PainWeek®

Empowering Patients with Osteoarthritis: Updating Practice with Modern Science

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Disclosure

- CEO and Lead Instructor of Modern Pain Care where we teach continuing education courses related to this topic

Learning Objectives

- Describe how a strict biomedical definition of osteoarthritis can limit the understanding of a person who is dealing with joint pain
- Summarize other contributing factors to joint pain outside of traditional strict tissue-based considerations
- Describe a person-center and evidence-based approach to the person with osteoarthritis

Osteoarthritis

- Affects 80% of the population over 55 years old
- Cartilage is avascular and aneural
  - Possible nociceptive / local tissue contributors
    - Periarticular structures
    - Subchondral bone
    - Increased interosseous pressure
    - Synovial inflammation
    - Injuries to the bone marrow

Lluch Girbés E, Nijs J, Torres-Cueco R, López Cubas C. Pain treatment for patients with osteoarthritis and central sensitization. *Phys Ther.* 2013;93(6):842-851.

Tissue Associations with Pain

- Bone attrition
- Bone marrow lesions
- Meniscal tears
- Grade 2 or 3 synovitis/joint effusion
- Kellgren Lawrence grading

Torres L, Dunlop DD, Peterfy C, et al. The relationship between specific tissue lesions and pain severity in persons with knee osteoarthritis. *Osteoarthritis Cartilage.* 2006;14(10):1033-1040.

Duncan R, Peat G, Thomas E, Hay E, McCall I, Croft P. Symptoms and radiographic osteoarthritis: not as discordant as they are made out to be? *Ann Rheum Dis.* 2007;66(1):86-91.

Neogi T, Felson D, Niu J, et al. Association between radiographic features of knee osteoarthritis and pain: results from two cohort studies. *BMJ.* 2009;339:b2844.

Pain is not always a good indicator of tissue findings

- Studies have shown little relationship between amount of tissue damage and pain intensity
- 30% to 50% of patients with severe OA-related joint damage are asymptomatic
- Approximately 10% of patients with diagnosis of knee OA have moderate to severe knee pain but have normal X-rays

Davis MA, Ettinger WH, Neuhaus JM, Barclay JD, Segal MR. Correlates of knee pain among US adults with and without radiographic knee osteoarthritis. *The Journal of Rheumatology.* 1992;19(12):1943-1949.

Hannan MT, Felson DT, Pincus T. Analysