benefit: minimize the need to taper opioids to prevent withdrawal symptoms at the end of treatment.

Note: Durations should be individualized to the patient's clinical circumstances.



RECOMMENDATION 7

- **Providers should evaluate benefits and risks with patients within 1–4 weeks of starting opioid therapy for subacute or chronic pain or of dosage escalation.**
 - Clinicians should consider shortening follow-up intervals when:
 - ER/LA opioids are started
 - ER/LA opioids are increased
- Benefit of reassessment of pain and function provides an opportunity to update treatment plan and goals.

Increased risk for overdose within the first 2 weeks of treatment or when total daily opioid dosage is ≥ 50 MME/day.



RECOMMENDATIONS 8, 9, & 10

Providers should evaluate and discuss risk for opioid related harms with patients.

- Strategies to mitigate risk should be added to the management plan.

Providers should review the patient's history of controlled substance prescriptions using state prescription drug monitoring program (PDMP) data.

Providers should consider the benefits and risks of toxicology testing to assess for prescribed medications as well as other prescribed and nonprescribed controlled substances

SUBSTANCE USE SCREENING TOOLS

DAST

In the past 12 months...		Circle	
1.	Have you used drugs other than those required for medical reasons?	Yes	No
2.	Do you abuse more than one drug at a time?	Yes	No
3.	Are you unable to stop abusing drugs when you want to?	Yes	No
4.	Have you ever had blackouts or flashbacks as a result of drug use?	Yes	No
5.	Do you ever feel bad or guilty about your drug use?	Yes	No
6.	Does your spouse (or parents) ever complain about your involvement with drugs?	Yes	No
7.	Have you neglected your family because of your use of drugs?	Yes	No
8.	Have you engaged in illegal activities in order to obtain drugs?	Yes	No
9.	Have you ever experienced withdrawal symptoms (felt sick) when you stopped taking drugs?	Yes	No
10.	Have you had medical problems as a result of your drug use (e.g. memory loss, hepatitis, convulsions, bleeding)?	Yes	No
Scoring: Score 1 point for each question answered "Yes," except for question 3 for which a "No" receives 1 point.			Score:

Interpretation of Score		
Score	Degree of Problems Related to Drug Abuse	Suggested Action
0	No problems reported	None at this time
1-2	Low level	Monitor, re-assess at a later date
3-5	Moderate level	Further investigation
6-8	Substantial level	Intensive assessment
9-10	Severe level	Intensive assessment

- In the PAST 12 MONTHS, how often have you used any tobacco product (for example, cigarettes, e-cigarettes, cigars, pipes, or smokeless tobacco)?

<input type="checkbox"/> Daily or Almost Daily	<input type="checkbox"/> Weekly	<input type="checkbox"/> Monthly
<input type="checkbox"/> Less Than Monthly	<input type="checkbox"/> Never	
- In the PAST 12 MONTHS, how often have you had 5 or more drinks containing alcohol in one day? One standard drink is about 1 small glass of wine (5 oz), 1 beer (12 oz), or 1 single shot of liquor. (Note: This question should only be answered by males).

<input type="checkbox"/> Daily or Almost Daily	<input type="checkbox"/> Weekly	<input type="checkbox"/> Monthly
<input type="checkbox"/> Less Than Monthly	<input type="checkbox"/> Never	
- In the PAST 12 MONTHS, how often have you had 4 or more drinks containing alcohol in one day? One standard drink is about 1 small glass of wine (5 oz), 1 beer (12 oz), or 1 single shot of liquor. (Note: This question should only be answered by females).

<input type="checkbox"/> Daily or Almost Daily	<input type="checkbox"/> Weekly	<input type="checkbox"/> Monthly
<input type="checkbox"/> Less Than Monthly	<input type="checkbox"/> Never	
- In the PAST 12 MONTHS, how often have you used any drugs including marijuana, cocaine or crack, heroin, methamphetamine (crystal meth), hallucinogens, ecstasy/MDMA?

<input type="checkbox"/> Daily or Almost Daily	<input type="checkbox"/> Weekly	<input type="checkbox"/> Monthly
<input type="checkbox"/> Less Than Monthly	<input type="checkbox"/> Never	
- In the PAST 12 MONTHS, how often have you used any prescription medications just for the feeling, more than prescribed or that were not prescribed for you? Prescription medications that may be used this way include: Opiate pain relievers (for example, OxyContin, Vicodin, Percocet, Methadone) Medications for anxiety or sleeping (for example, Xanax, Ativan, Klonopin) Medications for ADHD (for example, Adderall or Ritalin)

<input type="checkbox"/> Daily or Almost Daily	<input type="checkbox"/> Weekly	<input type="checkbox"/> Monthly
<input type="checkbox"/> Less Than Monthly	<input type="checkbox"/> Never	

<https://www.mdcalc.com/calc/10526/drug-abuse-screening-test-10-dast-10>

TAPS

<https://cde.nida.nih.gov/instrument/29b23e2e-e266-f095-e050-bb89ad43472f>

AUDIT-C

<https://www.mdcalc.com/calc/2021/audit-c-alcohol-use>

Question	Answer	Score
1. How often did you have a drink containing alcohol in the past year?	Never	0 point
	Monthly or less	1 point
	2 to 4 times per month	2 points
	2 to 3 times per week	3 points
	4 or more times per week	4 points
2. On days in the past year when you drank alcohol how many drinks did you typically drink?	0, 1, or 2	0 point
	3 or 4	1 point
	5 or 6	2 points
	7 - 9	3 points
	10 or more	4 points
3. How often did you have 6 or more (for men) or 4 or more (for women and everyone 65 and older) drinks on an occasion in the past year?	Never	0 point
	Less than monthly	1 point
	Monthly	2 points
	Weekly	3 points
	Daily or almost daily	4 points

PATIENT EVALUATION: ASSESS MISUSE

- Pain Medication Questionnaire (PMQ)
- Prescription Drug Use Questionnaire (PDUQ)
- Current Opioid Misuse Measure (COMM)



In order to develop the best treatment plan for you, we want to understand your thoughts, needs and experiences related to pain medication. Please read each statement below and indicate how much it applies to you by marking your response with an "X" anywhere on the line below it.

1) I believe I am receiving enough medication to relieve my pain.

Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree

2) My doctor spends enough time talking to me about my pain medication during appointments.

Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree

3) I believe I would feel better with a higher dosage of my pain medication.

Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree

4) In the past, I have had some difficulty getting the medication I need from my doctor(s).

Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree

5) I wouldn't mind quitting my current pain medication and trying a new one, if my doctor recommends it.

Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree

6) I have clear preferences about the type of pain medication I need.

Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree

7) Family members seem to think that I may be too dependent on my pain medication.

Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree

8) It is important to me to try ways of managing my pain in addition to the medication (such as relaxation, biofeedback, physical therapy, TENS unit, etc.)

Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree

9) At times, I take pain medication when I feel anxious and sad, or when I need help sleeping.

Never | Occasionally | Sometimes | Often | Always

10) At times, I drink alcohol to help control my pain.

Never | Occasionally | Sometimes | Often | Always

11) My pain medication makes it hard for me to think clearly sometimes.

Never | Occasionally | Sometimes | Often | Always

12) I find it necessary to go to the emergency room to get treatment for my pain.

Never | Occasionally | Sometimes | Often | Always

13) My pain medication makes me nauseated and constipated sometimes.

Never | Occasionally | Sometimes | Often | Always

14) At times, I need to borrow pain medication from friends or family to get relief.

Never | Occasionally | Sometimes | Often | Always

15) I get pain medication from more than one doctor in order to have enough medication for my pain.

Never | Occasionally | Sometimes | Often | Always

16) At times, I think I may be too dependent on my pain medication.

Never | Occasionally | Sometimes | Often | Always

17) To help me out, family members have obtained pain medications for me from their own doctors.

Never | Occasionally | Sometimes | Often | Always

18) At times, I need to take pain medication more often than it is prescribed in order to relieve my pain.

Never | Occasionally | Sometimes | Often | Always

19) I save any unused pain medication I have in case I need it later.

Never Occasionally Sometimes Often Always

20) I find it helpful to call my doctor or clinic to talk about how my pain medication is working.

Never Occasionally Sometimes Often Always

21) At times, I run out of pain medication early and have to call my doctor for refills.

Never Occasionally Sometimes Often Always

22) I find it useful to take additional medications (*such as sedatives*) to help my pain medication work better.

Never Occasionally Sometimes Often Always

23) How many painful conditions (*injured body parts or illnesses*) do you have?

1 painful conditions 2 painful conditions 3 painful conditions 4 painful conditions 5+ painful conditions

24) How many times in the past year have you asked your doctor to increase your prescribed dosage of pain medication in order to get relief?

Never 1 time 2 times 3 times 4+ times

25) How many times in the past year have you run out of pain medication early and had to request an early refill?

Never 1 time 2 times 3 times 4+ times

26) How many times in the past year have you accidentally misplaced your prescription for pain medication and had to ask for another?

Never 1 time 2 times 3 times 4+ times



PDUQ-P

1.	Do you have more than one painful condition?	Y	N	19.	Have you ever had to buy pain medications on the street?	Y	N
2.	Are you disabled by pain (unable to work or participate fully in activities)?	Y	N	20.	Have doctors ever refused to give you the pain medications you felt you needed because of fear that you might abuse them?	Y	N
3.	Are you receiving any disability payments (such as SSI, or VA disability)?	Y	N	21.	Is anyone in your family or among your friends concerned that you might be addicted to pain medications?	Y	N
4.	Do you have any current lawsuits or claims related to your pain problem?	Y	N	22.	Do any of your family members disagree with your use of pain medications? ^a	Y	N
5.	Have you tried any non-medication treatments for your pain problem (such as physical therapy, TENS, biofeedback)	Y	N	23.	Does anyone in your family help to take care of you due to your pain problem? ^b	Y	N
6.	Has your pain been adequately treated over the past 6 months?	Y	N	24.	Does your spouse or significant other have problems with drugs or alcohol?	Y	N
7.	Do you feel at all angry or mistrustful toward your previous doctors?	Y	N	25.	Have those in your family or among your friends ever obtained pain medications for you?	Y	N
8.	Have you been given pain medications from more than one clinic over the past 6 months?	Y	N	26.	Have you ever borrowed pain medications from a friend or family member?	Y	N
9.	Have you ever been or do you think you might currently be addicted to pain medications?	Y	N	27.	Has anyone in your immediate family (father, mother, siblings) ever had a problem with drugs or alcohol?	Y	N
10.	Has a doctor ever told you that you were addicted to pain medications?	Y	N	28.	Has anyone in your immediate family (father, mother, siblings) ever had a problem with chronic pain?	Y	N
11.	Have you had to increase the amount of pain medications you take over the past 6 months?	Y	N	29.	Have you ever had an alcohol or drug addiction problem?	Y	N
12.	Have you had to call in for more pain medications because your prescription ran out?	Y	N	30.	Have you ever been treated for an alcohol or drug abuse problem?	Y	N
13.	Have you used the pain medications to help other symptoms such as problems sleeping, anxiety, or depression?	Y	N	31.	Have you ever been taken partially or completely off pain medications to decrease your tolerance?	Y	N
14.	Do you save up unused medications in case you might need them in the future?	Y	N				
15.	Do you ever use alcohol to help relieve some of the pain?	Y	N				
16.	Do you think certain pain medications (such as vicodin, codeine, or percocet) work better for you and you prefer to take them and not others?	Y	N				
17.	Have you ever lost your pain medications and needed them replaced?	Y	N				
18.	Have you had to visit the emergency room in the past 6 months because of your pain problem?	Y	N				



COMM

Current Opioid Misuse Measure (COMM)		NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
...in the past 30 days		0	1	2	3	4
1	How often have you had trouble with thinking clearly or had memory problems?					
2	How often do people complain that you are not completing necessary tasks?					
3	How often have you had to go to someone other than your prescribing physician to get sufficient pain relief from your medication (i.e.: another doctor, the emergency room)?					
4	How often have you taken your medications differently from how they are prescribed?					
5	How often have you seriously thought about hurting yourself?					
6	How much of your time was spent thinking about opioid medications (having enough, taking them, dosing schedule)?					
7	How often have you been in an argument?					
8	How often have you had trouble controlling your anger (e.g.: road rage, screaming etc.)?					
9	How often have you needed to take pain medications belonging to someone else?					
10	How often have you been worried about how your handling your medications?					
11	How often have others been worried about how you're handling your medications?					
12	How often have you had to make an emergency phone call or show up at the clinic without an appointment?					
13	How often have you gotten angry with people?					
14	How often have you had to take more of your medication than prescribed?					
15	How often have you borrowed pain medication from someone else?					
16	How often have you used your pain medicine for symptoms other than for pain (e.g.: to help you sleep, improve your mood, or relieve stress)?					
17	How often have you had to visit the emergency room?					



PATIENT PROGRESS

- Prescription Monitoring Program (PMP)
- Urine Drug Screen (UDS)
- Naloxone Prescription



RECOMMENDATION 11



- **Providers should use caution when prescribing opioids and benzodiazepines concurrently.**
 - Providers should carefully weigh the benefits and risks of continuing dual therapy and discuss with the patient and other members of the care team.



RECOMMENDATION 12

- **Clinicians should offer or arrange treatment with evidence-based medications to treat patients with opioid use disorder.**
 - Withdrawal management without medications for opioid use disorder is not recommended.



DSM-5 CRITERIA FOR DIAGNOSIS OF OPIOID USE DISORDER

Check all that apply

	Opioids are often taken in larger amounts or over a longer period of time than intended.
	There is a persistent desire or unsuccessful efforts to cut down or control opioid use.
	A great deal of time is spent in activities necessary to obtain the opioid, use the opioid, or recover from its effects.
	Craving, or a strong desire to use opioids.
	Recurrent opioid use resulting in failure to fulfill major role obligations at work, school or home.
	Continued opioid use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of opioids.
	Important social, occupational or recreational activities are given up or reduced because of opioid use.
	Recurrent opioid use in situations in which it is physically hazardous
	Continued use despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by opioids.
	*Tolerance, as defined by either of the following: (a) a need for markedly increased amounts of opioids to achieve intoxication or desired effect (b) markedly diminished effect with continued use of the same amount of an opioid
	*Withdrawal, as manifested by either of the following: (a) the characteristic opioid withdrawal syndrome (b) the same (or a closely related) substance are taken to relieve or avoid withdrawal symptoms

TREATMENT SETTINGS

Intensive
Outpatient

Partial
Hospitalization

Inpatient
Treatment
Residential
Treatment

Opioid Treatment
Program

Office-Based
Opioid Treatment



CLINICAL OPIATE WITHDRAWAL SCALE (COWS)

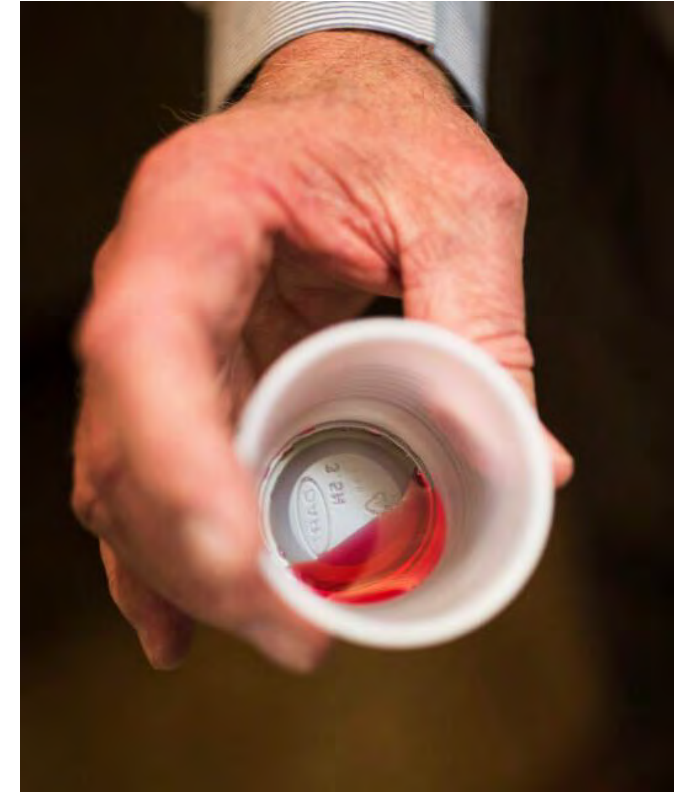
Resting Pulse Rate: _____ beats/minute <i>Measured after patient is sitting or lying for one minute</i> 0 Pulse rate 80 or below 1 Pulse rate 81-100 2 Pulse rate 101-120 4 Pulse rate greater than 120	GI Upset: over last 1/2 hour 0 No GI symptoms 1 Stomach cramps 2 Nausea or loose stool 3 Vomiting or diarrhea 5 Multiple episodes of diarrhea or vomiting
Sweating: over past 1/2 hour not accounted for by room temperature or patient activity 0 No report of chills or flushing 1 Subjective report of chills or flushing 2 Flushed or observable moistness on face 3 Beads of sweat on brow or face 4 Sweat streaming off face	Tremor: observation of outstretched hands 0 No tremor 1 Tremor can be felt, but not observed 2 Slight tremor observable 4 Gross tremor or muscle twitching
Restlessness: Observation during assessment 0 Able to sit still 1 Reports difficulty sitting still, but is able to do so 3 Frequent shifting or extraneous movements of legs/arms 5 Unable to sit still for more than a few seconds	Yawning: Observation during assessment 0 No yawning 1 Yawning once or twice during assessment 2 Yawning three or more times during assessment 4 Yawning several times/minute
Pupil size 0 Pupils pinned or normal size for room light 1 Pupils possibly larger than normal for room light 2 Pupils moderately dilated 5 Pupils so dilated that only the rim of the iris is visible	Anxiety or irritability: 0 None 1 Patient reports increasing irritability or anxiousness 2 Patient obviously irritable anxious 4 Patient so irritable or anxious that participation in the assessment is difficult
Bone or Joint aches: If patient was having pain previously, only the additional component attributed to opiates withdrawal is scored 0 Not present 1 Mild diffuse discomfort 2 Patient reports severe diffuse aching of joints/ muscles 4 Patient is rubbing joints or muscles and is unable to sit still because of discomfort	Gooseflesh skin: 0 Skin is smooth 3 Piloerection of skin can be felt or hairs standing up on arms 5 Prominent piloerection
Runny nose or tearing: Not accounted for by cold symptoms or allergies 0 Not present 1 Nasal stuffiness or unusually moist eyes 2 Nose running or tearing 4 Nose constantly running or tears streaming down cheeks	Total Score _____ The total score is the sum of all 11 items Initials of person completing Assessment: _____
Score: 5-12 mild; 13-24 moderate; 25-36 moderately severe; more than 36 = severe withdrawal	



MEDICATIONS FOR OPIOID USE DISORDER (MOUD)

■ Methadone

- MOA: Full μ -agonist, long-acting
 - No withdrawal required for treatment initiation.
- Adverse Effects:
 - Prolonged QT interval
 - Drug-drug interactions
 - Overdose
- Federally certified treatment program
 - Initially must be seen daily.



MEDICATIONS FOR OPIOID USE DISORDER (MOUD)



■ Buprenorphine

- MOA: Partial μ -agonist, higher affinity at the receptor, slower dissociation from the receptor. Kappa antagonist
- Mild withdrawal required for treatment initiation.
- Adverse Effects
 - Headache
 - Nausea
 - Constipation
 - Insomnia
- Can be administered in any outpatient setting.



MEDICATIONS FOR OPIOID USE DISORDER (MOUD)

■ Naltrexone

- MOA: Full μ -antagonist
- Must completely withdraw from opioids before treatment initiation.
- Adverse Effects:
 - Headache
 - Depression
 - Insomnia
 - Decreased tolerance → increased risk of overdose if relapse
- Can be administered in any outpatient setting.
- No restrictions on prescribing



CDC RECOMMENDATION SUMMARY

CATEGORY A

- Recommendation 2
- Recommendation 3
- Recommendation 4
- Recommendation 6
- Recommendation 7
- Recommendation 8
- Recommendation 12



CATEGORY B

- Recommendation 1
- Recommendation 5
- Recommendation 9
- Recommendation 10
- Recommendation 11



DISCONTINUING THERAPY

- **Indications for Tapering**

- Patient Request
- Lack of clinical improvement in function.
- Risk outweighs benefit
- Serious adverse effect, ex, overdose
- Patient has a substance use disorder



DISCONTINUING THERAPY

- **Communicating with the patient**
 - Explore the patient's fears and concerns.
 - Highlight the main goals of tapering (individualized).
 - Support and reassure the patient that their pain and function will continue to be addressed.
 - Openly discuss details of the treatment plan and taper.



DISCONTINUING THERAPY

- **Communicating with the patient**

- Don't go back to previous doses.
 - Evidence to support specific tapering rates is limited.
 - Adjust the rate of the taper based on the patient's response.
 - Tapers of approximately 10% per month or slower are likely to be better tolerated.



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Thank



You



Saturday, December 14, 2024

2024 WINTER SCIENTIFIC SEMINAR

December 12-15, 2024

The Westin, Chicago-Lombard, IL





Endeavor
HealthSM

Sports Injury Prevention in the Student Athlete

SHAHEEN JADIDI, D.O.

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Endeavor Health Orthopaedic & Spine Institute

2024 IOMS Winter Scientific Seminar

Shaheen Jadidi, D.O.– Additional Credentials & Athlete Engagements

- Clinical Preceptor, North Central College
- Team Physician, Plainfield East High School & Plainfield Central High School

Disclosures

- None

Learning Objectives

- 1 Note common causes of sports injury
- 2 List the best techniques for sports injury prevention
- 3 Recognize the role for protective equipment

Overview

- Most common cause is previous injury
- What is the role of stretching?
 - “(Is it..?) It is safe to lift weights”
 - Improving upon nature
- The importance of learning how to land
 - Correct training is key
- Major role for protective equipment
 - Braces, headgear, padding, bubble-wrap

Patient Family Question

“My daughter is getting back to soccer after a knee injury. Can she do anything, like stretches either before or after practices and games to keep that knee from being re-injured?”

Rate of Injuries in the Young Athlete

- Age 5-14 years, 59.3/1000 persons
- Age 15-24 years, 56.4/1000 persons.
- Males 2x > females.
- Strains/sprains : 31% of injuries
- Most common mechanisms of injury were
 - 34% struck by/against
 - 28% fall
 - 13% overexertion
- Basketball: 4 injuries/1000 population.

Conn, Annest & Gilchrist (CDC) 2003

Most Injuries

- Most Common Injuries: Contusions/strains
- Most Injured Areas
 - Ankle
 - Hand, Wrist, Elbow
 - Knee
 - Shin and Calf
 - Head, Neck and Clavicle

Sports Injury Prevention

Primary vs. Secondary Prevention?

- “Recent sports injury literature emphasizes the need of the practitioner to address sports injury prevention and to provide anticipatory guidance at pediatric office visits”.

Spector & Kelly 2005

- Pre-participation exam provides necessary opportunities to identify the most common risks for injury.

Pre-participation Exam monograph 2004

Secondary Prevention

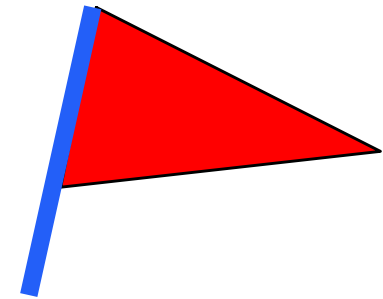
Secondary prevention strategy begins with the diagnosis of the injury.

- **Acute injuries:** Especially those that result in swelling and/or limping; easily recognized and will need to be rested
- **Overuse injuries:** May go un-recognized, activity will need to be modified or stopped

Acute Injury

Red Flag Complaints

- “Dead arm” ... “Feels like it’s asleep”
- “Hurts at night” ... “swollen”
- “My shoulder pops”
- “My arm comes out of place”
- “My knee gives out”
- Performance drop-off with soreness
- “I have a spike stuck in my ankle”



Performance drop-off with soreness

Structural Differences with Age



- **Epiphysis**

- Reserve zone
- Chondrocytes

- Proliferative zone
- Tendon tension injuries

- Hypertrophy zone
- Shear injuries

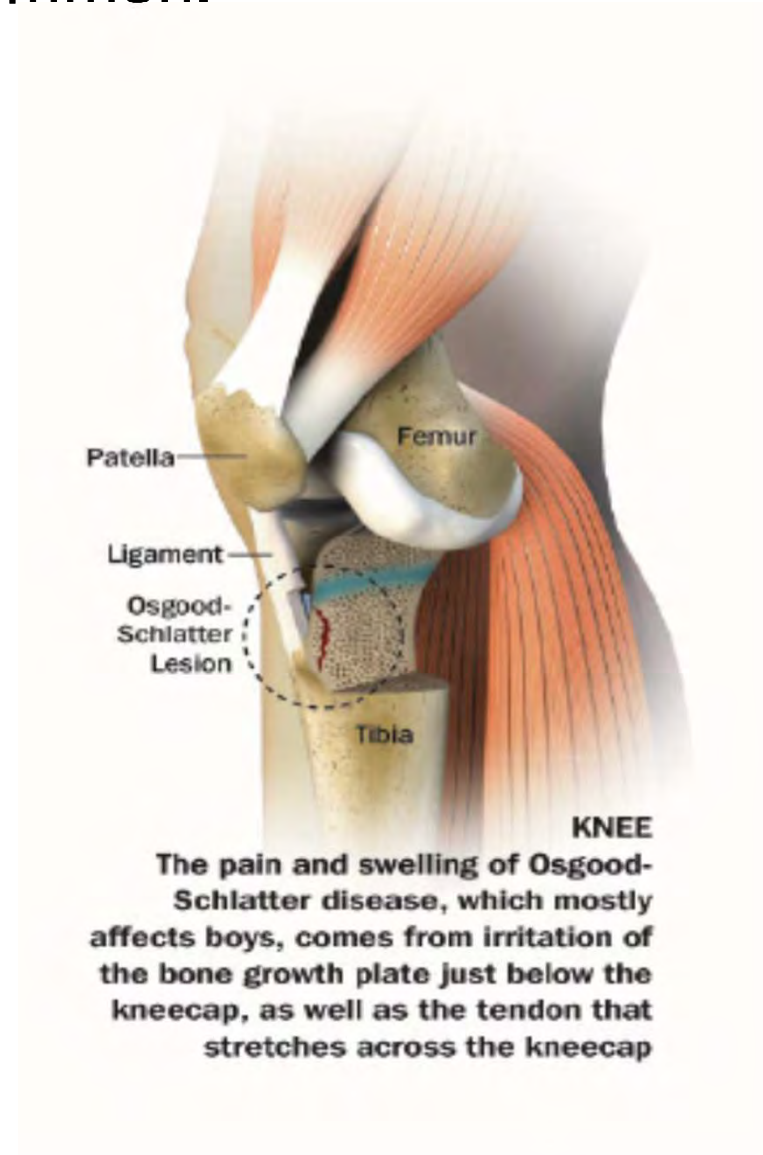
- Provisional calcification
- Compression injuries

- **Metaphysis**

Early Adolescence

Overuse Apophysitis (sprains) are common.

- Knee: Osgood-Schlatter's
- Heel: Sever's
- Elbow
 - “ Little League Elbow”



Overuse Injuries at the Growth Plate

Due to Repetition

- Traction / rotation
- Pounding / compression

Overuse Shoulder Injuries

- RTC tendinitis / Bursitis
- Subluxation / Dislocation
- “Little League Shoulder”



Overuse Elbow Injuries

- Medial Epicondylitis
- Ulnar collateral sprain
- “Compression-side” OCDs



Overuse Lower Extremity Injuries

- Multiple hip, knee & lower leg injuries
- Shin splints / stress fractures
- “Jumper’s Knee”



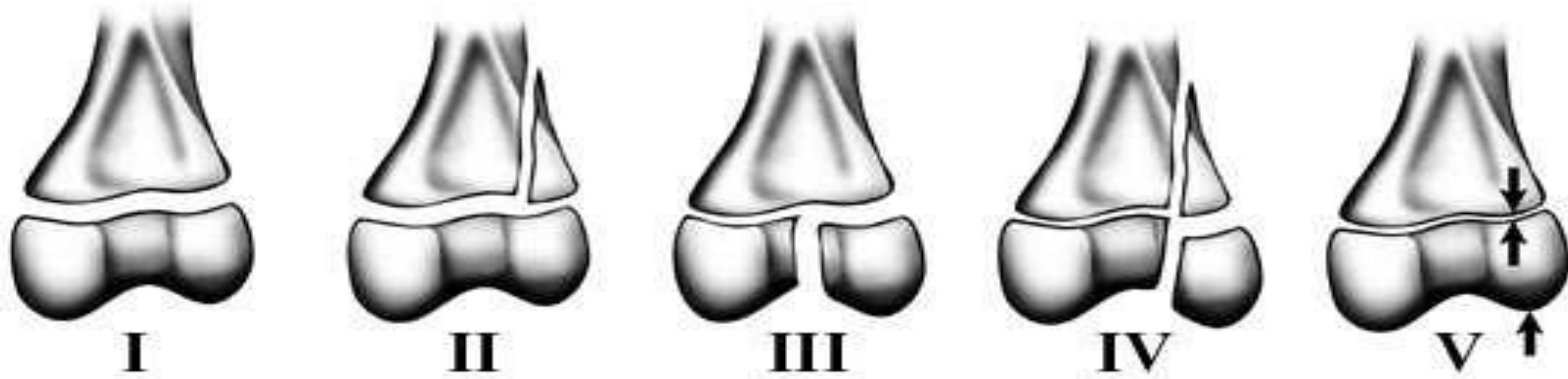
Risk Factors for Adolescent Sports Injuries

These risk factors are similar to adults.

- Poor endurance
- Lack of preseason training
- Psychosocial factors
- Non-modifiable body type risk factors & previous injury are consistent among studies

Emery 2003

Acute Growth Plate Injuries: Macrotrauma



Common Acute Growth Plate

Injury Sites

- Distal radius: 1/3 of all GP injuries
- Phalangeal physis
- Distal tibia/fibula (“ankle sprain”)
- Knee: only 2% of injuries

But 50% of growth arrests require surgery.

Sports Injury

How do you know when they have a significant problem?

- The most common injury risk is re-injury to the same area, so repeat pain should be checked out.
- There is new swelling or an *effusion*.
- Student athlete is unable to bear total body weight or to bend and straighten without significant pain.
- They have prolonged pain that limits play for more than a couple days of rest, ice, and ibuprofen.

Improving *Secondary* Prevention

- Accurate diagnosis and treatment of injuries
- RTP with pain-free ROM, symmetrical strength and good balance has returned
- Pre-participation exam
- Medical coverage of teams and events

Improving *Primary* Prevention

Initial Considerations

- Body type / size / gender / development
- Basics: Strength, flexibility, speed/endurance
- Advanced Skills:
 - Develop sports-specific skills /techniques
 - Proper training errors

Sports Injury Prevention

Physical and physiological differences between children and adults that may cause children to be more vulnerable to injury.

- Size
 - Larger surface area to mass ratio
 - Larger heads proportionately
 - May be too small for protective equipment
- Growing cartilage more vulnerable to stresses
- Lacking complex motor skills needed for certain sports until after puberty.

Adirim & Cheng 2003

Sports Injury Prevention

Although flexibility is important, strength is more important.

- Weight training, not weight lifting
- Focus on muscles that cross joints
 - hamstrings, peroneals
- Hip (core) /thigh strength are key in reducing the risk of lower extremity injury

Demo of Hip/Hamstring Strength Photo

- Examples include:
 - 1/2 wall squats



Sports Injury Prevention

Balance, and learning how to land from jumps is also protective.

- The advance “class.”
- Lower leg coordination drills, speed training, and plyometrics improve coordination skills, performance ability and reduce injury risk.
- “Don’t try this at home kids.” It should begin with expert instruction first, and then be included into regular training program.

Sports Injury Prevention

Consistencies between the adult and pediatric literature on injury prevention.

- Neuromuscular training programs
 - Balance training programs

Emery 2005

Sports Injury Prevention

Neuromuscular Training has significant effects on overall knee or ACL injury rates.

- Training involved:
 - Plyometric power
 - Supervision of biomechanics and technique
 - Strength, balance, & core stability training
- “Unknown which of these components is most effective or whether the effects are combinatorial.”

Hewett, Myer, Ford 2005

Sports Injury Prevention

“External” Factors Contributing to Overuse Injuries

- Recognizing environment influences
- Training / technique errors
 - Adding a new movement or skill
 - Too much added volume & intensity / time
- Protective gear

Sports Injury Prevention

Younger athletes are more susceptible to climate / hydration issues.

- Smaller body size
 - Less cooling capabilities
 - Less warming capabilities

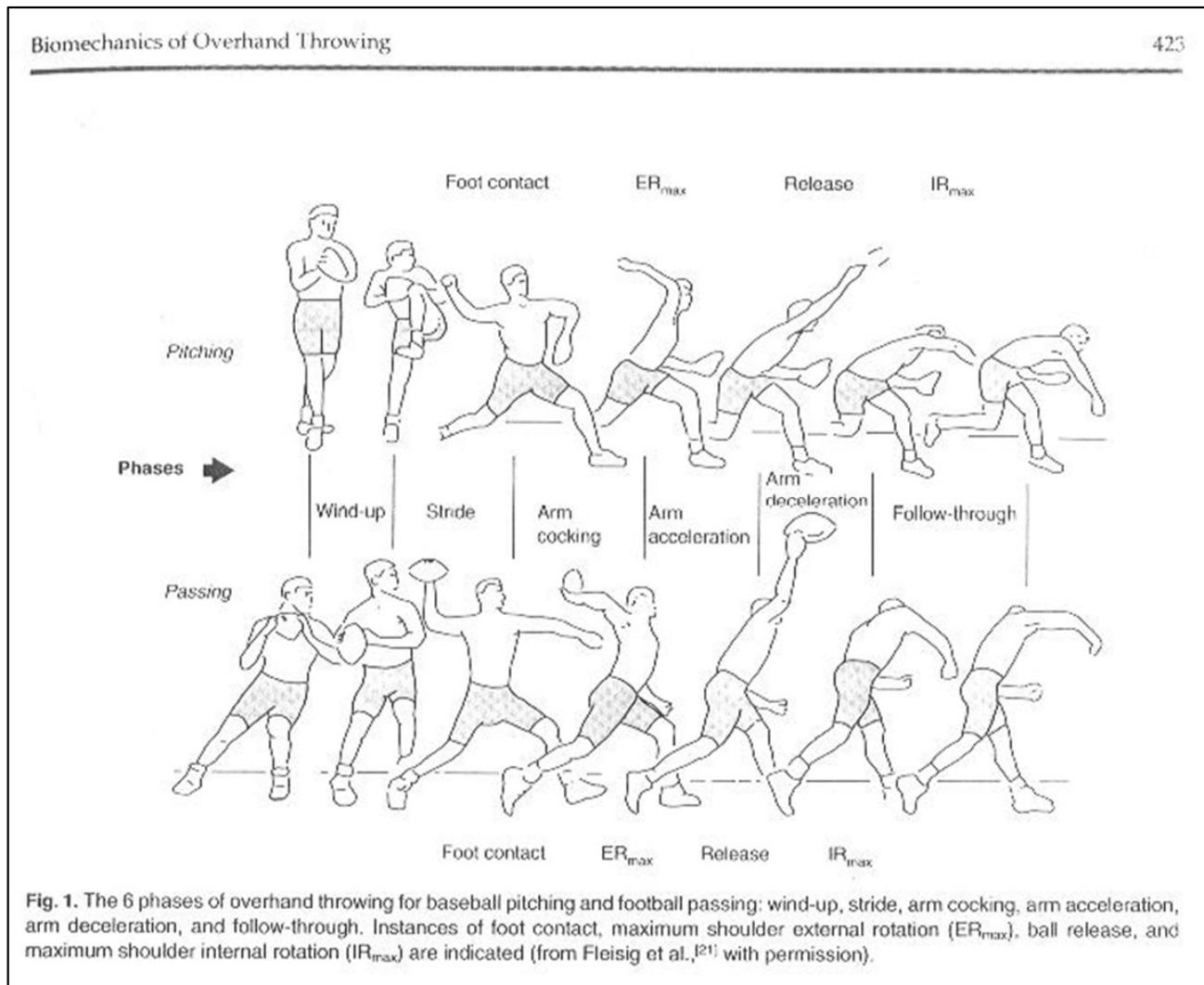
Avoiding Primary Overuse

- Definition: All relative
 - Each pitch / throw / run
 - Game / week
 - Training season
- Identify risk factors early
 - & improve the “basics”
 - & improve technique errors
- Secondary: Have a criteria for RTP

Too Much Training Volume

- 10 % /week = injury 6-8 weeks
- 50 % /week = injury 2-3 weeks
- 100 % / week = injury in 1 week
- > 100 % = injury in days

Biomechanics of Overhead Throwing



Technique Analysis & Coaching

Attention to Pain During Phases of Throwing

- Cocking: Anterior Sublimation, Tendinitis, “Dead Arm”
- Acceleration: IR strain, bursitis, elbow (medial)
- Release / deceleration: same as cocking: posterior
- Follow-through: posterior strain - triceps, elbow (posterior)

Decline in injuries with rule changes

Equivalent benefits to technique coaching, if enforced.



U.S. Football Fatalities Due to Concussion

Years	No.	%
1945–1954	87	17.7
1955–1964	115	23.4
1965–1974	162	33.0
1975–1984	69	14.1
1985–1994	32	6.6
1995–1999	26	5.1
Total	491	99.9

*Because of rounding, percentages do not total 100.

Do braces, pads or sleeves work?

- Braces can offer protection against repeat injuries; however, they are most often used to “remind” the athlete that they are still recovering from an injury.
- Knee pads should be worn for sports when falling is a risk especially by those with the very common, painful, Osgood-Schlatter’s bumps on the knees.

Other Protective Equipment

- Helmets
- Protective eye wear
- Mouthguards
- Facemask/Neck/Throat protection
- Chest protectors
- Shoulder, elbow, knee, hand pads
- Shoes/footware

Cleats and Severs



NOCSAE Certification



NOCSAE Certification

Helmet

\$90.00-150.00

MUST BE NOCSAE Certified for Lacrosse
National Operating Committee on
Standards for Athletic Equipment

Helmet Size Chart

Head Circumference Size

21 1/4" XS

21 1/2 - 22 3/8" S

22 3/4 - 23 5/8" M

23 3/4 - 24 1/4" L

24 3/8" XL

Shoulder Pad's

\$40.00-100.00

Arm Pads

\$20.00-70.00

Rib pads

optional

\$30.00-50.00

Gloves

\$35.00-105.00

hockey gloves won't do.

They don't flex in the right places.

© copyright 2003 MBYLL Logo's TM Warrior Lacrosse

Stick

\$20.00-200.00

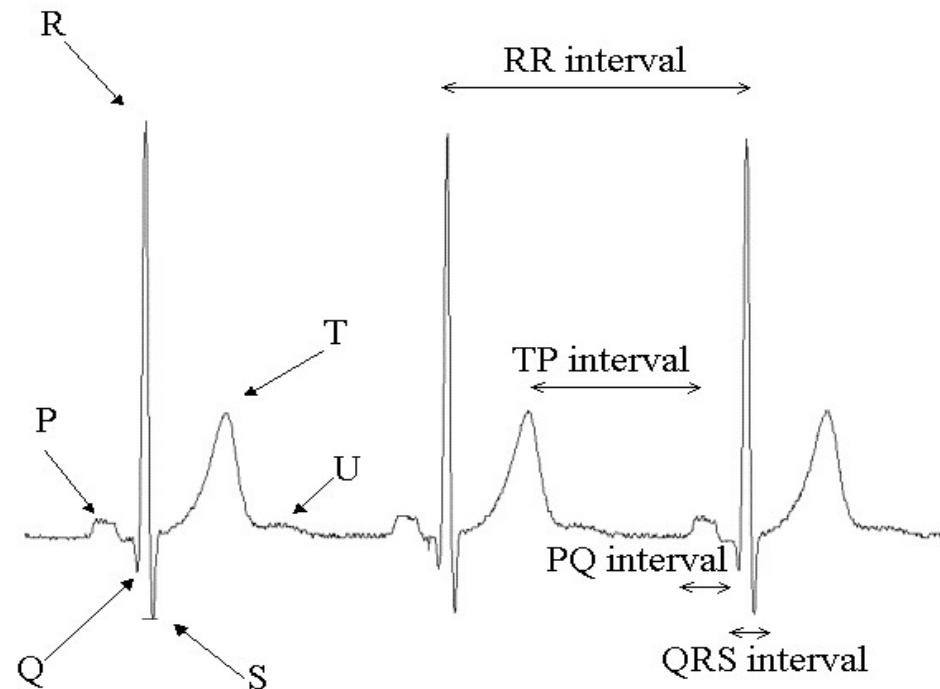
(mesh is recommended for badinoges)



Boys Equipment

Manuf. Certifies
Meets **NOCSAE** Standard
For Face Guards
ClearView Systems, Inc.
RIP-IT-01 11/04
Pat. Pend.

Commotio Cordis



- No structural damage to pliable chest walls, the ribs, sternum, or heart itself
- Baseball, softball, hockey, football, lacrosse, playful “shadow boxing” or as a remedy for hiccups
- Survival is only 16%

U.S. Commotio Cordis Registry

128 cases

- 62%: During organized sporting events
- Fatal blows often occurred inadvertently
 - 28%: Wearing chest barriers
 - 5.4%: Direct contact w/protective padding
 - 1.5%: Baseball specifically designed to reduce risk
- 16% overall survival rate
- 83%: CPR was performed
 - 25% success rate, if CPR began in < 3 minutes
 - 3% if > 3 minutes
- 32% received defibrillation
 - 46% who received defibrillation survived
 - AED used in 2 cases : 13 & 38 yrs. : survived

AED

In older arrest victims,
survival rates decline
7% to 10% for every minute
defibrillation is delayed.



How well does it work in young athletes?

AED

Time to defibrillation is the most important factor in survival from out-of-hospital cardiac arrest due to ventricular fibrillation.



“Devices should be deployed so as to provide a response time of less than 5 minutes.”

Six broad, potential means to prevent injuries

1. The pre-season physical examination
2. Medical coverage at sporting events
3. Proper coaching/training
4. Proper equipment and field/surface playing conditions.
5. Follow rules: proper officiating
6. Adequate hydration & nutrition

Concluding Takeaways

"My daughter is getting back to spring soccer after a knee injury. Can she do anything, like stretches either before or after practices and games to keep that knee from being re-injured?"

- Treatment and prevention strategy depends upon the (re-) injury.
- Although flexibility is important strength is more important.
- Balance and learning how to land from jumps is also protective.
- Braces, pads and shoes work to prevent injury.

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8. Kyle SB. **Youth Baseball Protective Equipment: Final Report**. Washington, DC: U.S. Consumer Product Safety Commission; 1996.

Shaheen Jadidi, D.O.: Clinic Locations & Contact Information

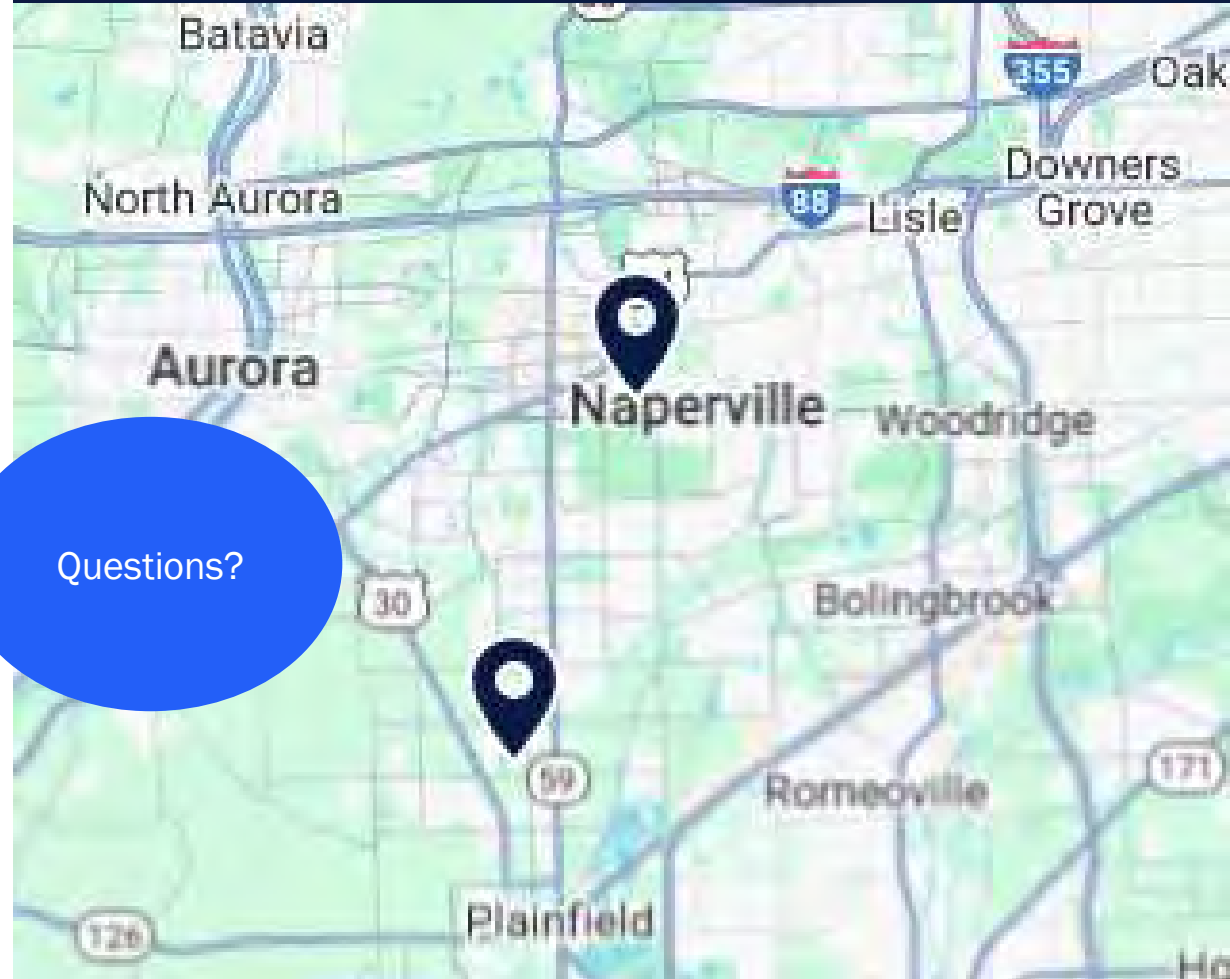


Clinic Locations

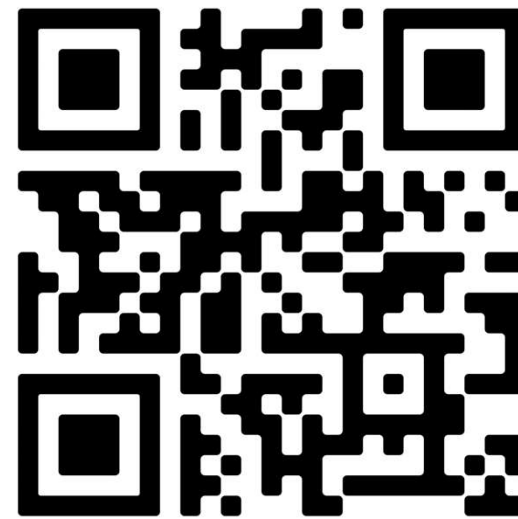
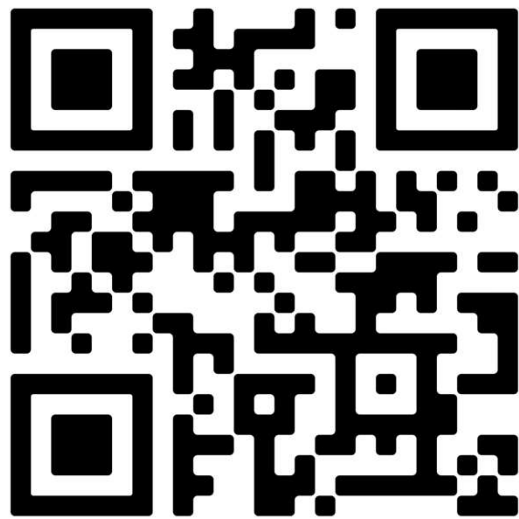
- Naperville
- Plainfield

Contact Information

- Shaheen.Jadidi@EEHealth.org
- (630) 646-7000



Staying Connected Online – Orthopaedic & Spine Institute



Staying Connected Online – Orthopaedic & Spine Institute





Endeavor
HealthSM

Thank You

Saturday, December 14, 2024

2024 WINTER SCIENTIFIC SEMINAR

December 12-15, 2024

The Westin, Chicago-Lombard, IL



The Osteopathic Hour 2: An Osteopathic Approach to the Knee

KATE WORDEN, DO, FAAO, PROFESSOR OMM, MWU AZCOM

ANGELIQUE MIZERA, DO, NMM/OMM, FAAPMR

IOMS

SAT. 12/14/2024

Dr. Worden & Dr. Mizera
Have no Conflicts of Interest or Disclosures



Learning Objectives

As a result of this unit the learner will be able to:

1. Describe the physiology underlying Counterstrain (CS) tenderpoints and the Chapman neurolymphatic reflex (CR) for the Lower Extremity (brief review).
2. Summarize the approach to osteopathic treatment using Counterstrain technique.
3. Identify specific Counterstrain tenderpoints: ACL, PCL, MM/MCL, M/L HAM, & the Chapman reflex to the Lower Extremity: Groin Gland.
4. Palpate the tissue texture changes associated with dysfunction and resolution of dysfunction of these tenderpoints and reflexes.
5. Recognize the clinical indications for treatment of these dysfunctions, specifically: Knee pain, stiffness, effusion, ligamentous sprain (ACL, PCL, MM/MCL) muscle strain with hypertonicity (HAM), or lymphatic congestion/edema of the Lower Extremity (Groin Gland).
6. Demonstrate osteopathic treatment of the above tenderpoints and reflexes.

Learning Objectives:

As a result of this unit the learner will be able to identify and treat the following clinically common SCS tenderpoints & Chapman Reflex re Knee:

SCS tenderpoints:

- **ACL (Ant Cruciate Ligament)**
- **PCL (Post Cruciate Ligament)**
- **MM/MCL (Medial Meniscus/
Med Collateral Lig)**
- **HAM (MED & LAT Hamstrings)**

Chapman Neurolymphatic Reflex:

- **Groin Gland (Inguinal Lymphatics)**

Regenerative Medicine

including Prolotherapy is a growing field with exciting promise.

Dx is currently based on Hx, mechanism of injury, knowledge of anatomy, and palpation of point tenderness & TTAs (tissue texture abnormalities) at specific soft tissue sites-ligaments- supported by Ultrasound imaging.

Clinically, one of the most common areas to receive prolotherapy is the knee.

As DOs, can we influence its pain, tenderness, swelling and functionality with our hands to require less invasive treatment ?

Introduction: Strain Counterstrain



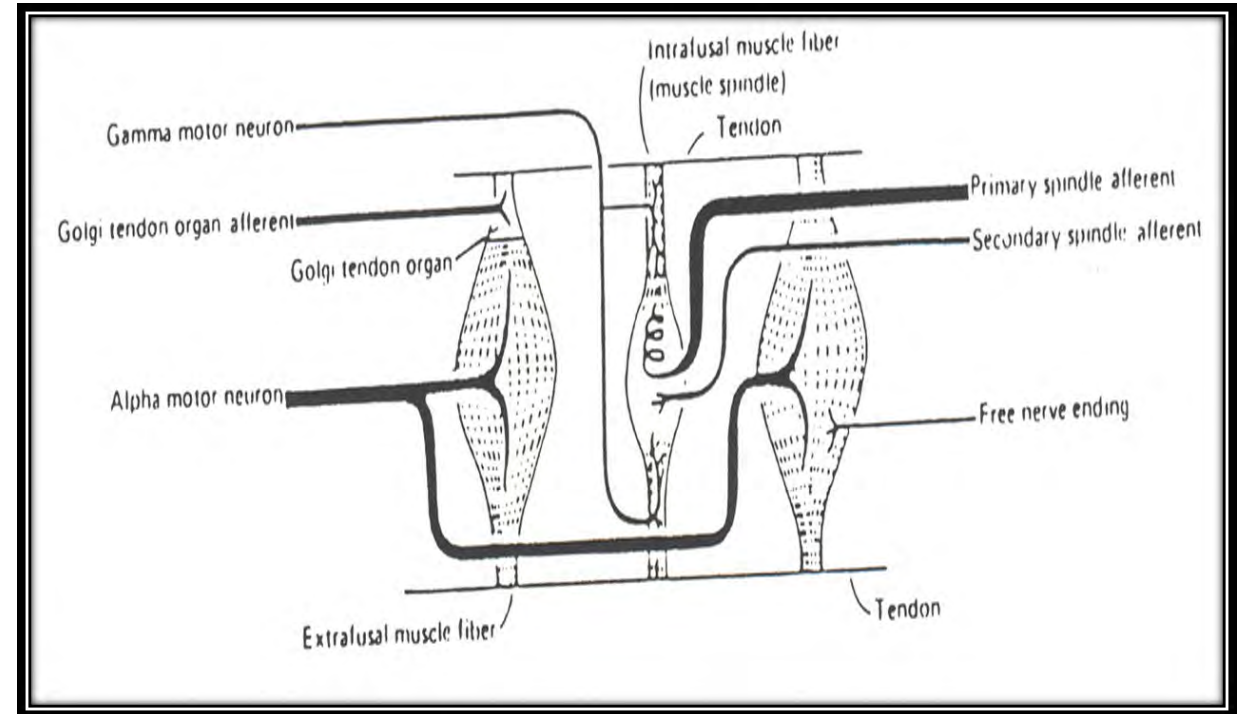
Larry Jones, DO, FAAO

- Lawrence H. (Larry) Jones, DO, FAAO, in 1950's, developed a system of Osteopathic treatment that began with having the patient in a position that provided the most comfort until relief of pain (and release of soft tissue tension) occurred.
- Over time, he identified reproducible tenderpoints (tps) corresponding to certain pain patterns, and eventually associated clinical visceral symptoms, which would give relief when held by positions that provided maximal relaxation of those points.
- This system became known as Strain Counterstrain (SCS), now Counterstrain (CS), and the tenderpoints as Jones' or counterstrain tenderpoints (tps).
- He found them on the posterior & later anterior body, the extremities, and the cranium.
- Although a soft tissue phenomenon, he named them for the nearest bony landmarks.

Introduction: Physiology of SCS

In time, the physiology of the release was discovered:

- The position of maximum relaxation of the tenderpoint gives **afferent** feedback of the **gamma gain** (high tone of the gamma muscle fibers in the muscle spindle) and other mechanoreceptors to the brain via the spinal cord.
- **Efferent** response from the CNS, via the corticospinal tracts, decreases this dysfunctional amount of gamma gain back down to the normal resting tone of the muscle. This leads to relaxation of the alpha muscle fibers and the muscle in total.
- This **somatic dysfunction of the CNS** is relieved by reeducating the brain how much gamma tone is needed for relaxation to occur.

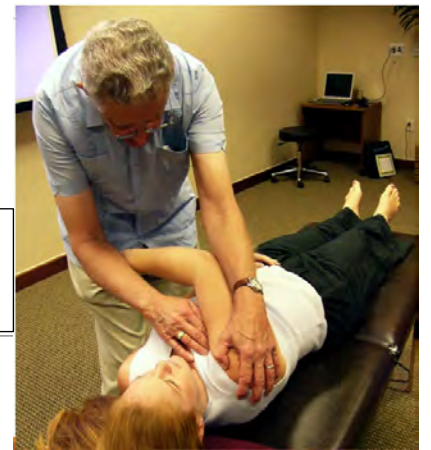


Myers, H, et al, *Clinical Application of Counterstrain*, compendium ed, 2012 Osteopathic Press, Tucson AZ.

Introduction: SCS Treatment Process

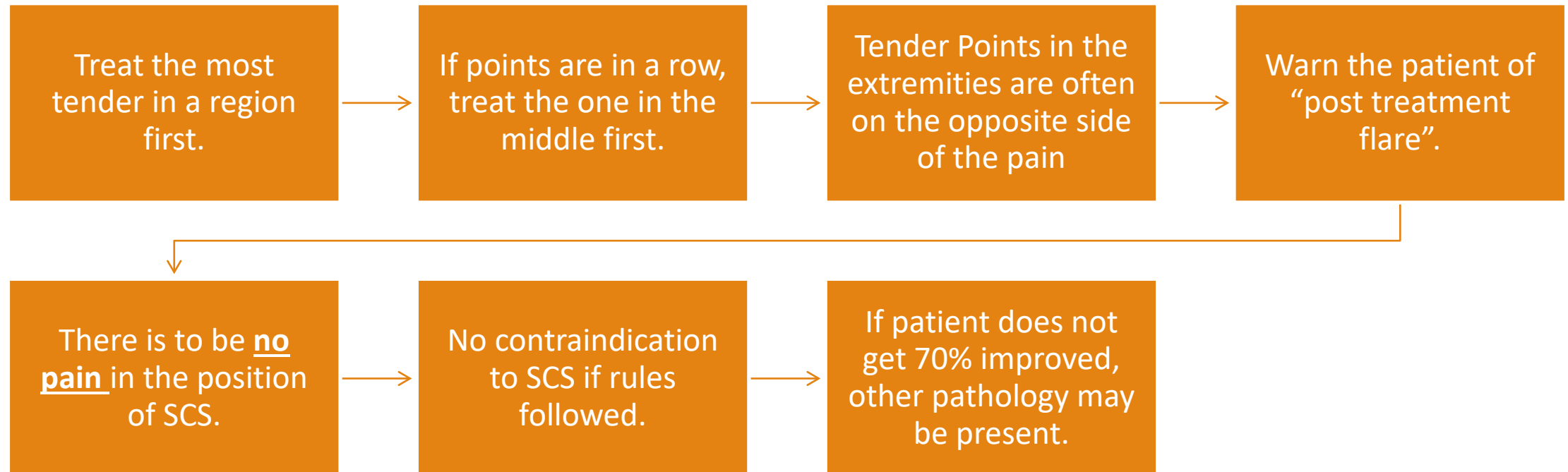
Myers, H, et al, *Clinical Application of Counterstrain*, compendium ed, 2012 Osteopathic Press, Tucson AZ.

Harmon Meyers, DO
& Brigid Stigler, DO



1. Dx via discrete tenderness of the tp by the patient, based on suspicion from the Hx and/or by screening on PE using a **testing pressure** (nailbed blanches)
2. Passively position the patient to place the tp in its most relaxed position (**seek ease & avoid bind**) and retest for reduced tenderness from the patient (**>70% reduction** by convention). Fine tune if needed.
3. As the release occurs, constantly adapt position to small changes in soft tissue tone to maintain maximum ease (**wobble point**) using a **monitoring pressure** (no nailbed blanch) until no further change occurs (~ **90 sec** by convention)
4. 3 phases of release occur and can be palpable during the release:
 - **Neurologic**-the tenderness (nociception) decreases
 - **Circulatory**-fascial restriction releases so that a newly released pulse of fresh blood is palpable
 - **Lymphatic**-the tissue softens/empties as the lymphatic fluid returns to circulation
5. Slowly, passively return the position of the patient to one of neutral rest while maintaining your monitoring finger. Retest for improvement/resolution of the tenderness.

Guidelines for Sequencing CS Tx:



Myers, H, et al, *Clinical Application of Counterstrain*, compendium ed, 2012 Osteopathic Press, Tucson AZ.

What is a Chapman Neuro-Lymphatic Reflex?

Traditional: A disruption of the lymphatic system, innervated by ANS imbalance, related to the organ/condition for which it is named.

Chapman described success with rapid superficial treatment of CRs AFTER treating biomechanics of the pelvis/sacrum.

It has been postulated that perhaps due to changes in our world 100 years later-genetically, phenotypically, with lower levels of physical activity and quality of air, water, soil and foods-that such superficial Tx may no longer be as effective.

Fossum, C, Kuchera, ML, Devine, WH, and Wilson, KL, Ch 40.E. A Modern Approach to Chapman Reflex Points, in *Foundations of Osteopathic Medicine*, 4th ed, Seffinger, M, ed., Wolters Kluver, 2018.

Theory:

What is a Chapman Neuro-Lymphatic Reflex?

Newer: A marked deep fascial distortion (NOT the 6 superficial FDM patterns), ANS maintained, which happens to involve the innervation to the named organ/condition, that maintains significant biomechanical somatic dysfunction as well.

Resolution of the Chapman Point & its fascial distortion improved visceral as well as biomechanical function, as measured clinically by a Northwest Study Group.

Worden, KA, Kania, A, and Lewis JA, *An Observational Study of Findings Associated with the Treatment of Chapman's Neurolymphatic Reflexes in Selected Study Subjects: Preliminary Report*, prepublication.

What's in a name?

Because Chapman died prematurely, most of what we know of his writings is from his student, Charles Owens, DO, who studied Chapman's work extensively, called himself the Interpreter, and wrote his observations in a textbook in 1937.

Generations of DOs have been perplexed by the description of the palpable findings of a Chapman reflex point.

Owens used the term **gangliform contracture**, a tissue texture abnormality (TTA) that has been described hypothetically as a discrete structure like a pea, tapioca bead, or seed.

Owens, C, *An Endocrine Interpretation of Chapman's Reflexes*, 1937.

What's in a name?

In 2008, the AAO held the 1st conference on Chapman reflexes in over 30 years, at AZCOM. It was discovered that there were 2 known remaining copies of an original text written by Chapman himself, one of which was the personal copy of Beryl Arbuckle, DO with her notes in the margins (now housed at WVCOM).

They discovered that Chapman used the phrase **ganglion formed contracture** ie, hypertonicity often with bogginess, instead of **gangliform contracture**.

This has broadened the diagnostic findings used to ID Chapman reflexes leading to additional study by a Northwest study group and others.

Chapman, F, *Chapman Reflexes*, 1929.

Newer Approach to Tx:

(Judy Lewis, DO, FAAO, FCA and others in a NW Study Group)

1. Evaluate anterior points bilaterally to screen for diagnosis.
2. ID those which have S/Sx (TTA +/-pain). Screen biomechanical changes nearby or distally, eg, IR/ER of LE by leg rolling, amount of dorsiflexion of the ankle.
3. Tx: connect the Ant & Post points indirectly to each other fascially and to the embryologic midline energetically.
4. Tx A & P points simultaneously on the worst side first, then the other side if needed
5. Reassess the points, but also biomechanical changes

Worden, KA, Kania, A, and Lewis JA, *An Observational Study of Findings Associated with the Treatment of Chapman's Neurolymphatic Reflexes in Selected Study Subjects: Preliminary Report*, prepublication.

Tx: NEW Chapman Reflex Technique

1. Palpate posterior point: cephalad hand, use middle or index finger pad or tip.
2. Palpate anterior point: caudal hand, use middle or index finger.

3. Take each point (A & P) fascially indirect or to point of ease in the 3 cardinal planes (sup/inf, med/lat, CW/CCW).
4. Connect the 2 points to each other by intention (approximate-may feel a suction feeling when they connect and the anterior point will become less tender to the patient).
5. Connect the 2 points to the midline (embryologic notochord) by intention (if able).
6. Allow the tissues to unwind & soften until they cease (a systemic Still Point).
7. Reassess for softening/less tender or boggy, ease of leg roll & ankle dorsiflexion

Worden, KA, Kania, A, and Lewis JA, *An Observational Study of Findings Associated with the Treatment of Chapman's Neurolymphatic Reflexes in Selected Study Subjects: Preliminary Report*, prepublication.

FALL BY A NOVICE HIKER

CASE

History:

cc: R Knee Pain

HPI: Pt. is a 40 y/o M being seen in Urgent Care, who states he is starting to build up to hike the Grand Canyon next summer. As a novice hiker, he has been carrying a backpack full of emergency items including a sleeping bag. He was hiking at a local state park 3 days ago when he stepped on a rock, felt his R ankle give way, followed by **pain on his inner R knee**, then landed flat on his back. The sleeping bag cushioned his back, neck & head. Pain is 5/10 in his R knee. Pain is better with an ice pack & ibuprofen and worse standing and walking. He denies pain radiation, numbness/weakness of the legs, or bowel/bladder control changes.

Meds: ibuprofen 400mg ii bid **ALL:** NKDA **PMH:** HTN **PSH:** **R Inguinal herniorrhaphy**
Soch: married, bookstore owner, Habits: CAF (1-2 c/d), ETOH: 2beers/wk, nonsmoker, occas mj edibles, **FamH:** noncontrib **ROS:** otherwise neg.

Osteo Hx: Birth: VBAC w/o complications, **chronic R ankle inversion sprains** in HS basketball



STOP! Time to put on your osteopathic thinking cap

Given the Hx so far, what osteopathic findings would you expect to find on your osteopathic exam?

Does this patient require neurologic testing today?

What Special Orthopedic Tests are important to perform today?

Are there indications or contraindications to OMT in this patient today?

Will this patient likely need imaging, lab testing medication, or referral to specialist?

PE:

VS: 142/74 88 16 98.4 6'1" 184#

Gen: adult male in **mild-mod distress** walking stiffly w R leg

HEENT: No lesions. Eyes clear. Ears: TMs grey & mobile. N: no discharge.
Thr: moist w/o erythema or discharge.

Neck: supple, nontender, full ROM.

CV: HRRR w/o m, **mild-mod edema R knee & lat ankle**, distal pulses full, CR < 2 sec R foot

Lungs: CTA

Abd: BS x4 soft, nontender w/o HSM, mass, or guarding

Neuro: LEs: DTR: +2/4, Motor: 5/5, SI (LT)

Skin: **intact, warm**, erythema R knee with mild-moderate swelling , **no ecchymosis**

PE cont: Osteo/Msk Exam:

Head: CRI: R 8, decr A & V, SBS Compression, Temps: asym

Cervical: lordosis incr & ROM full

Thoracic: kyphosis incr & ROM full; no scoliosis

Ribs: inhaled R11-12 R, muscle HT & tp: QL R

Abd/Visc: diaphragm restricted R, **Chapman: + groin gland R**

Lumbar: lordosis decreased, no scoliosis or tender to percus spine, L5 FRS L, paraspinal m HT

Sacrum: seated flx + R, R on L torsion

Pelvis: stand flx + R, R sup innominate shear, m HT HAMs

PE cont: Osteo/Msk Exam:

LE:

Hip/Thigh: SLR, FABERE's, Thomas & Hip Scour Test neg. HT & tps:
Med & Lat Hamstrings R

Knee/Leg: R: point tenderness med jt. line, Ant & Post drawer, Lachmanns, neg. collat ligaments intact. McMurray's sl + w click R MM, No apprehension, +mild effusion; muscle HT & tps: **ACL, PCL, MM/MCL**, PES, FH R

Ankle/Foot: arch dropped R, decreased dorsifl R, Ant Ankle drawer & Talar Tilt + R, Thompson neg. tp: Lateral ankle (LA) R

Assessment:

1. R Medial Meniscus Sprain
2. R Ankle Inversion Sprain
3. Muscle Spasm
4. Somatic Dysfunction: LE, V, L, S, P regions

Plan:

Indications & no contraindications for OMT.

Options discussed w Pt for Tx including OMT.

Consent obtained.

OMT performed to 5 regions using SCS & Visc with good relief.

Warned re possible Tx side effect of soreness 1-3 d.
Drink extra water and take ibuprofen prn

Taught self stretch for Hamstrings & Piriformis

Consider X-ray Lumbar if not improving clinically and balance retraining. No current indication for imaging, lab or referral.

Continue w RICE (Rest, Ice, compression, elevation)

F/U in 2 weeks.



STOP! Put on your osteopathic thinking cap again

Given the Hx & PE, what are the most important somatic dysfunctions to address today?

Which of the 5 models will you choose for Tx approach in this patient today?
(Biomechanic, Behavioral, Metabolic/Energetic, Neurologic, Respiratory/Circulatory)

What technique(s) will you use?

How will you sequence your Tx?

--Where do you start & why?

--Where do you go next & why?

--How do you know when the Tx is done?

LAB



Fred Mitchell, Jr, DO, FAAO & Kate Worden, DO, FAAO

Models: Biomechanical/Neurologic/Circulatory
Techniques: SCS & Visceral (Chapman)
Sequence:

Position: Supine

LE:

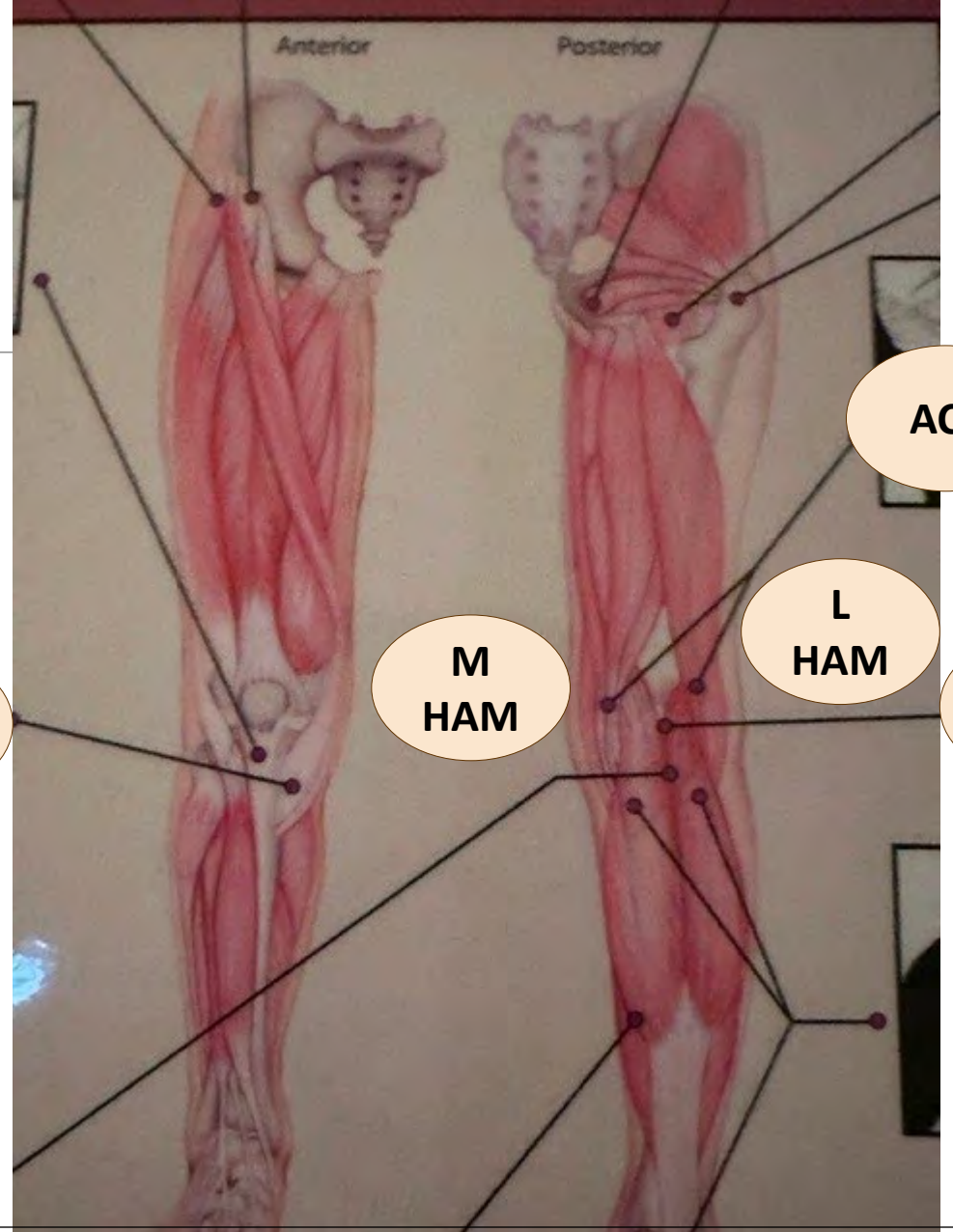
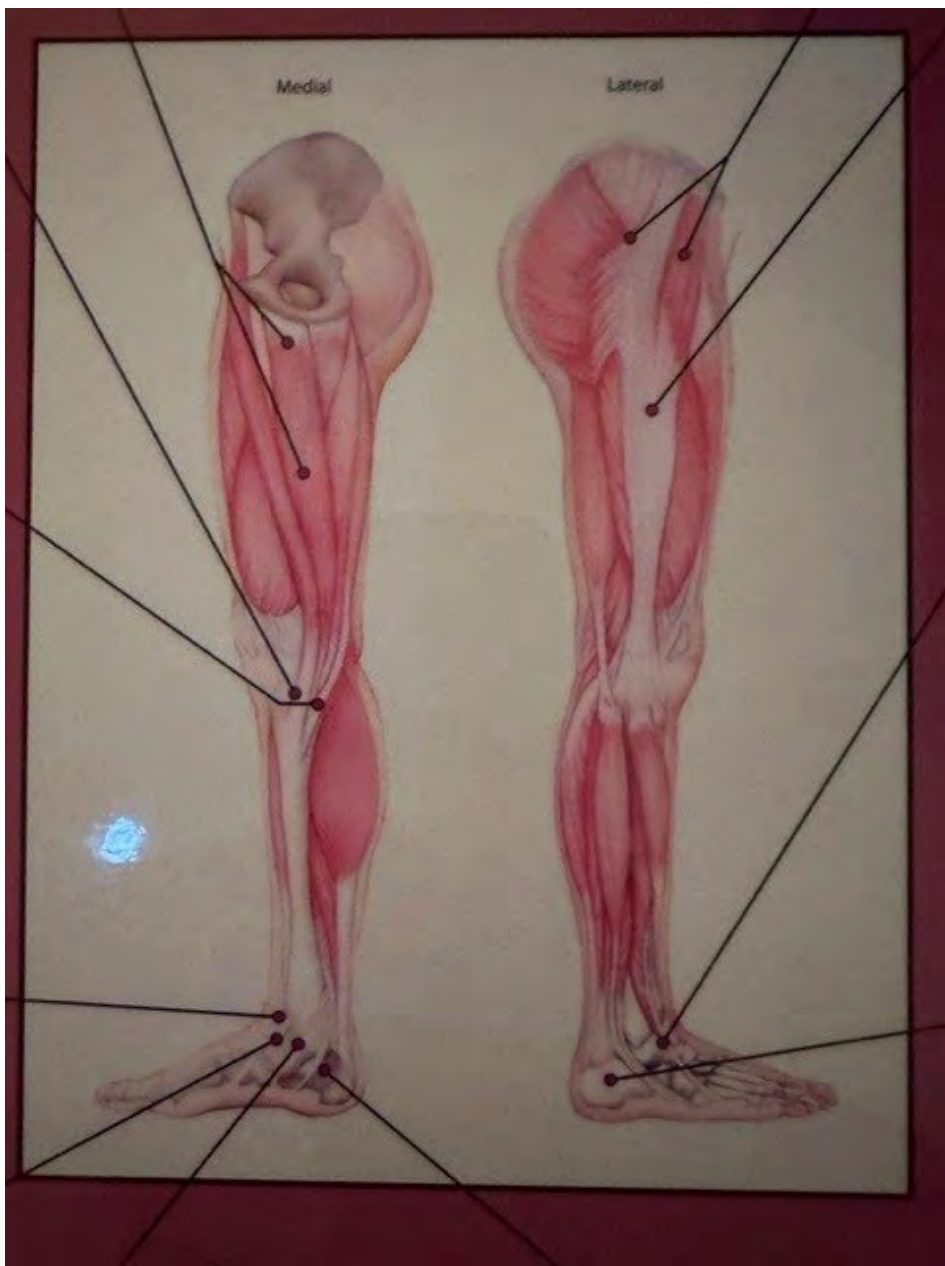
Knee/Leg: **ACL/PCL R, MM/MCL R**

Hip/Thigh: **Med/Lat HAM R**

Visceral:

Chapman Reflex: **Groin Gland R**

To emphasize the ease of the sequence, we will do the entire Tx with Dr. A, then repeat with Dr B.



Kusunose, RS, *Strain Counterstrain Techniques*, placard, from the work of Lawrence Jones, DO, FAAO, Jones Institute, Carlsbad CA www.jiscs.com

POSTERIOR KNEE TENDER POINTS

ANTERIOR CRUCIATE LIGAMENT

Location of Tender Point: Adjacent to the distal hamstring muscle at the level of the upper popliteal space. It can be either medial or lateral. If medial, it is found on the lateral aspect of this tendon; if lateral, it is found on the medial aspect of that tendon.

Anatomical Correlation: Anterior cruciate ligament.

Direction to Press on Tender Point: Press from posterior to anterior.

Treatment Position(s): With patient supine, place a rolled towel under the lower femur. Exert pressure on the upper tibia from anterior to posterior, creating a shearing force toward the table. The force needed may be as much as 50 pounds. Fine-tune with internal rotation of the tibia using pressure on the foot.

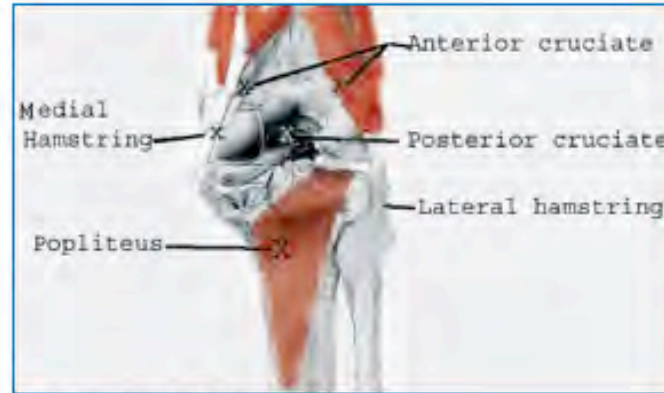
Frequency of Occurrence: Uncommon.

Clinical Correlation(s): Deep knee pain posteriorly.

Associated Pain Referral Pattern: Same.

Alternate Names/Nomenclatures: None.

Explanatory Notes: None.



Posterior knee Tender Points



Treatment position

tp: Can be med or lat, upper popliteal space adjacent to the med or lat hamstring tendon

Tx: Pt supine w rolled towel/pillow post ABOVE the knee. (ANT = ABOVE) With hands on ant prox tibia, slowly lean your wt. on it creating a shearing force (may need 50#). (Fine tune w IR tibia also releases Popliteus.)

Myers, H, et al, *Clinical Application of Counterstrain*, compendium ed, 2012 Osteopathic Press, Tucson AZ.

POSTERIOR KNEE TENDER POINTS

POSTERIOR CRUCIATE LIGAMENT

Location of Tender Point: In the center of the popliteal space.

Anatomical Correlation: Posterior cruciate ligament.

Direction to Press on Tender Point: Press from posterior to anterior.

Treatment Position(s): With patient supine, place a rolled towel under the upper calf. Exert pressure on the lower femur from anterior to posterior, creating a shearing force toward the table. The force needed may be as much as 50 pounds. Fine-tune with internal rotation of the tibia using pressure on the foot.

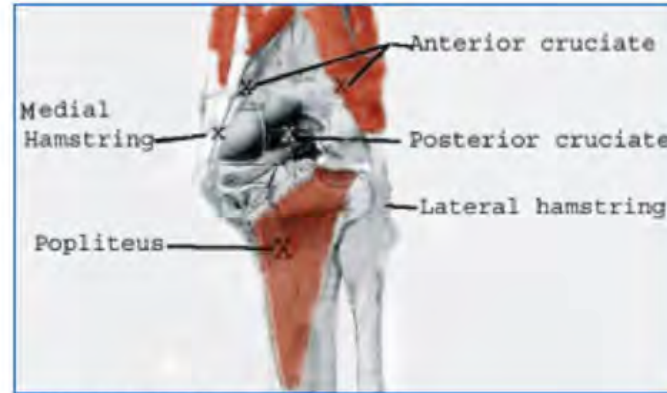
Frequency of Occurrence: Uncommon.

Clinical Correlation(s): Deep posterior knee pain.

Associated Pain Referral Pattern: Same.

Alternate Names/Nomenclatures: None.

Explanatory Notes: None.



Posterior knee Tender Points



Treatment position

tp: Mid popliteal space

Tx: Pt supine w rolled towel/pillow post BELOW the knee.

With hands on ant distal femur, slowly lean your wt. on it creating a shearing force

(may need 50#).

(Fine tune w IR tibia also releases Popliteus.)

Myers, H, et al, *Clinical Application of Counterstrain*, compendium ed, 2012 Osteopathic Press, Tucson AZ.

Medial Meniscus (MM)/MCL

MEDIAL COLLATERAL LIGAMENT

Location of Tender Point: Posterior and medial to patella over the meniscus.

Anatomical Correlation: Tibial (medial) collateral ligament.

Direction to Press on Tender Point: Press from medial to lateral.

Treatment Position(s): With patient supine, abduct lower limb at the hip so the lower leg hangs off the table with knee flexed to about 40°. The back of the thigh remains on the tabletop. Exert slight adduction and slight internal rotation on the lower leg to fine-tune the mobile point.

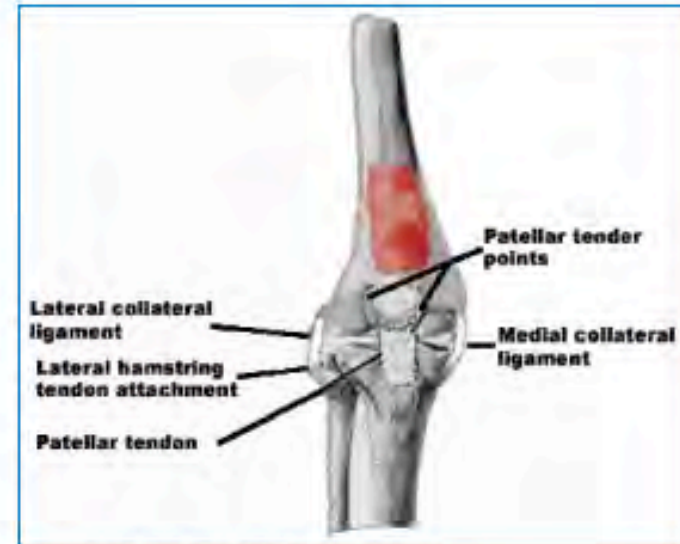
Frequency of Occurrence: Common to uncommon.

Clinical Correlation(s): Pain in the area of the medial knee, often intermittent (twitchy) in nature.

Associated Pain Referral Pattern: Same.

Alternate Names/Nomenclatures: Jones called this "Medial Meniscus."

Explanatory Notes: None.



Anterior Knee Tender Points

tp: inf med to patella/ medial joint line or inf @ MM

Tx: Pt. supine, sit facing side.
ABd Pt. hip w leg hanging off w knee flexed ~40.
SI ADd & IR lower leg to fine tune



Treatment position

Myers, H, et al, *Clinical Application of Counterstrain*, compendium ed, 2012 Osteopathic Press, Tucson AZ.

M HAM
Medial Hamstring

tp: distal med tendon attachment to the post med tibia

Tx: Pt supine. Stand ipsilat. Flex Pt's hip to 90, Flex knee to ~45, foot in fold of your flexed knee. Grasp post med calf to rollback toward you to ER tibia

Myers, H, et al, *Clinical Application of Counterstrain*, compendium ed, 2012 Osteopathic Press, Tucson AZ.

POSTERIOR KNEE TENDER POINTS

MEDIAL HAMSTRING TENDON

Location of Tender Point: On the tendon of the medial hamstring at, or just superior to, its attachment to the posterior medial surface of the tibia.

Anatomical Correlation: The tendon of the medial hamstring muscle at its attachment to the tibia.

Direction to Press on Tender Point: Press from posterior to anterior.

Treatment Position(s): With patient supine, stand on the same side as the Tender Point with one foot on the table. Place patient's foot in the fold of your flexed knee. The patient's hip is flexed about 90° and the knee is flexed more acutely. Grasp the underside of the patient's calf and externally rotate the tibia on the femur.

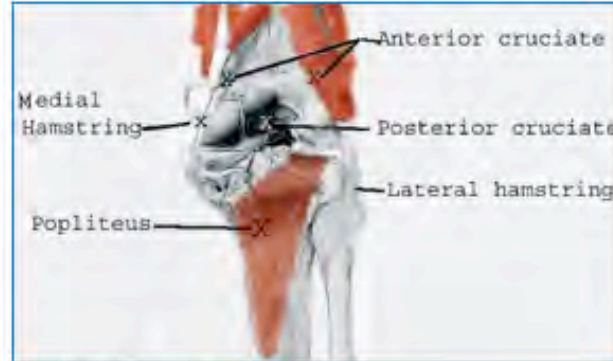
Frequency of Occurrence: Uncommon.

Clinical Correlation(s): Pain in the posterior medial knee area especially when walking or running.

Associated Pain Referral Pattern: Same.

Alternate Names/Nomenclatures: None.

Explanatory Notes: None.



Posterior knee Tender Points



Treatment position

POSTERIOR KNEE TENDER POINTS

LATERAL HAMSTRING TENDON

Location of Tender Point: On the lateral hamstring tendon at or near its attachment to the posterior lateral surface of the proximal fibula.

Anatomical Correlation: As stated.

Direction to Press on Tender Point: Press posterior to anterior.

Treatment Position(s): With patient supine, abduct lower limb at the hip to allow the knee to be flexed. Flex knee slightly while the back of the thigh remains on the tabletop. Then exert slight abduction and slight external rotation on the knee to fine-tune the mobile point.

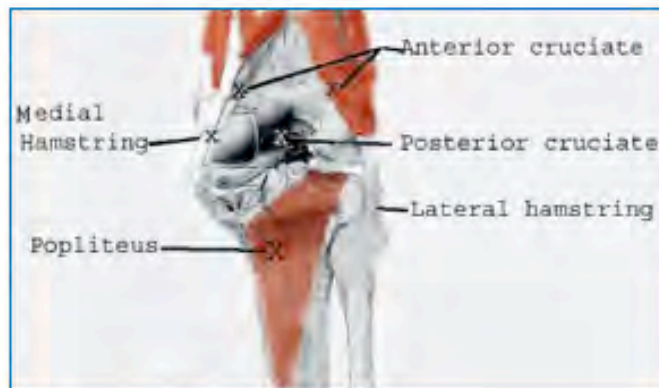
Frequency of Occurrence: Uncommon to rare.

Clinical Correlation(s): Pain in the posterior lateral knee.

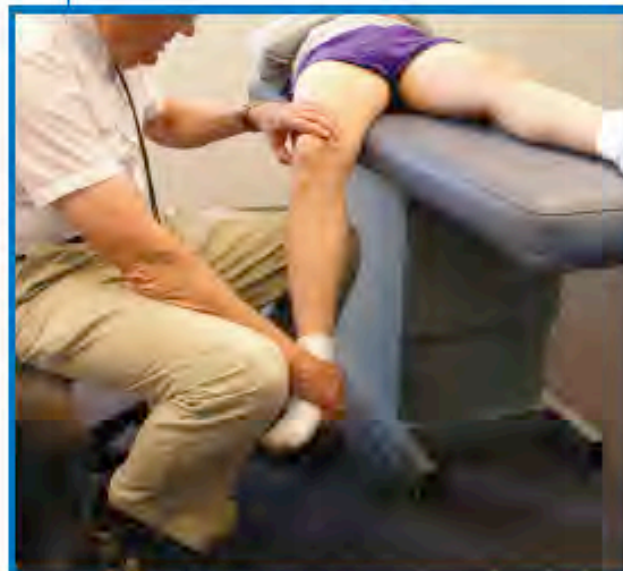
Associated Pain Referral Pattern: Same.

Alternate Names/Nomenclatures: None.

Explanatory Notes: None.



Posterior knee Tender Points



Treatment position

L HAM
Lateral Hamstring

tp: distal lat tendon
attachment to the post
prox fibula

Tx: Pt supine. Sit ipsilat.
Abd Thigh at hip. Flex knee
to barrier from hold on
lower leg.. Abd & ER knee
to fine tune.

Myers, H, et al, *Clinical Application of Counterstrain*,
compendium ed, 2012 Osteopathic Press, Tucson AZ.

Instead: Use Single Setup to Tx Med or Lat Hamstring!

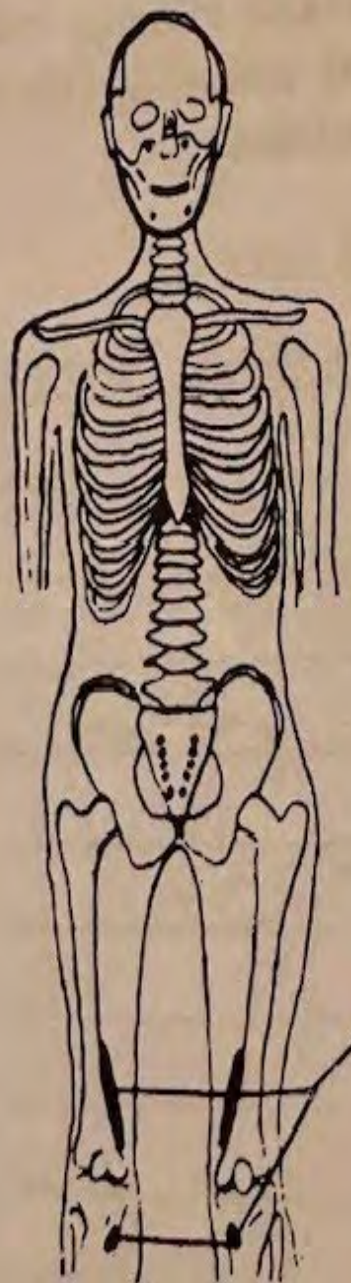
M HAM & L HAM
Medial & Lateral Hamstring

tp: distal tendon attachment to the post tibia (MHAM) OR prox fibula (LHAM)

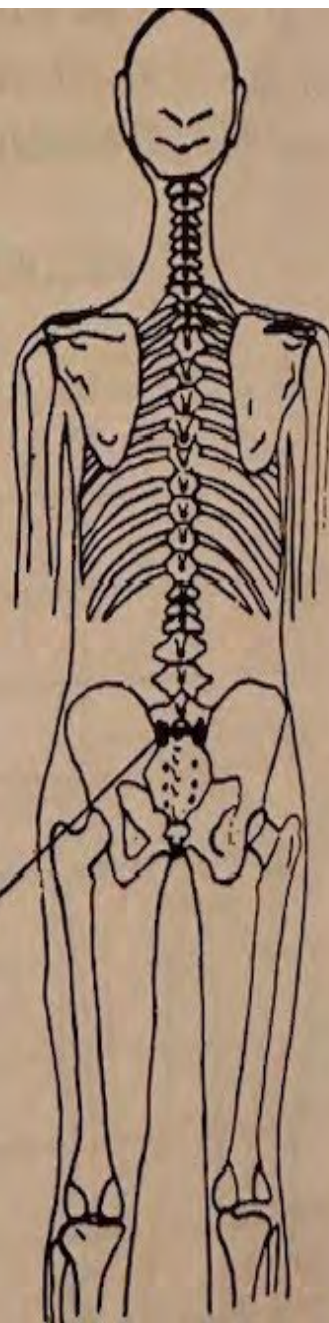
Tx: Pt supine. Sit ipsilat.
Abd Thigh at hip. Flex knee to barrier from hold on lower leg.
MHAM: Point heel to MH tp
LHAM: Point heel to LH tp
Add/Abd & IR/ER knee to fine tune.

Myers, H, et al, *Clinical Application of Counterstrain*, compendium ed, 2012 Osteopathic Press, Tucson AZ.





GROIN GLANDS



GROIN GLANDS:

Indications: LE or pelvic lymphedema, neuropathy, cold feet but ALSO LE myofascial/biomechanical SD

A: 1) distal 2/5 of sartorius m AND

2) tendinous attachment of sartorius just superior to medial condyle of the tibia

Can result in heavy feeling leg, engorgement or the inguinal lymph nodes

P: sup-lat SI Joint-palpate lat-to-med

Owens, C, *An Endocrine Interpretation of Chapman's Reflexes*, AAO, 1963, republished from 1937 with forward by Fred Mitchell, Jr, DO, FAAO.

References- Counterstrain:

- Myers, H, et al, *Clinical Application of Counterstrain*, compendium ed, 2012 Osteopathic Press, Tucson AZ.

- Glover, JC and Rennie, PR, *Foundations of Osteopathic Medicine*, 4th ed. Seffinger, Chapter 37 on Strain Counterstrain.
- Devine, WH, *ABCs of Counterstrain*, AAO OMED presentation 2021.
- Worden, KA, Cranial Counterstrain in *AAO Masters of Counterstrain Workshop*, 9/15-17/2023.
- Kusunose, RS, *Strain Counterstrain III: TMJ*, Course Syllabus, 1995, Jones Institute, Carlsbad CA.
- Kusunose, RS, *Strain Counterstrain Techniques*, placard, from the work of Lawrence Jones, DO, FAAO, Jones Institute, Carlsbad CA www.jiscs.com.
- Jones, LH, Kusunose, RS, and Goering, E, *Jones Strain-Counterstrain*, 1995, Jones Strain Counterstrain, Inc., Boise ID.

References-Chapman Reflexes:

Worden, KA, Kania, A, and Lewis JA, *An Observational Study of Findings Associated with the Treatment of Chapman's Neurolymphatic Reflexes in Selected Study Subjects: Preliminary Report*, prepublication.

Owens, C, *An Endocrine Interpretation of Chapman's Reflexes*, AAO, 1963, republished from 1937 with forward by Fred Mitchell, Jr, DO, FAAO.

Owens, C, *An Endocrine Interpretation of Chapman's Reflexes*, 1937.

Chapman, F, *Chapman Reflexes*, 1929.

Fossum, C, Kuchera, ML, Devine, WH, and Wilson, KL, Ch 40.E. A Modern Approach to Chapman Reflex Points, in *Foundations of Osteopathic Medicine*, 4th ed, Seffinger, M, ed., Wolters Kluver, 2018.

Kuchera, ML and Kuchera WA, *Osteopathic Considerations in Systemic Dysfunction*, greydenpress, Dayton OH, rev 2nd ed, 1994.

Thank
you!

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Saturday, December 14, 2024

2024 WINTER SCIENTIFIC SEMINAR

December 12-15, 2024

The Westin, Chicago-Lombard, IL





Poster Contest Introduction and announcement of Top Poster Presentations

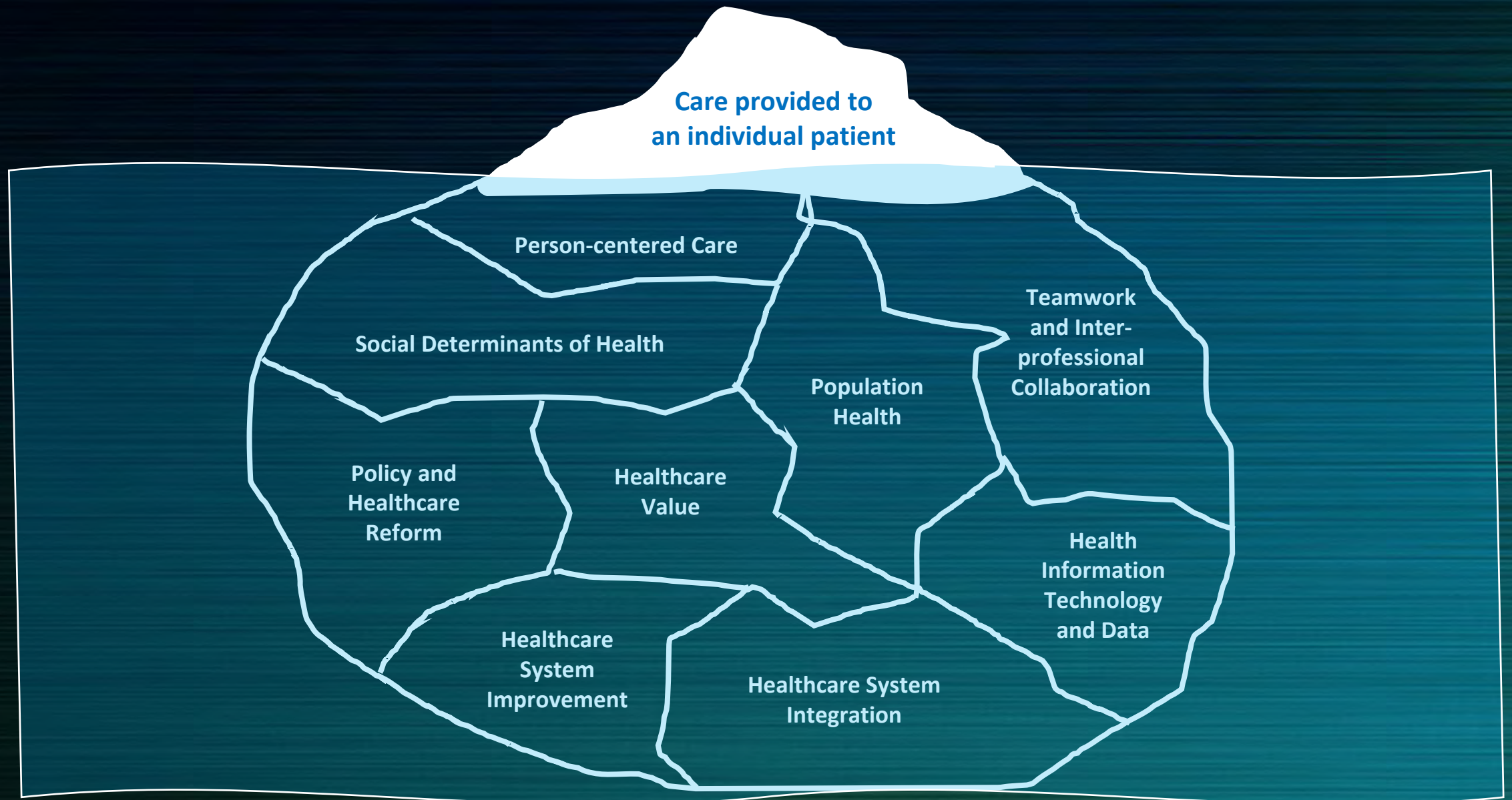


CURRENT AND FUTURE TRENDS IN MEDICAL EDUCATION AND SCHOLARSHIP



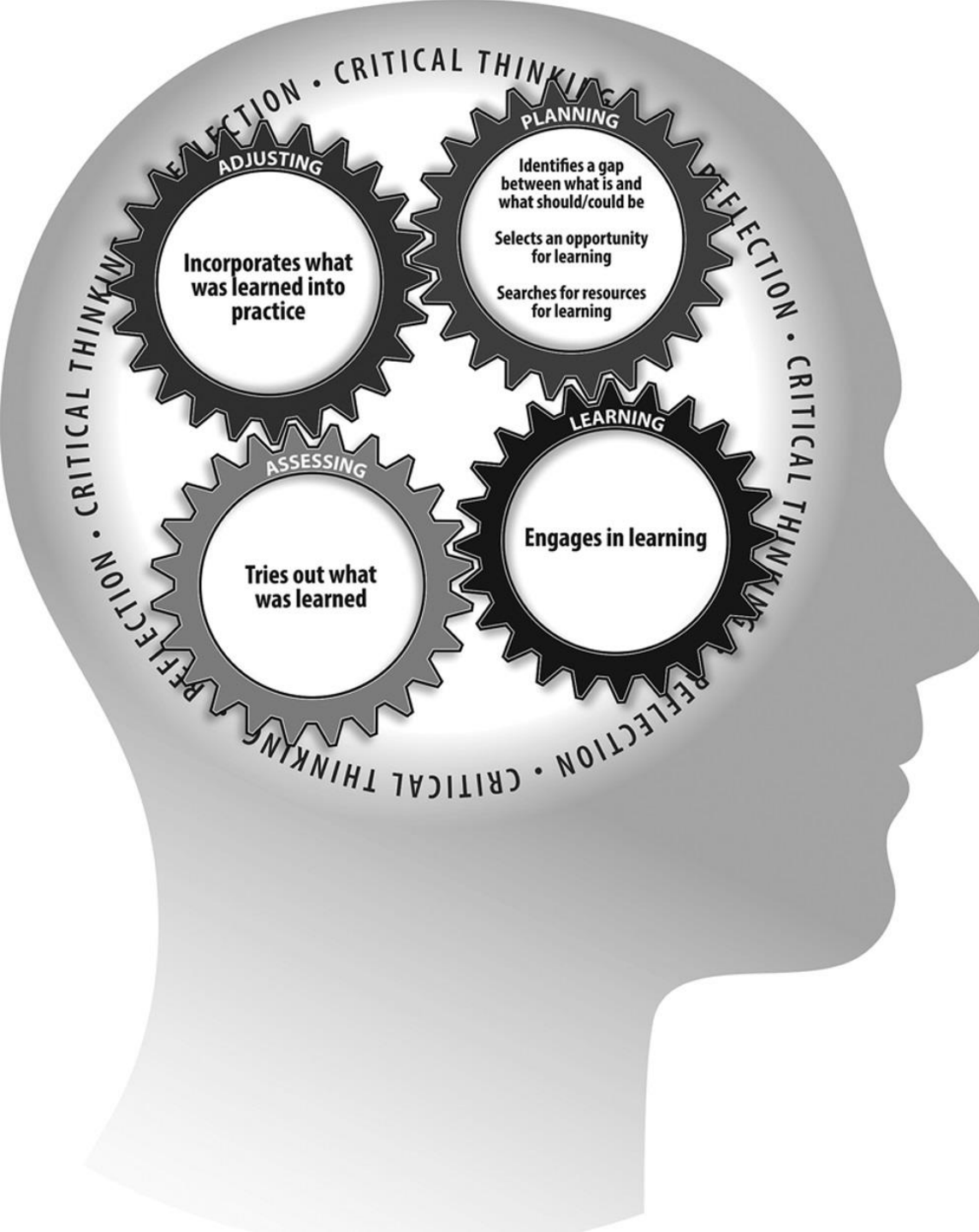
Hilal ARNOUK, MD, PhD

Midwestern University



The "Iceberg" of Health Care Concepts Impacting Health

Numerous factors and concepts are often underappreciated in the provider-patient interaction within a clinic room. Traditionally, these concepts have not been included in the scope of medical education.



Inside the mind of the Master Adaptive Learner

Thinking and Reasoning Competencies

Critical Thinking:

Uses logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.

Inside the mind of the Master Adaptive Learner

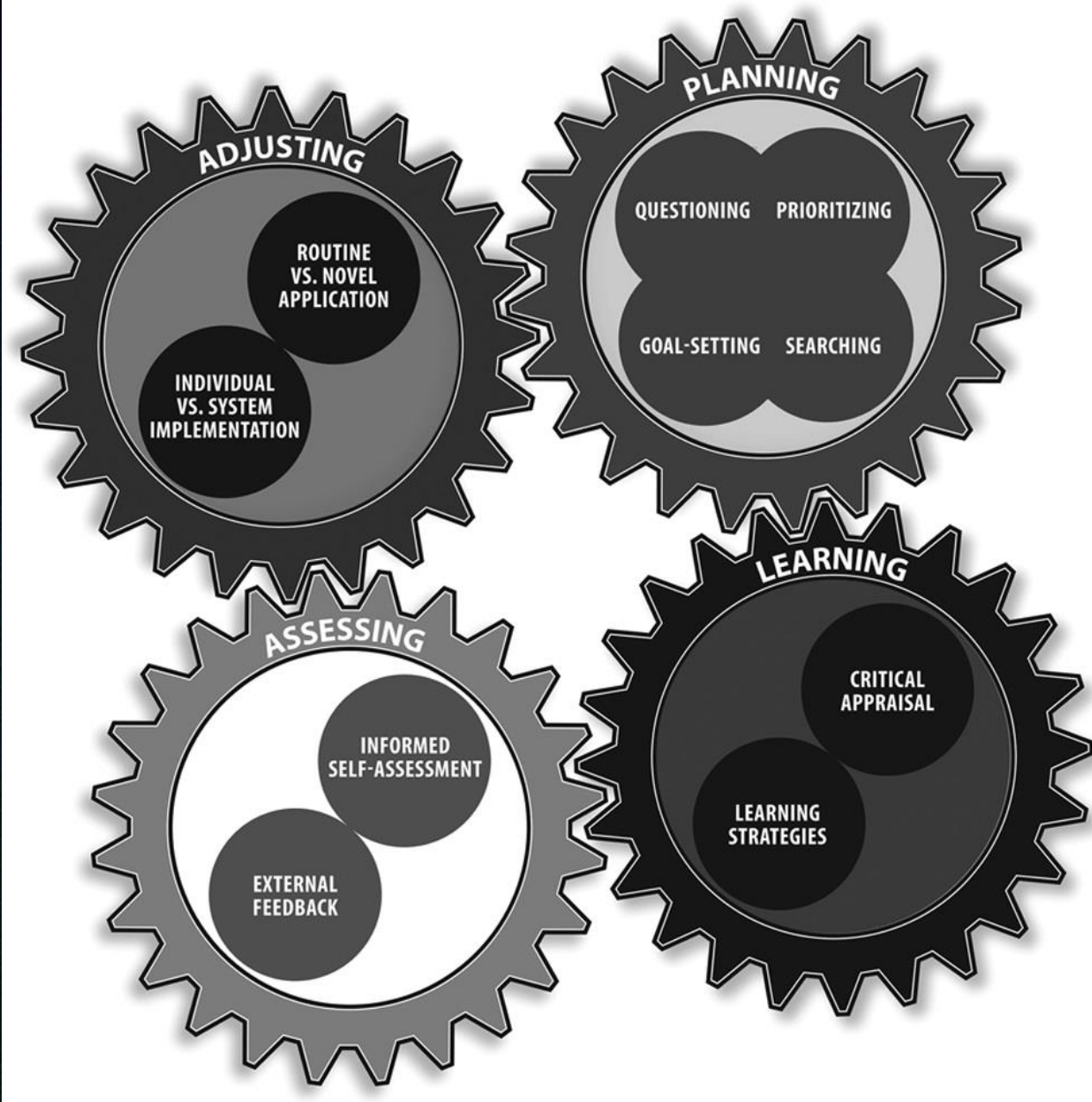
Thinking and Reasoning Competencies

Planning phase: identifying a gap; selecting an opportunity for learning.

Learning phase: seeking to understand the “what,” “how,” and “why” of the given situation by critically appraising different sources.

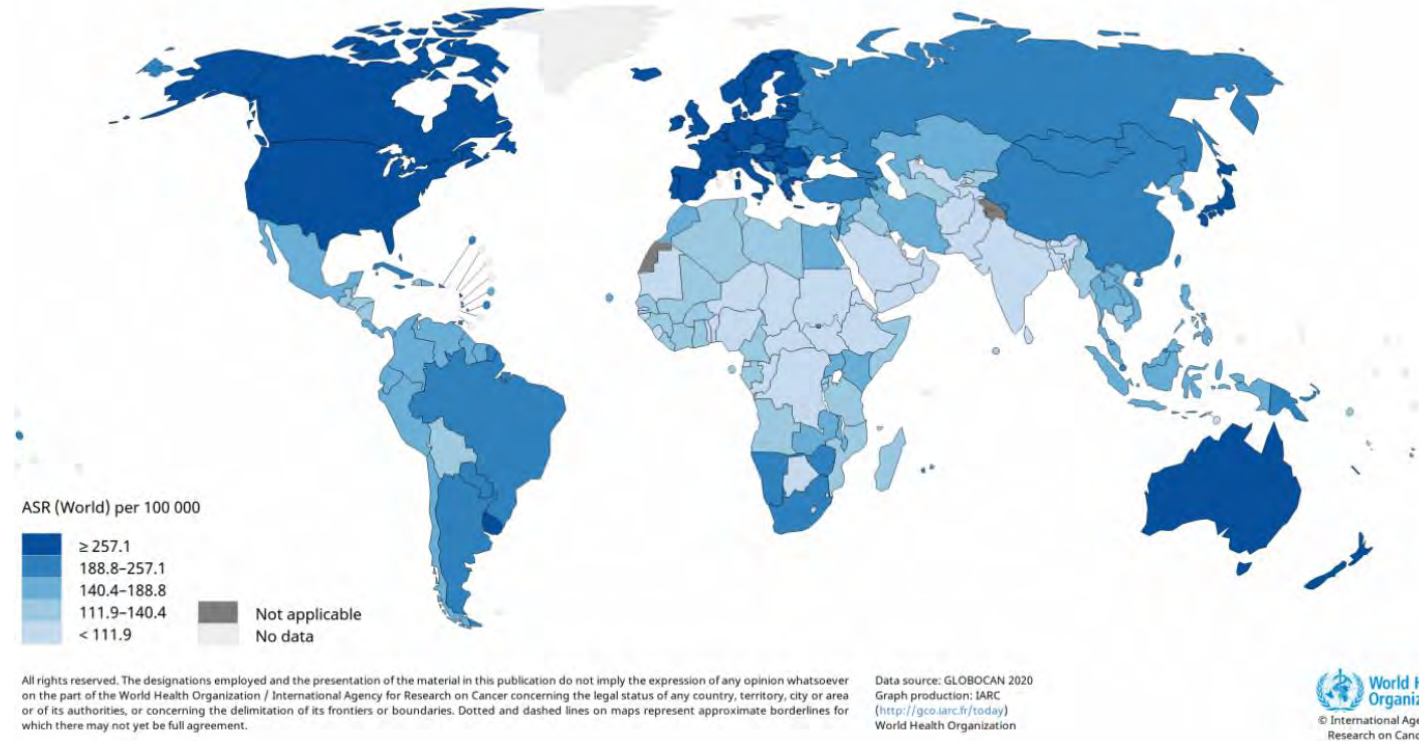
Assessing phase: trying out what was learned.

Adjusting phase: incorporating what was learned into practice.

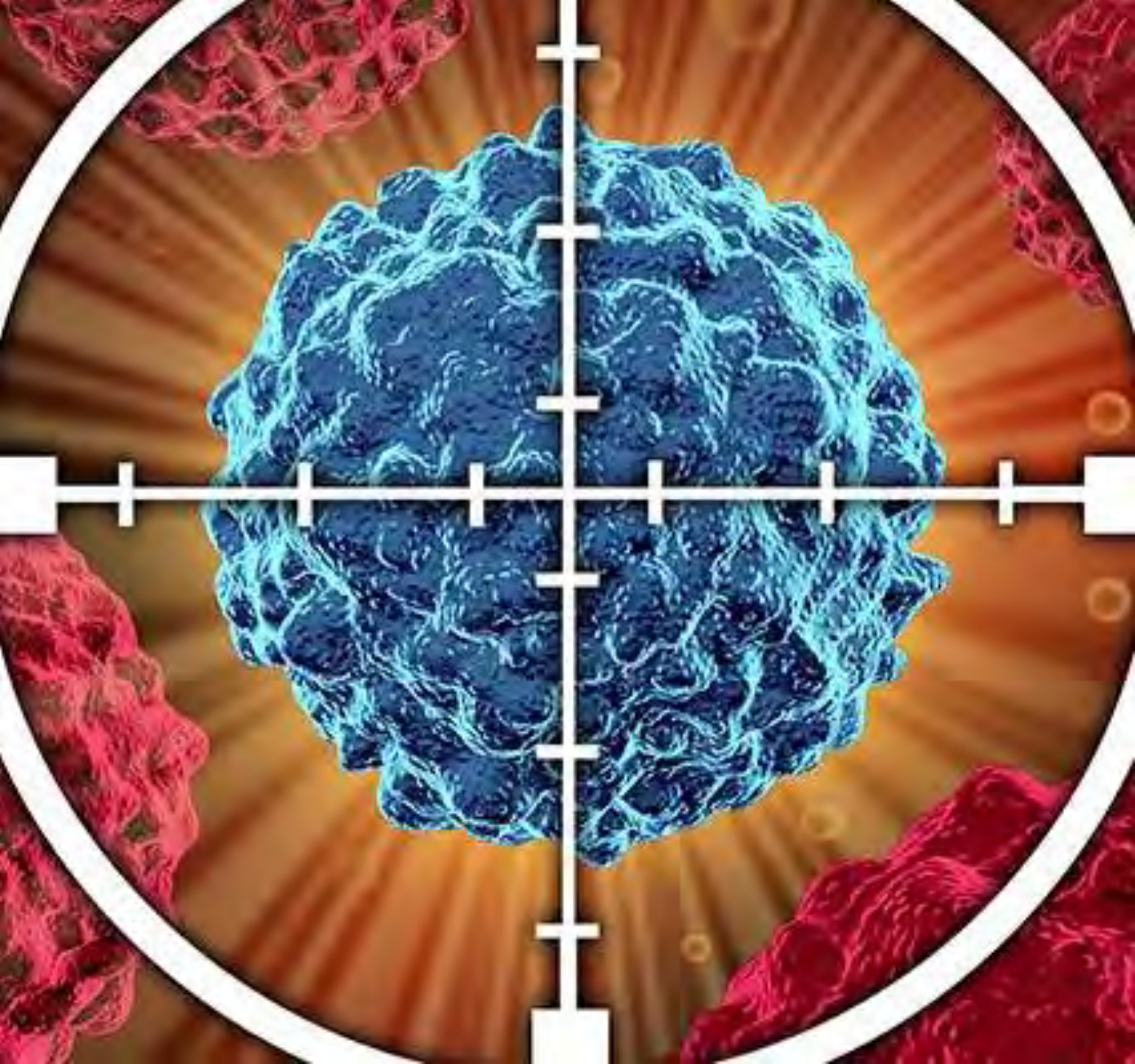


CANCER STATISTICS

Estimated age-standardized incidence rates (World) in 2020, all cancers, both sexes, all ages



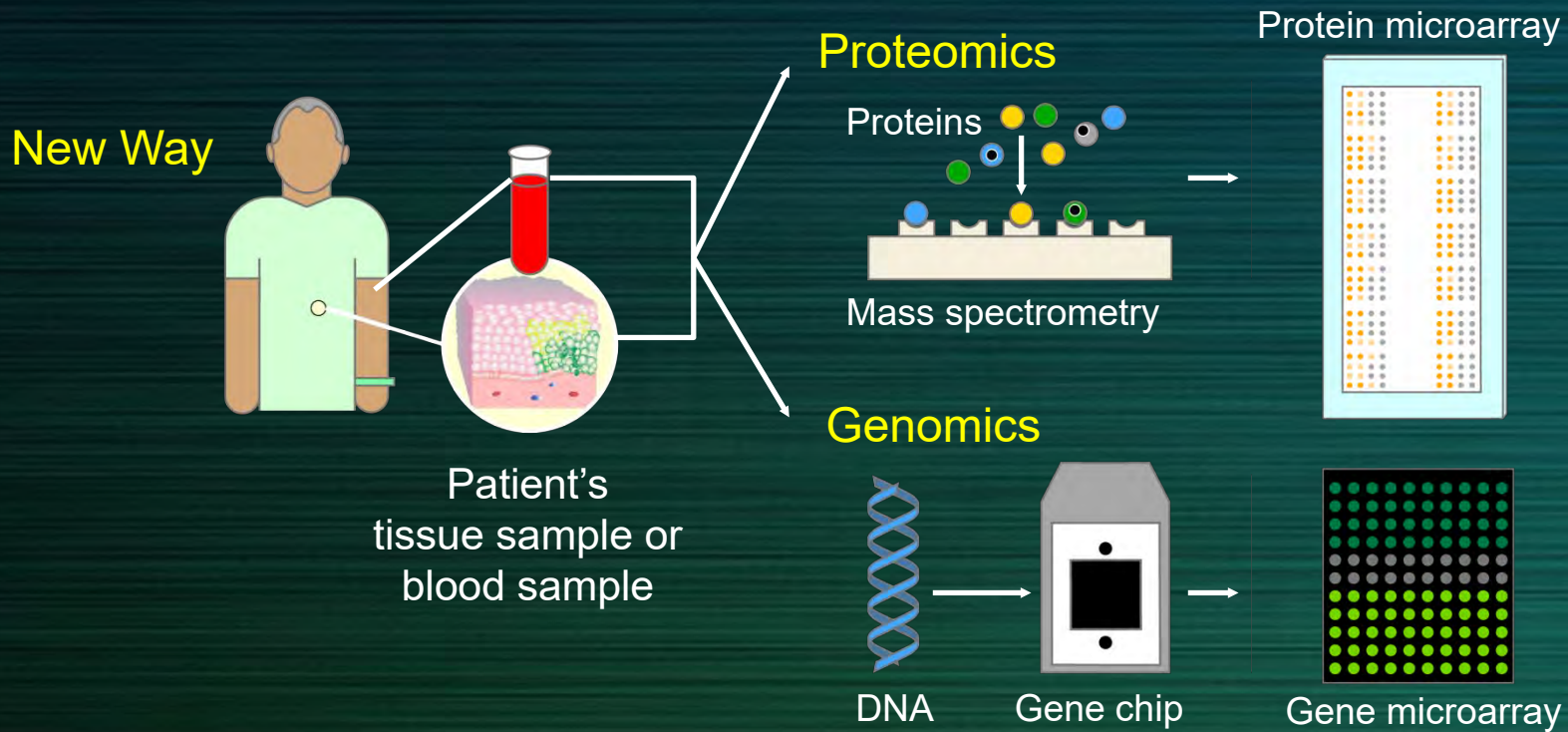
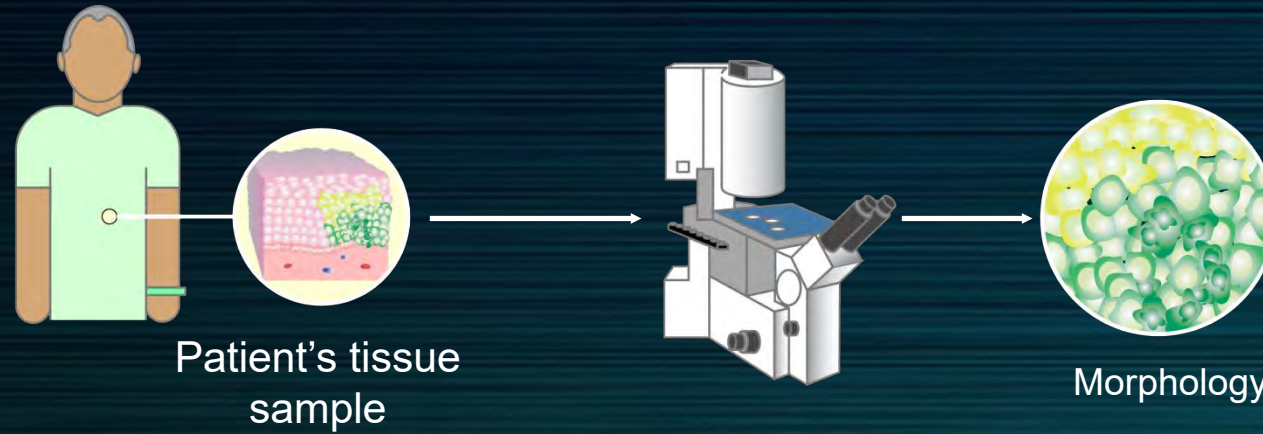
- Cancer is a leading cause of morbidity and mortality in developed countries, including the United States.
- 1 in 2 men and 1 in 3 women will experience cancer in their lifetimes.
- Cancer mortality is slowly declining ~ 20% over the last two decades.



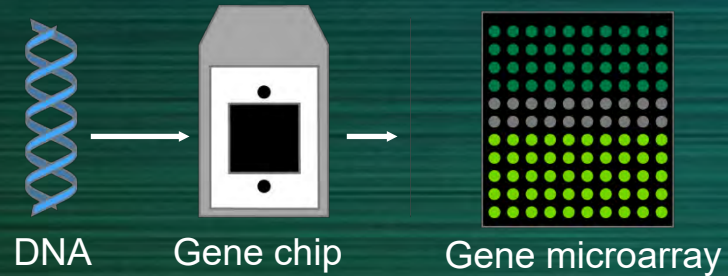
CANCER DIAGNOSTICS

Early detection of cancers, before they spread and become incurable, has been the best weapon in the war on cancer that began with the signing of the National Cancer Act in 1971

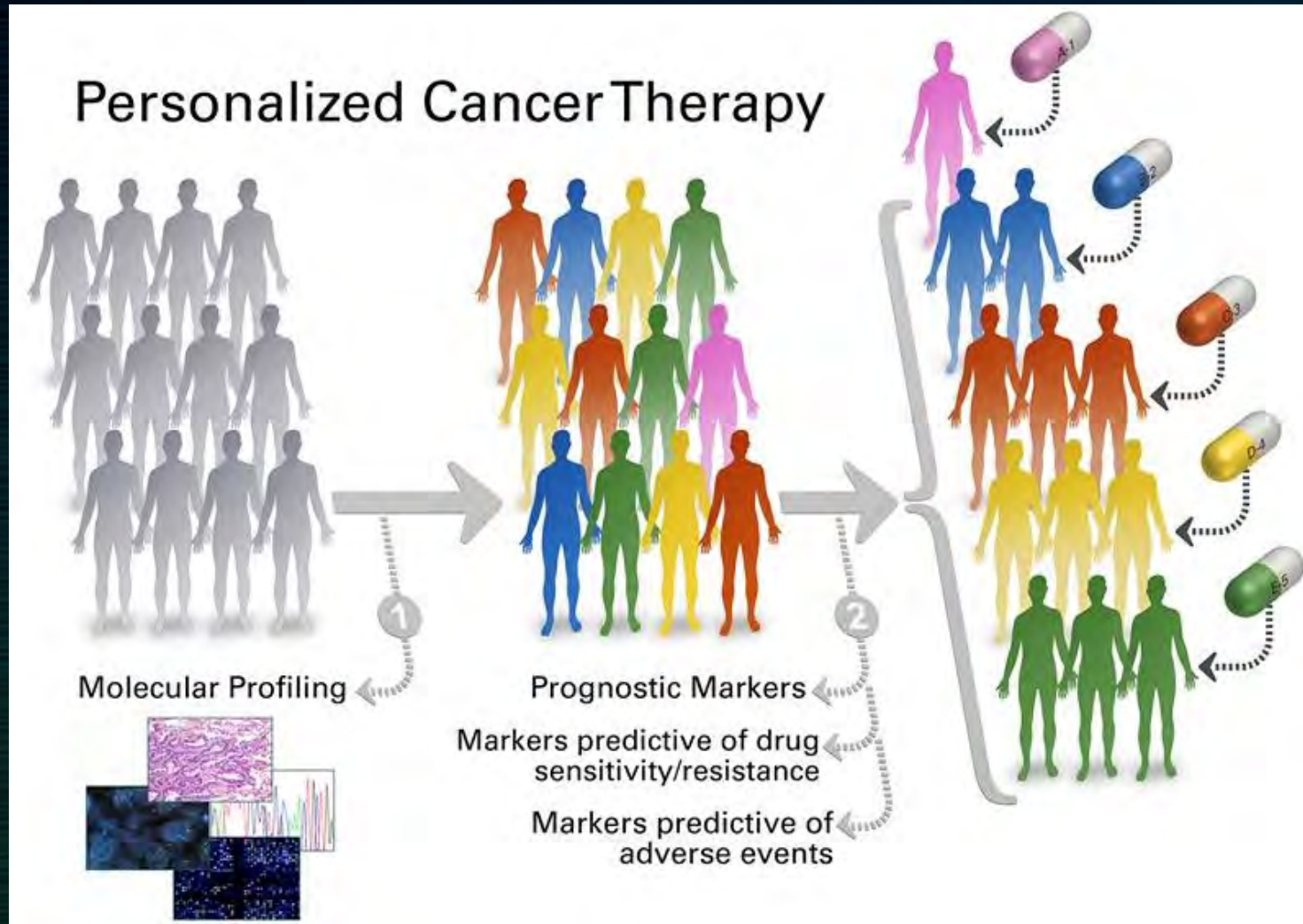
CANCER MOLECULAR DIAGNOSTICS



Genomics



PRECISION MEDICINE ONCOLOGY



The premise of Precision Medicine is the ability to customize personalized medical care to individual patients through the incorporation molecular diagnostics and targeted therapies.

Saturday, December 14, 2024

2024 WINTER SCIENTIFIC SEMINAR

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The Westin, Chicago-Lombard, IL



Musculoskeletal Diagnosis That are Misunderstood in Medicine

The Importance of Biomechanical Evaluation

Illinois Osteopathic Medical Society
December 2024



Delmas Bolin, MD, PhD, FACSM, FAAFP

Professor, Family & Sports Medicine , VCOM – Virginia Campus
Director, Performance Medicine of Southwest Virginia
Chief Medical Officer, Roanoke College
Head Team Physician, Radford University
Medical Consultant, Salem Red Sox

Conflict of Interest

- **I have no COI or commercial interests in any related topics I will be discussing today**
- **There will be NO off-label uses of medications discussed**
- **Much of what I'm going to say is osteopathic...**

Objectives

Topics: thoracic outlet, chest wall syndromes, tensor fascia lata/iliotibial band syndrome, meniscal tears/osteoarthritis of the knee, and ankle sprains.

- 1. Recognize common musculoskeletal complaints that have a biomechanical underlying cause**
- 2. Utilize evidenced-based physical examination techniques to identify biomechanical contributions underlying patient complaints**
- 3. Recommend evidence-based treatments for commonly encountered conditions including functional thoracic outlet, chest wall syndromes, tensor fascia lata/iliotibial band syndrome, meniscal tears/osteoarthritis of the knee, and ankle sprains.**

Case #1

- **22 year-old swimmer complains of 3-weeks of right arm numbness**
- **Onset after lifting boxes moving into her apartment**



Case #1

- **Symptoms come on quickly with arm overhead**
- **Symptoms abate rapidly if she lowers arm**



Differential Diagnosis

- **Cervical Radiculopathy**
- **Thoracic Outlet Syndrome**
 - ◆ Neurologic
 - ◆ Vascular
 - ◆ Functional
- **Paget Schroetter Syndrome**
- **Muscle strain/tendinitis**
- **Local nerve/vascular entrapment**

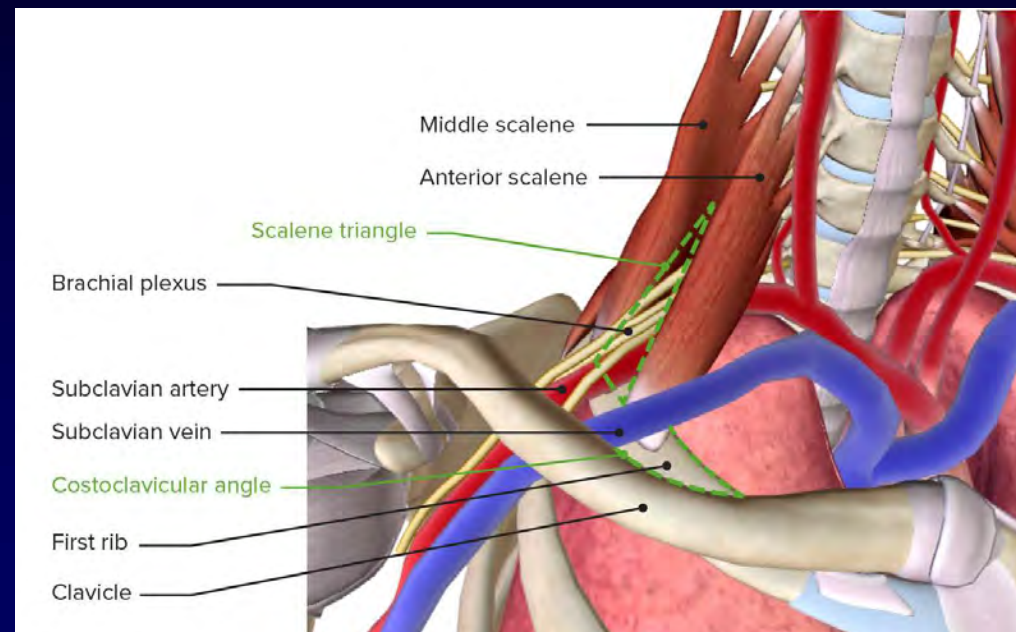
Diagnostic Tests

- **Cervical**
- **Shoulder**
- **Neurological**
- **Adson's Test**
 - ◆ Loss of pulse with arm at shoulder level
- **Roos/EAST Test**
 - ◆ Parasthesia with repetitive hand motion



Thoracic Outlet Syndrome

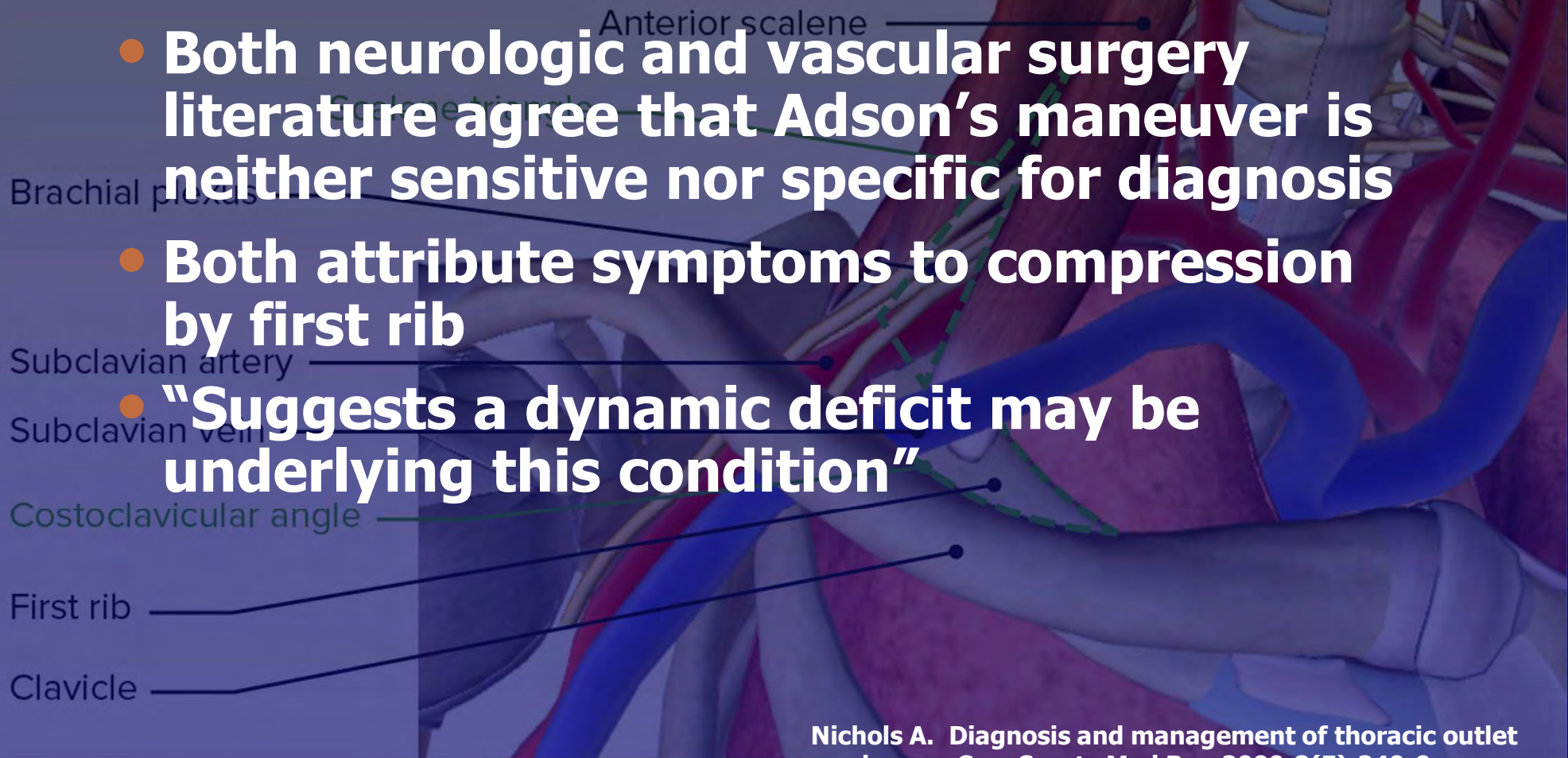
- **Neurologic**
 - ◆ 95% cases
 - ◆ Swimmers & overhead athletes
- **Vascular**
 - ◆ Rarer, 5%
- **Functional**



Nichols A. Diagnosis and management of thoracic outlet syndrome. *Curr Sports Med Rep* 2009;8(5):240-9

Thoracic Outlet Syndrome Literature

- Both neurologic and vascular surgery literature agree that Adson's maneuver is neither sensitive nor specific for diagnosis
- Both attribute symptoms to compression by first rib
- "Suggests a dynamic deficit may be underlying this condition"



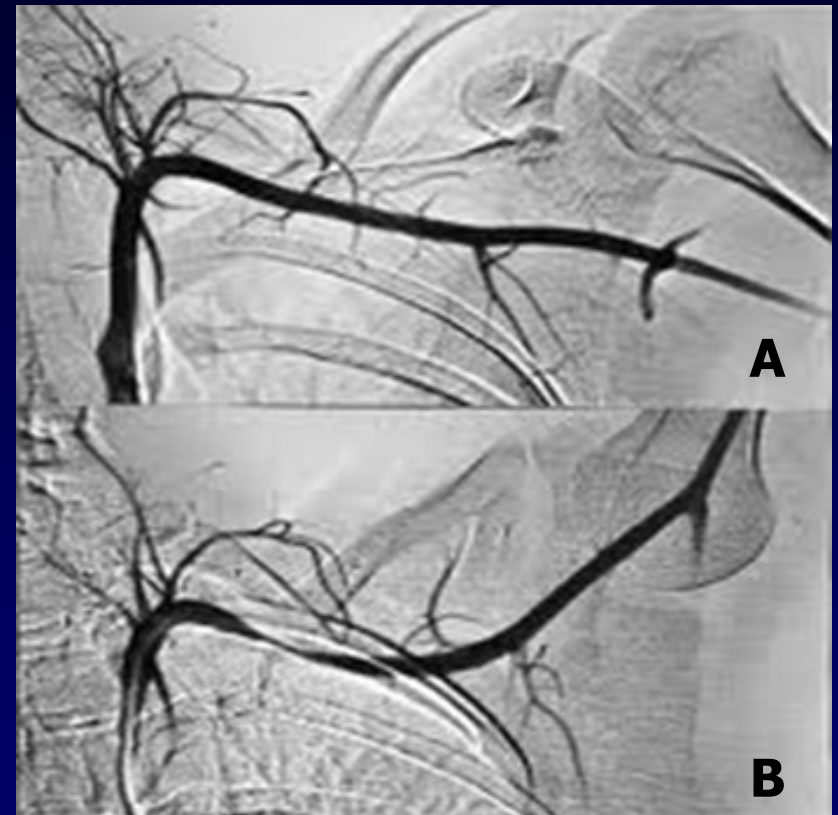
Thoracic Outlet Syndrome Literature

- Both neurologic and vascular surgery literature agree that Adson's maneuver is neither sensitive nor specific for diagnosis
- Both attribute symptoms to compression by first rib
- "Suggests a dynamic deficit may be underlying this condition"

Why now and why only one side?

Thoracic Outlet Syndrome Management

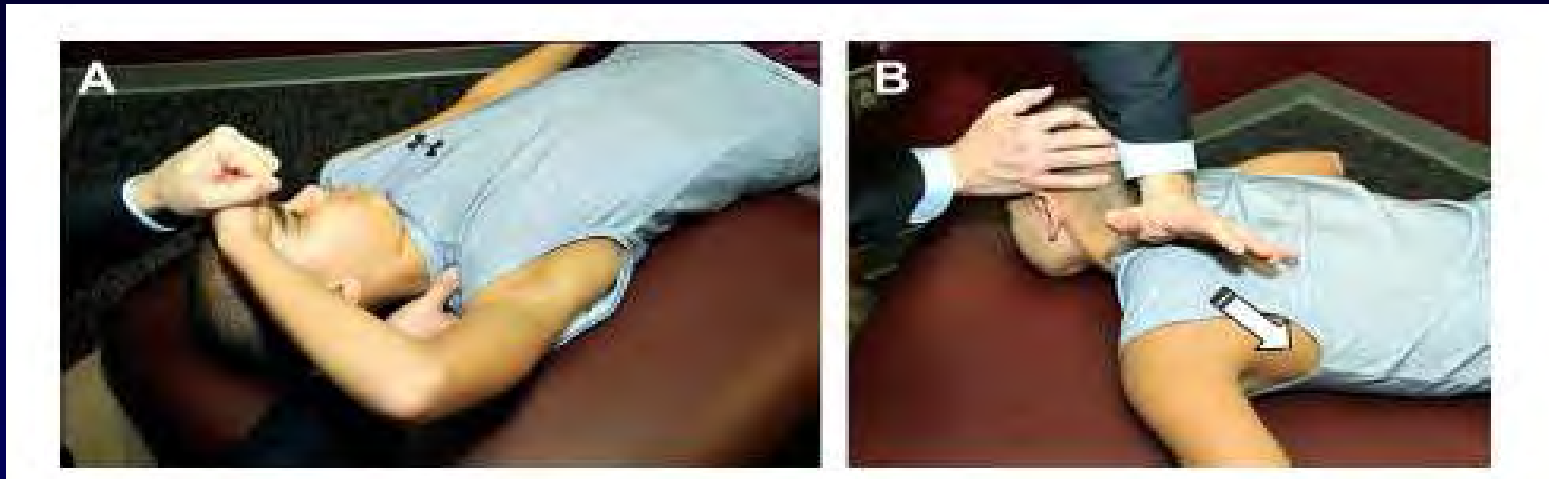
- Compression of subclavian vessels & nerves most commonly against 1st rib
- EMG & Arteriogram
- Physical Therapy
- Surgical 1st rib resection



Compression of subclavian vessel
between clavicle & first rib on arteriogram

Osteopathic Treatment

- Muscle Energy
- HVLA



Anecdotal: Evidence is scant but there are case reports²

Only 1 patient has been referred for 1st rib resection in 20 years since applying OMT

Mechanics & Considerations

- Literature suggests a dynamic component to this malady; why not address it?
- If compression by the 1st rib occurs & resecting eliminates symptoms, why did the rib become symptomatic NOW?
- In an era of health-care cost consciousness, why not try a \$34 OMT treatment instead of a \$50,000 invasive surgery *FIRST*?

Case 2

71 year-old with 8 hr of chest pain, which began after coughing; he is 5 weeks out from a 4 vessel CABG. The pain is anterior left-sided chest pain, centered around the sternum & radiating around the left chest to the back. Pain is constant and “like a rock, sitting on my chest”. Pain rated at 8-10/10 and comes on with certain exertion. He has no history of lung problems or congestive heart failure.

Medications include daily ASA, Coumadin, metoprolol and lisinopril; NKDA

ROS – negative except as above

Examination

- **Afebrile, slightly tachycardic with BP 148/92**
- **Alert & oriented x 3**
- **Heart: tachycardic at 95, regular without murmur, heave or rub**
- **Lungs: clear bilaterally**
- **Extremity – no pedal edema**

- **Initial troponin and CK WNL**
- **EKG shows no ST elevation or strain pattern**

Disposition

- **Admitted to Telemetry – R/O ischemia/MI**
- **3 sets cardiac enzymes**
- **Stress test**
- **Discharged on day #2 – all tests negative**

Is this reasonable medical care?

Case 2 Actual

The patient is a 71 year-old with a 1.5 yr history of chest pain, which began after healing from a 4 vessel CABG. The pain is anterior left-sided chest pain, centered around the sternum and radiating around the left chest to the back. Pain is constant and “like a rock, sitting on my chest”. Pain rated at 8-10/10 and comes on with certain exertion. He has no history of lung problems or congestive heart failure.

Chart Review

- Admitted to the hospital 16 occasions for at least 23-hour observation since the surgery
- 2 catheterizations, 4 stress tests with echo or chemical imaging
- IV fluids and medications, including MSO_4
- Multiple chest x-ray, 3 CT scan chest
- Cardiac step-down admission for telemetry monitoring at least 24 hrs each time
- Multiple CK and Troponin, other blood work

Chart Review

- **Total cost of care: ~ \$500,000**
- **No admission documentation of chest wall palpation - none**

The Story

- **On the 17 presentation to the ER, seen by FM service who recommended Admission for CP, R/O ischemia**
- **Pain reproduced by palpation of chest wall**
- **Evaluated in ER by attending at 2 am, and sent home – FU in office next day**

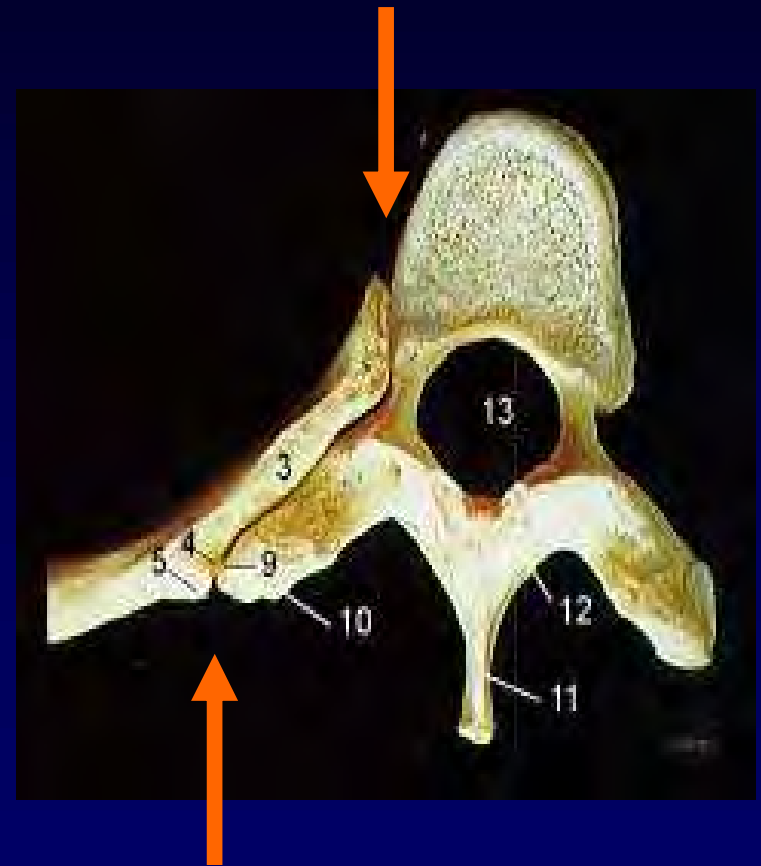
Diagnosis of the Patient

- **Palpation of ribs/ anteriorly & posteriorly**
- **Decreased excursion during inspiration**
- **Structural diagnosis**
 - ◆ Ribs stuck in inhalation or exhalation
- **Dynamic testing**
 - ◆ Trunk rotation



Rib Articulations

- Sliding joints
- Joints as pain generator
- Articulation at transverse process & vertebral body
- Rib articulations critical for trunk twisting & sidebending
- Implications of open-heart surgery(?)



Treatment of the Patient

- **Patient discharged with follow-up next day**
- **Trial of OMT**
- **Demonstrated here: HVLA – high velocity, low amplitude thrust**



Biomechanical Evaluation

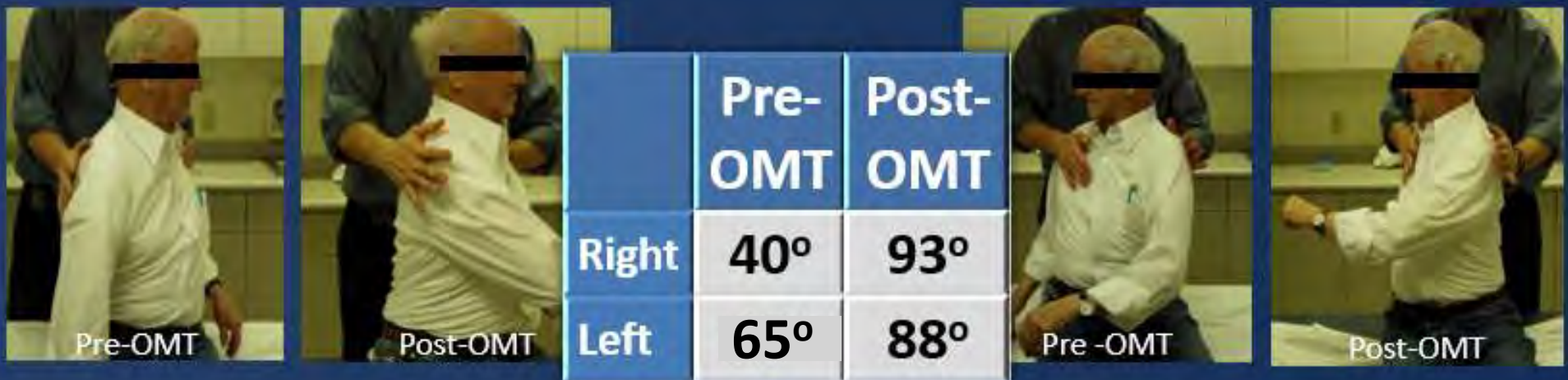
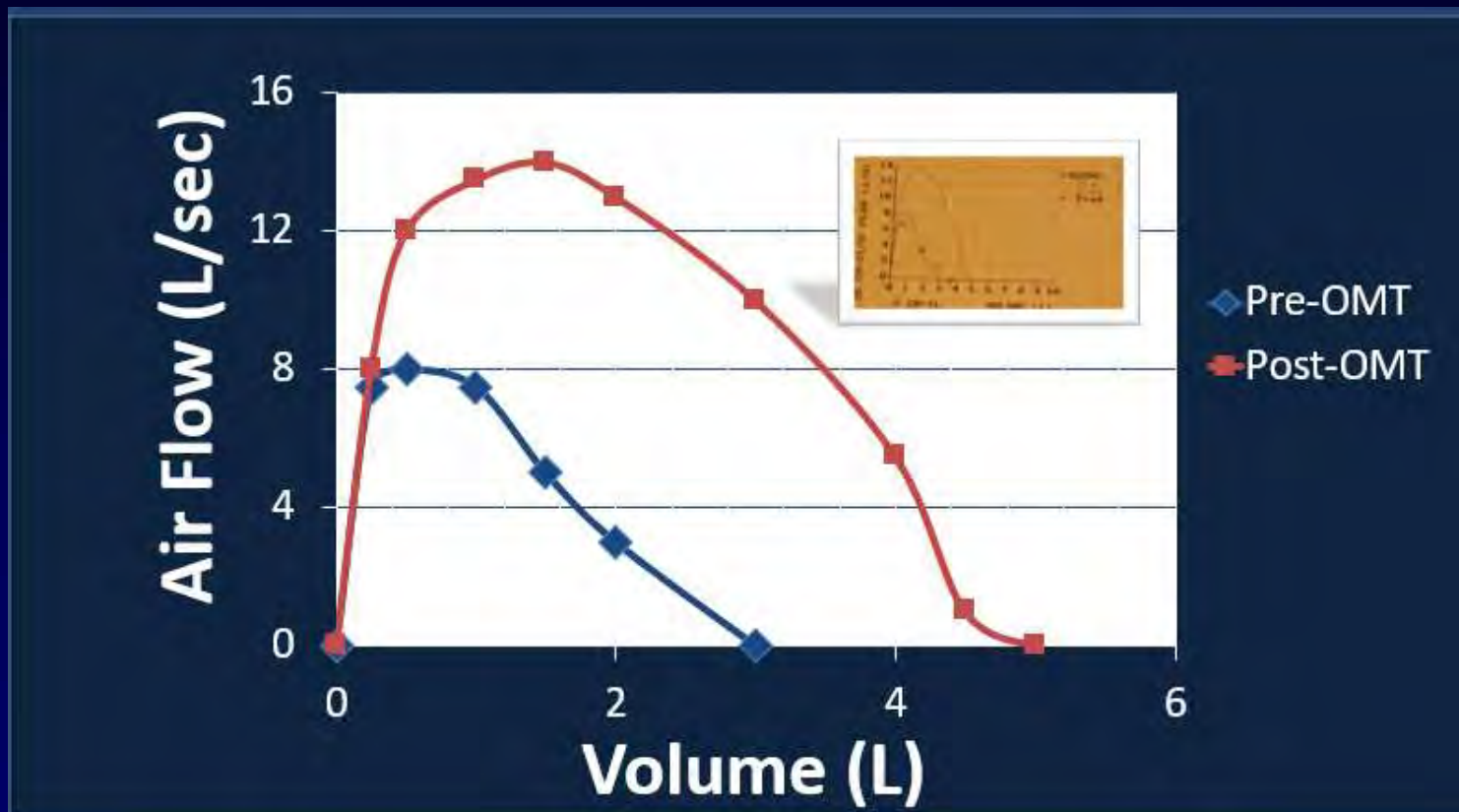


Figure 2: Passive Trunk Range of Motion Before and After Osteopathic Manipulation (OMT).

Passive range of motion was performed before and after manual treatments and measured with a goniometer. The patient pictured (not the actual patient in this case) is shown before and after manipulation to demonstrate increased ROM.

Spirometry Evaluation



Patient Follow-up

Table 1: Patient Visits to Urgent Care, Family Practice or Hospital 18 Months Before and After Manipulation.

Pre-Manipulation	Post-Manipulation
16	4*

*Patient seen in urgent care for headache @ 4 months, Hypertensive crisis @ 13months. GI for regular follow up of GERD @ 6 months. Hypertension follow up at 15 months. No ER visits.

- **Follow-up at 6, 12, & 18 months, patient stated no longer had left chest pain & attributed the resolution of symptoms to manipulation**
- **No further ER visits for CP in subsequent 18 months**
- **Continued uneventful follow up care for chronic medical conditions until lost to FU at 5 years**

Summary of Case 2

- **Total cost of 16 ER visits/Step Down**
- **Usual standard care**
- **Physical examination remains a valuable & highly coveted skill**
- **In this case; patient symptoms were resolved satisfactorily with a single OMT**
 - ◆ Estimated reimbursement < \$40
 - ◆ Improvement of lung function and mobility

**Case #3 - Make the diagnosis:
45° PA WB film of bilateral knees**



Make the diagnosis: 45° PA WB film of bilateral knees



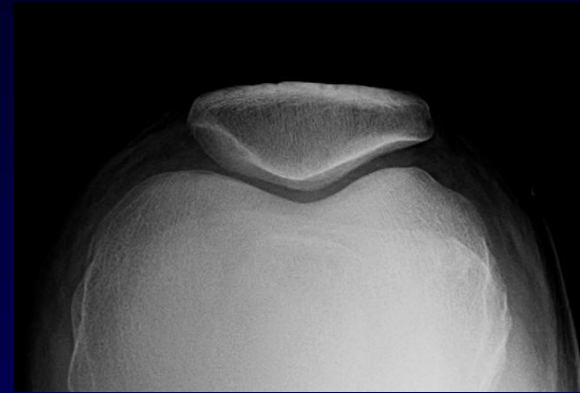
Motions of the knee?



- 1. Extension -2° ; Flexion 140°**
- 2. Rotation of tibia internally and externally?**
 - ♦ Important for “locking home”
 - ♦ Femur internally rotates and moves posterior; tibia moves anterior and externally rotates.
- 3. Varus & valgus tibial glide?**

Alignment Issues of Knee

Knee
Anatomy



Relate Anatomy to Symptoms

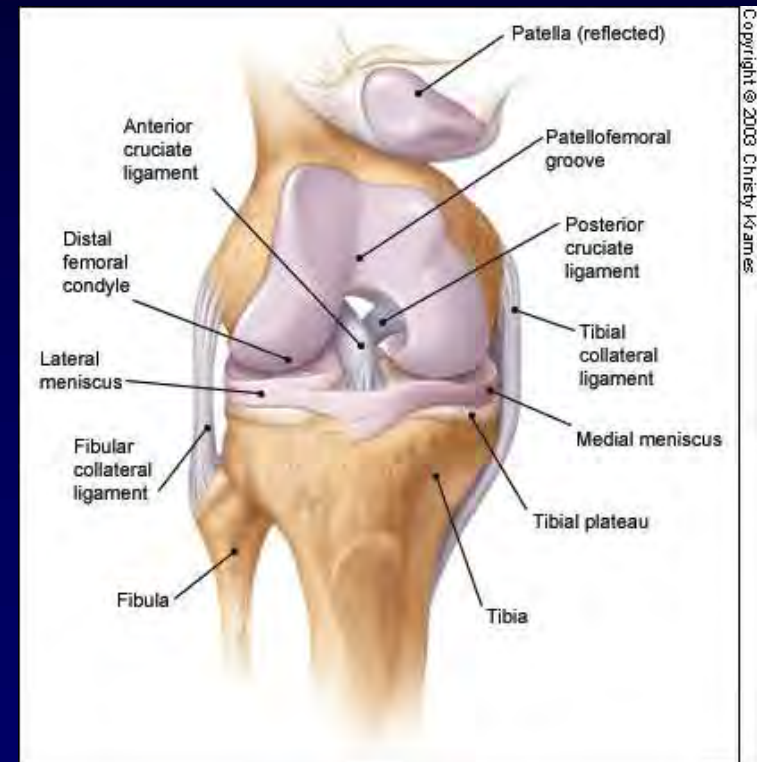
Structure & Function

- **Meniscus**

- ◆ Cushion & circulation of synovial fluid

- **Stability**

- ◆ Capsule
- ◆ ACL/PCL – ant/post
- ◆ MCL/LCL – varus/valgus
- ◆ Postero-lateral corner – fibula & associated ligaments important for rotational stability



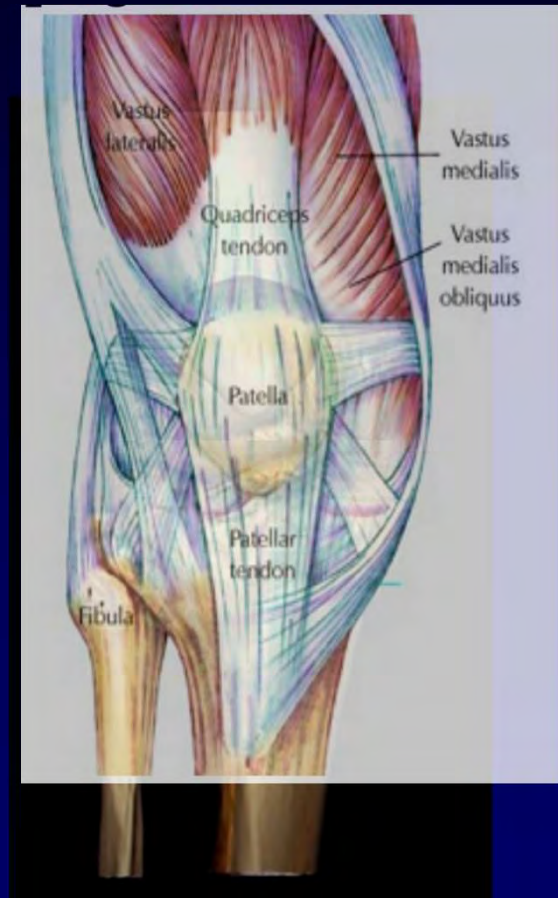
Relate Anatomy to Symptoms, Structure & Function

- **Meniscus**

- ◆ Cushion & circulation of synovial fluid

- **Stability**

- ◆ Capsule
- ◆ ACL/PCL – ant/post
- ◆ MCL/LCL – varus/valgus
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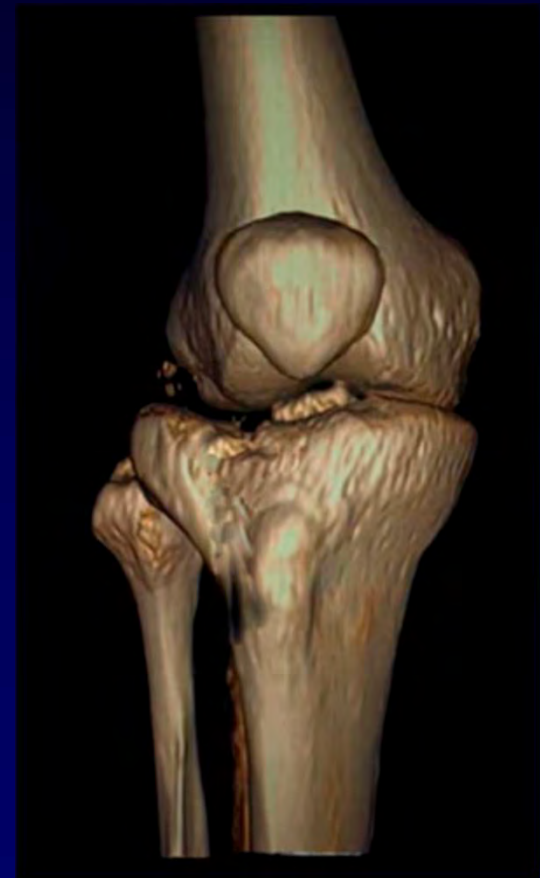
Relate Anatomy to Symptoms, Structure & Function

- **Meniscus**
 - ◆ Cushion & circulation of synovial fluid
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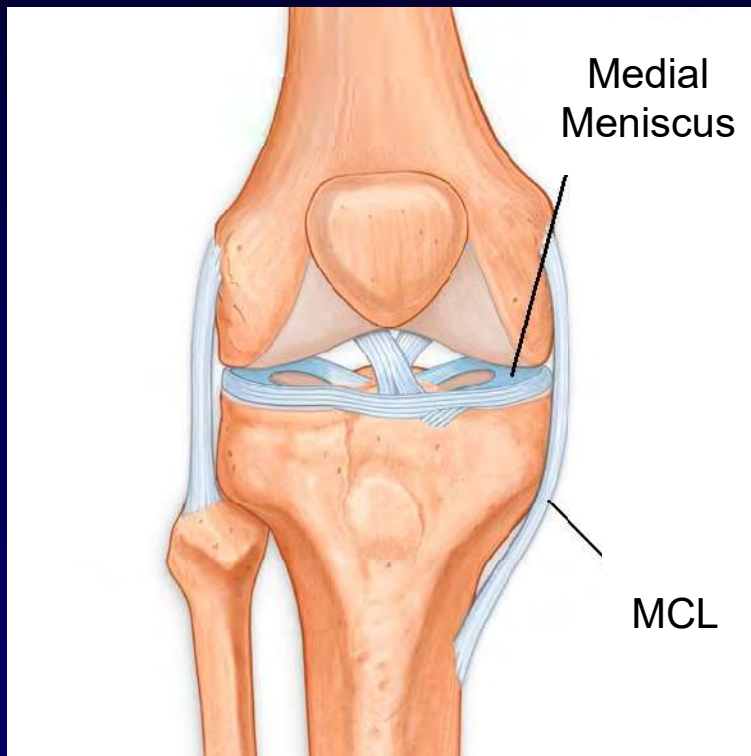


Somatic Dysfunction Contributes To Symptoms

- **Mechanical rotation of tibia (e.g. an external rotation dysfunction) relative to femur alters connections of ligaments, muscles & forces across patella**
 - ♦ MCL, LCL
 - ♦ Semitendinosus at Pes Anserine
 - ♦ Patellar alignment in femoral notch



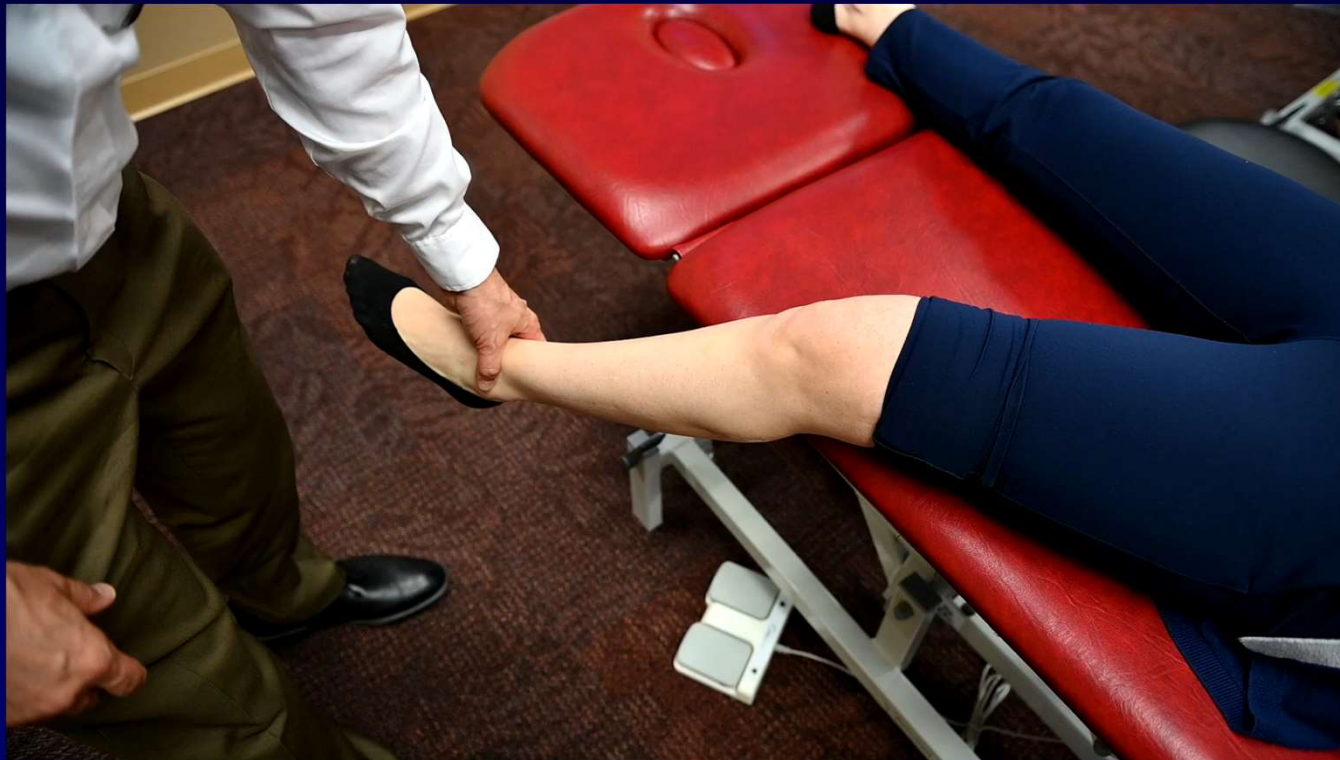
Functional Aspects of Anatomy



- **MCL prevents valgus stress opening medial joint line**
- **Connects to medial meniscus**

MCL Clinical Examination

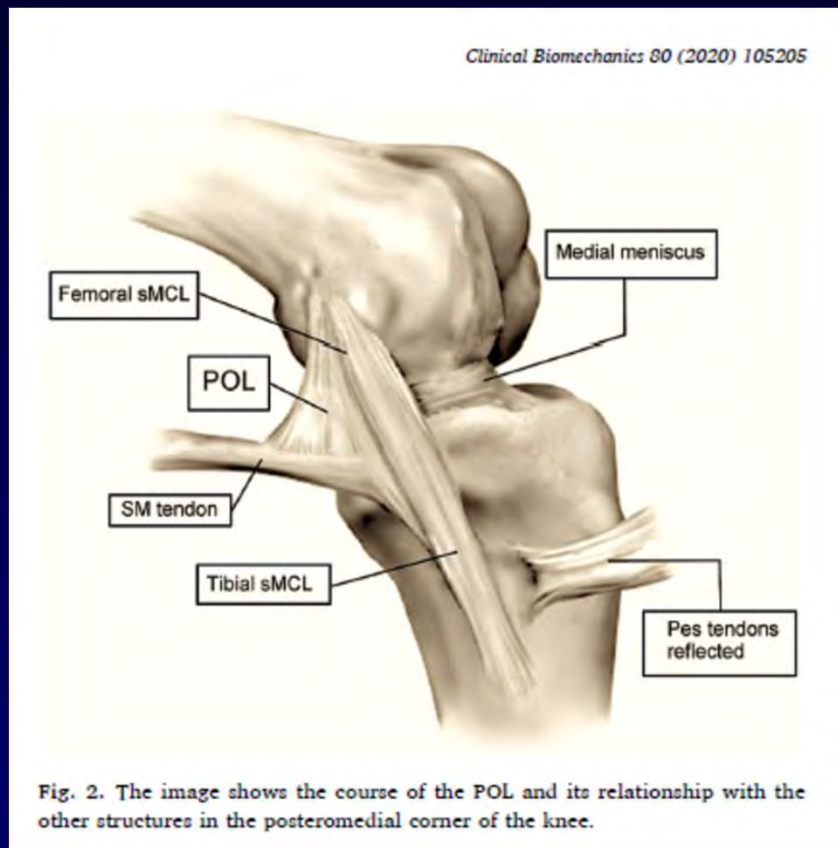
- MCL tested at 0° and 30° flexion
- 2 important observations: endpoint & glide



“New” Knee Anatomy

Posterior Oblique Ligament

AKA the posterior-medial capsule



- **Main stabilizer to prevent internal rotation of tibia at 0-30° flexion**
- **Resisting posterior translation of tibia (esp. in PCL deficient knee)**
- **Resists external rotation**

Testing Rotation

- Knee at 90° flexion, rotate distal tibia/ankle & observe external/internal rotation at joint line
- Limited internal rotation indicates dysfunction



Testing POL

Anteromedial Rotatory Instability Test

- Knee at 30° flexion, externally rotate distal tibia/ankle & apply valgus force
- Laxity or pain suggests injury to the POL



Injury to POL Results in Rotational Laxity of the Knee

Mechanism (several)

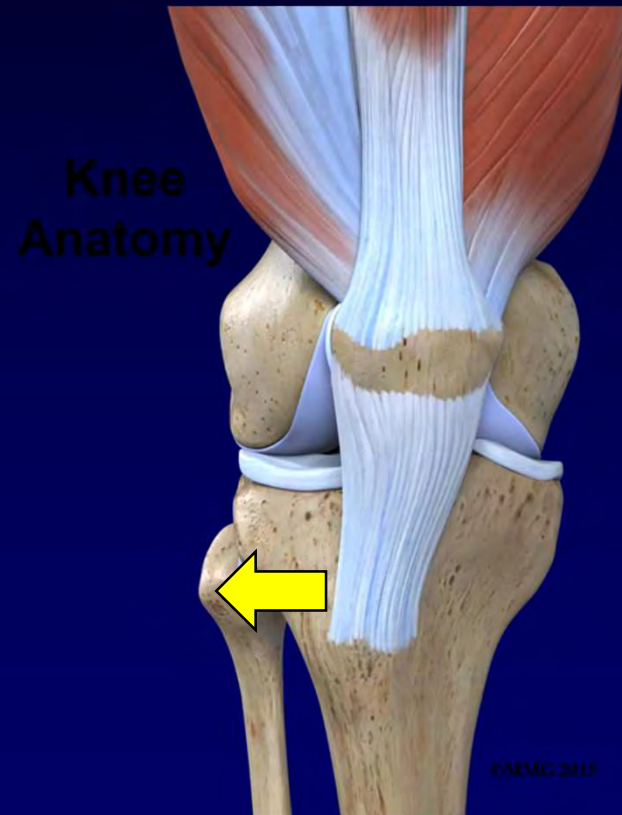
- **Feet on desk, calf unsupported**
 - ◆ Left leg is externally rotated
 - ◆ Posterior force at tibia by weight of opposite leg =
 - ◆ Change of alignment...
 - ◆ Chronic stretch of POL, shift of meniscus, alteration of mechanics



Alignment may be key...

- “Quadriceps tendon malalignment independent anatomical deformity; primary abnormality associated with lateral facet patellofemoral joint osteoarthritis”

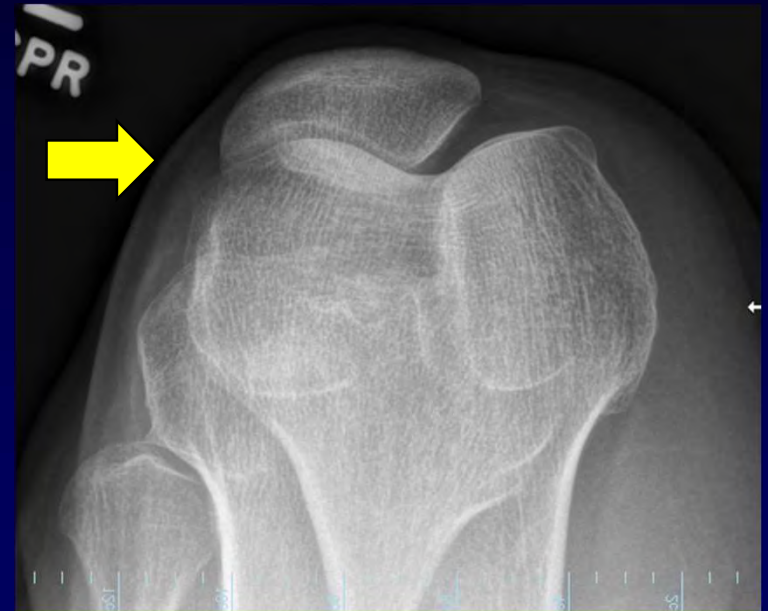
Talbot S, et al Knee Surg Sports Traumatol Arthrosc. 2023 31(12):5950-5961



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Alignment may be key...

- **Tibial rotation influences medial compartment contact pressure between tibia and femur**

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Alignment may be key...

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Treatment

Implications of Case #3

- **Injury (acute) or malpositioning (chronic) results in altered kinematics of the knee**
- **These can be detected by simple exam maneuvers**
- **Likely precedes degenerative change**

Case #4

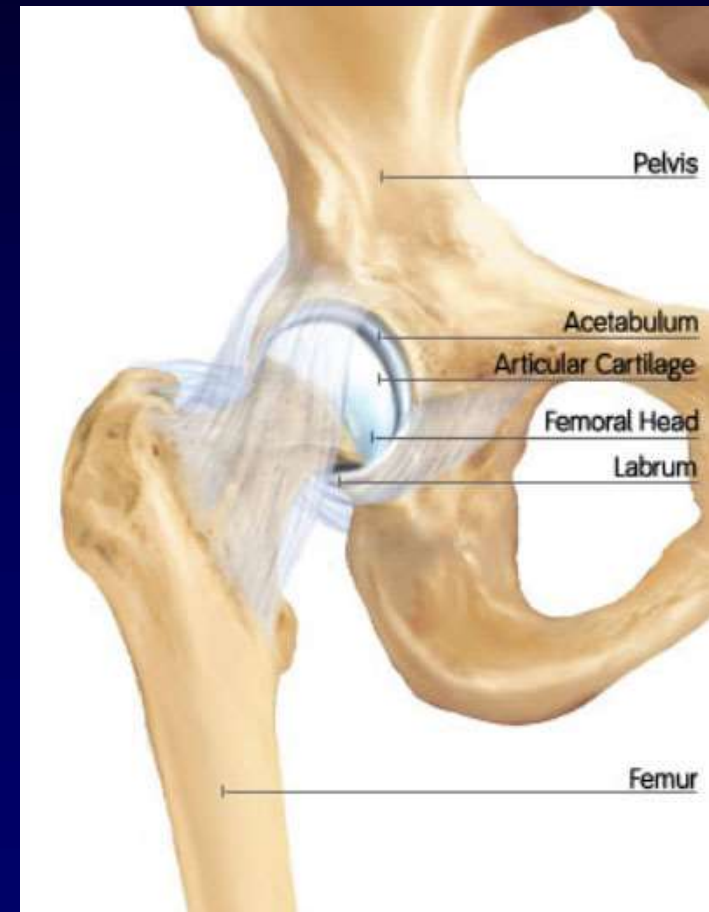
When the patient says “hip”...

- Ask them to point...
- Pain may be coming from muscles, bones, joints or other structures of FA joint, hemipelvis or posterior gluteus and SI joints



Hip Anatomy

- **Ball & socket joint**
 - ◆ Lined with articular cartilage
- **Synovial capsule**
- **Cartilaginous labrum attaches capsule to acetabulum**
- **Noises may arise *in certain contexts***



“His Hip Pops Out of Place”

- Mom brings 7 year old who has painless “popping” of right hip with gait. Started 2 days ago after a trip to the trampoline park
- I looked it up – “he needs an MRI”



Mechanism of External Snapping Hip

- Occurs during flexion and extension of hip
- Gluteus maximus – Iliotibial band – tensor fascia lata “windshield wiper” back & forth across greater trochanter



The clinical question is: “why did this happen only on the one side?”

You Can Diagnose Visually

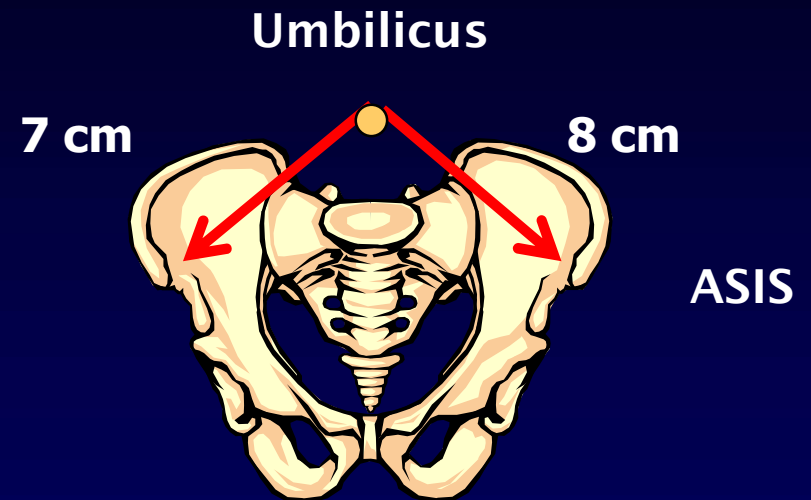
But, this is about using ultrasound...



Video snippet from supplemental video from Levine BD et al American Journal of Roentgenology. 2021;216: 446-446. 10.2214/AJR.20.22865 Used for educational purposes only.

Measure Pelvic Symmetry

- Measure from Umbilicus to ASIS bilaterally
- If asymmetric, consider a pelvic inflare/outflare diagnosis
- Relate findings to PT - they will often address during therapy



Assess Functional Leg Length

This is not a call for a heel lift...

- **Align pelvis by having patient knees bent and ask patient to raise hips off table**
- **Passively straighten legs & place thumbs under medial malleolus for subjective leg length difference**
- **Place thumbs on ASIS & note relative position**
- **Hemipelvis can rotate anteriorly or posteriorly**



What if the patient was 58?

- **Diagnosis would likely be greater trochanteric pain syndrome – formerly “trochanteric bursitis”**
 - ◆ Gluteus Medius tendinitis
- **Same mechanism**
 - ◆ Inflare/outflare
 - ◆ Anterior/posterior rotation
- **Bursa injection – SOR B**
- **Topical treatments**
- **PT for NM retraining**

Resisted external derotation test



Resisted external derotation test. With the patient supine, the hip and knee on the affected side are both flexed 90 degrees, and then the hip is externally rotated. From this position, the patient is asked to rotate the thigh back to a neutral position while the examiner opposes this motion.

Test illustrated in photo originally described in: Lequesne M, Mathieu P, Vuillemin-Bodaghi V, et al. Gluteal tendinopathy in refractory greater trochanter pain syndrome: diagnostic value of two clinical tests. Arthritis Rheum 2008; 59:241.

UpToDate®

Implications

- **Unilateral symptoms often are due to asymmetry of position**
- **Biomechanical (Osteopathic) findings are dynamic and can usually be treated with OMT followed by neuromuscular retraining**

Case #5

“Lateral ankle sprain” that doesn’t get better

- **Basketball player is driving to basket & “rolls” his ankle (inversion). He has immediate pain and swelling over lateral malleolus, just anterior and inferior. He has pain with weight-bearing.**



The Mechanics of the Injury

The common ankle sprain and more...

- **Inversion mechanism**
 - ◆ Anterior Talofibular ligament (ATF) "sprained"
 - ◆ Pulls fibula base anterior
- **Medial impaction**
 - ◆ Bone bruise: Talus on tibial plafond (OCD)
- **Anterior fibula position stretches & ruptures lateral retinacula**



Ankle Sprain & Fibular Mechanics

Biomechanics

- **Talus inversion**
 - ◆ Plantarflexed and inverted
 - ◆ ATF pulled tight
 - ◆ Pulls distal fibula anterior
 - ◆ Proximal fibula moves posterior – becomes locked
- **Fibular motion with gait**
 - ◆ Motion is anterolateral to posteromedial
- **Relates biomechanics to motion deficits**

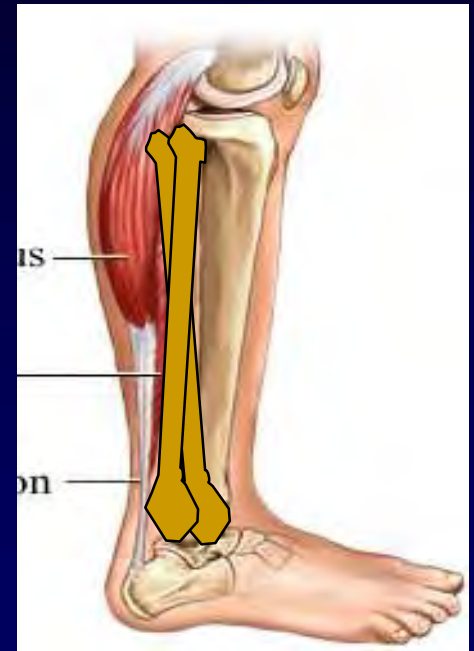


Image from
<http://www.pilatespatio.com/legfoot.php>

Implications

- **Ankle sprains remain swollen for long periods**
- **Motion deficits (particularly dorsiflexion and eversion)**
- **Loss of proprioception**
- **Mechanics never addressed or corrected**

Correction of Fibular Motion

Muscle Energy Illustrated

- **Barrier to motion is eversion and posterior fibular base glide**
- **Engage barrier, have patient gently invert (posterior tibialis muscle); resist motion**
- **Engage new barrier. Note my right thumb guiding fibular motion...**



Treatment

- **Early ROM**
- **Protection from reinjury**
 - ◆ Stirrup brace
- **NSAIDs**
- **Rehabilitation: proprioception**
 - ◆ Lose sense of balance after injury
- **Osteopathic approach**
 - ◆ Relative contraindication: acute injury
 - ◆ Address motion restrictions after ~ 1 wk



Case #6

“Plantar Fasciitis”

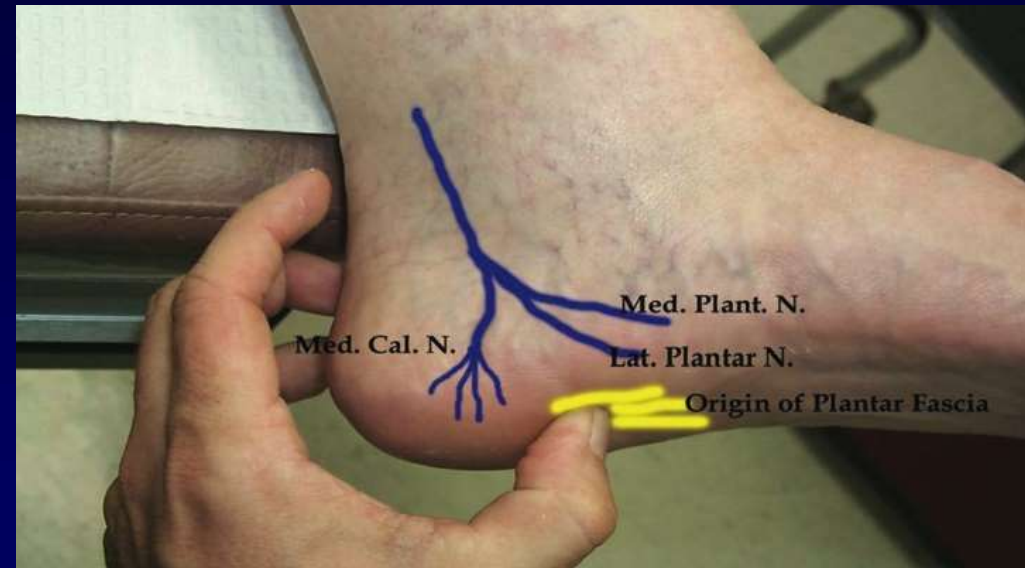
- 45 year old complains of heel pain, medial plantar surface of the calcaneus (heel), worse **the first steps out of bed in morning.** Gradually getting worse since started 2-3 months ago.



Differential Diagnosis

Heel Pain

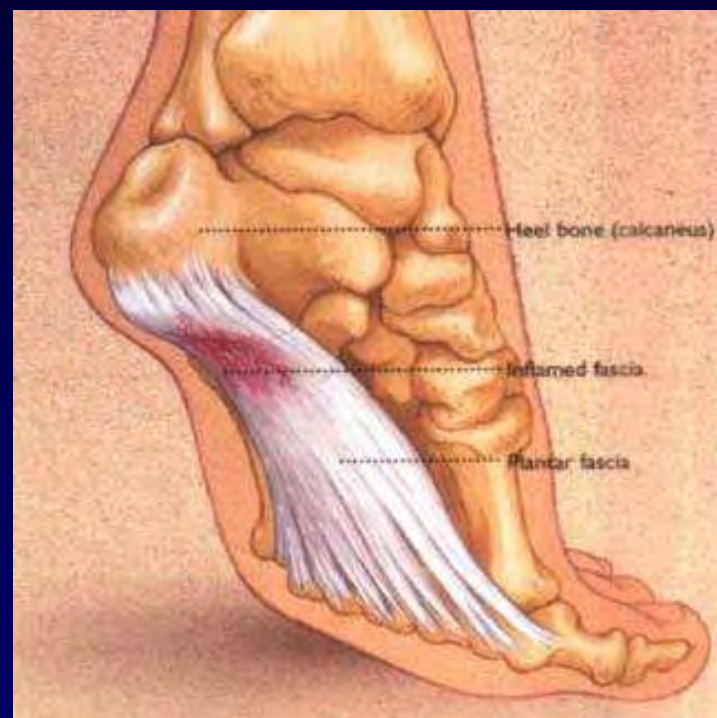
- Fat pad syndrome
- **Plantar fasciitis**
- Foreign body
- Medial plantar nerve entrapment
- Bone bruise/stress fracture/fracture
- Somatic dysfunction



Plantar Fasciitis

(there is no inflammation, in fact)

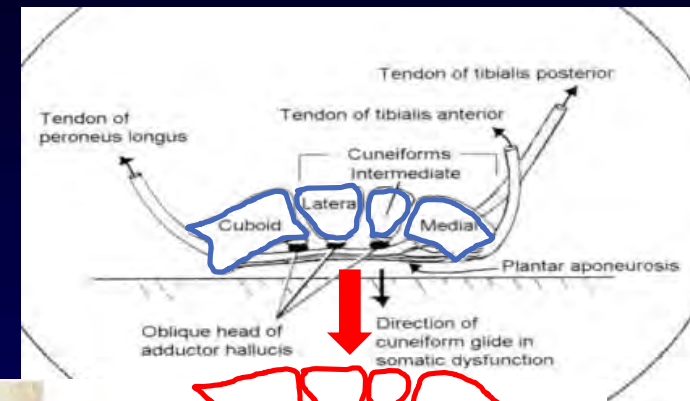
- Not a heel spur
- Morning symptoms related to fascial tension
- Pain at medial insertion of PF at calcaneus
- ****** Proximal transverse arch dysfunction - Medial & middle cuneiform bones



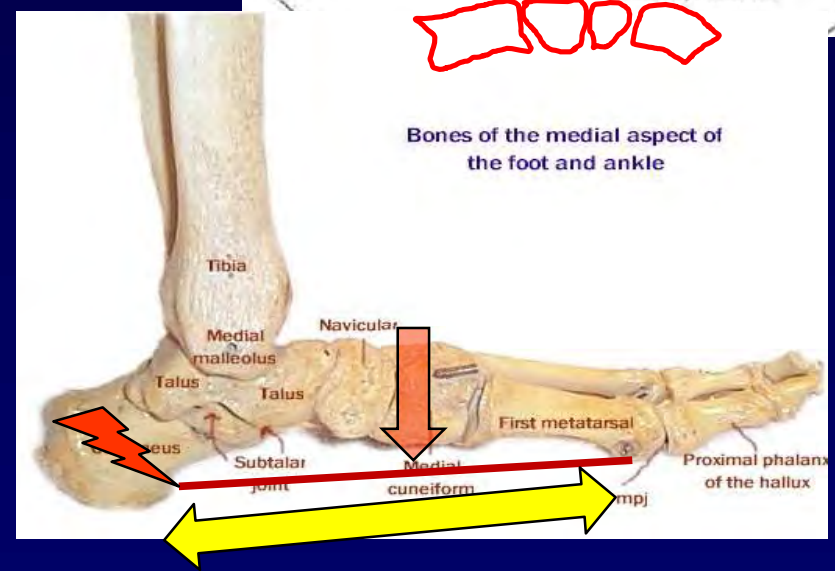
Biomechanical Principles

What contributes to plantar fascia tightness? ?

- Firmness at plantar midfoot
- Dropped cuneiforms stretch proximal transverse and medial longitudinal arch
- Causes calcaneus to plantar flex – results in tight achilles
- Leads to strain on plantar fascia at insertion

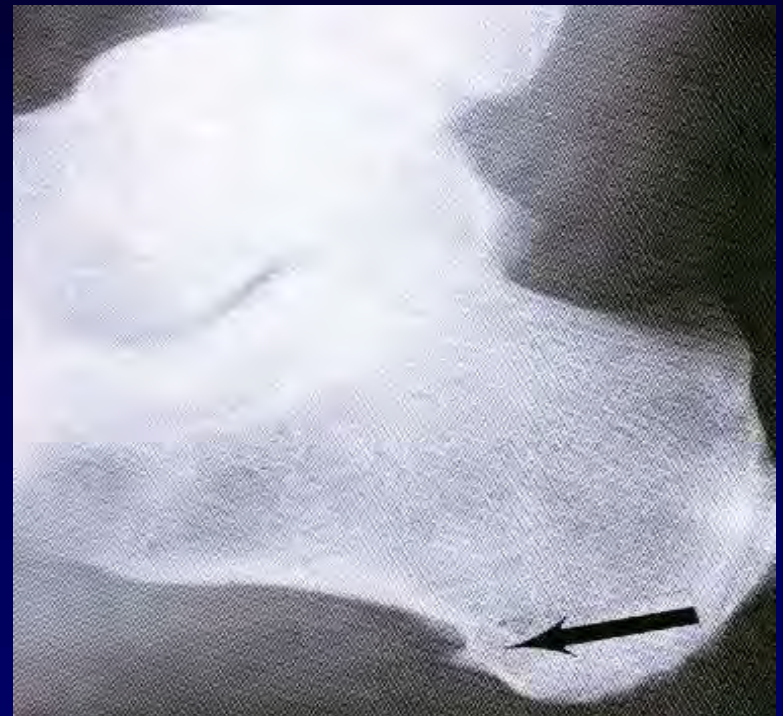


Bones of the medial aspect of the foot and ankle



The Dreaded Heel Spur

- The spur **is not the problem...**
- Calcification is body's response to constant tension & repetitive tearing
 - ♦ From increased tension
- Removing heel spur does not solve problem & may lead to others...



Treatments for Plantar Fasciitis

"When you find multiple treatments in the medical literature and none work well, the answer is likely to be found in biomechanics." Dr. Bolin

- **Cast/night splint**
- **Injection**
- **Rest**
- **Ice**
- **Orthotics**
- **NSAIDs**
- **Heel Cup**

Restoration of
normal mechanics:
OMT?

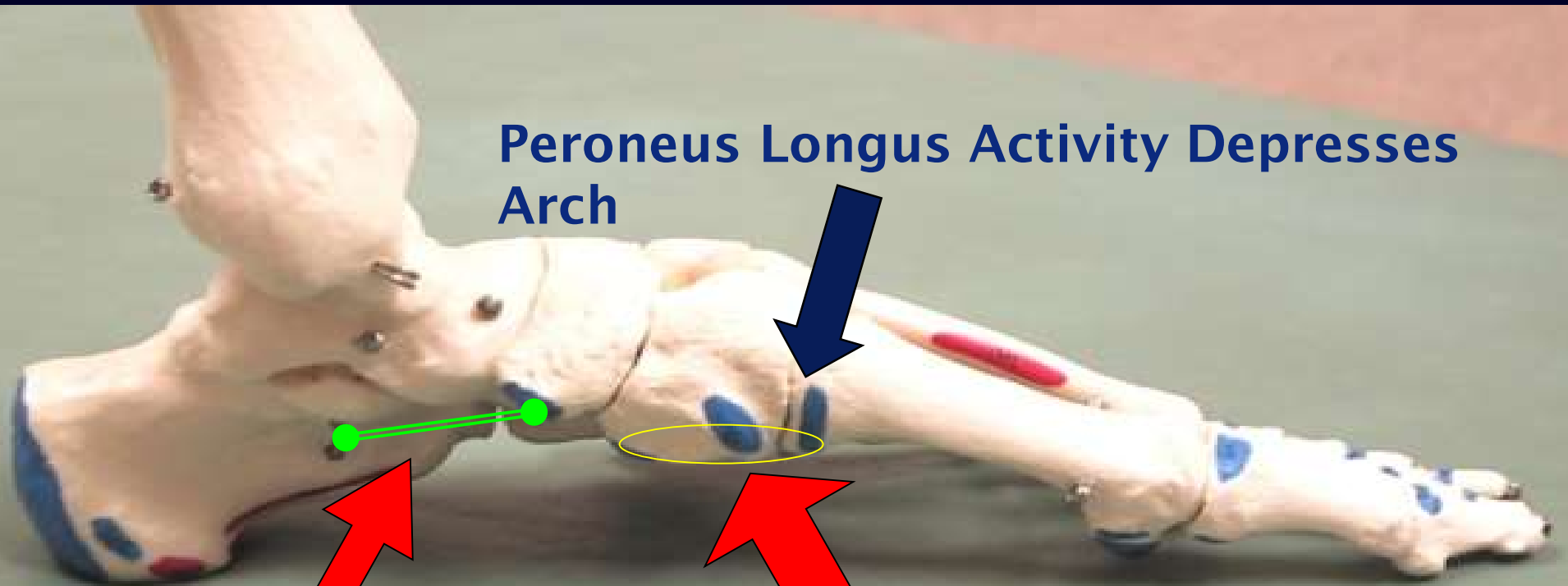


Least
Effective



Hill et al, Foot and Ankle Int 1996, 17:527

Anatomic Implications for OMT



Peroneus Longus Activity Depresses Arch

Spring Ligament

Peroneus Longus Insertion

Summary

- **Numerous examples of musculoskeletal conditions where biomechanical evaluation explains the underlying issue**
- **Diagnosis made by dynamic testing**
- **Unilateral symptoms related to minor trauma can often be addressed with OMT and neuromuscular retraining**

Thank You

Questions?

References

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- 4. Rigberg D, Gelebert H. The management of thoracic outlet syndrome in teen-aged patients. Ann Vasc Surg 2009;23:334-40**
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Saturday, December 14, 2024

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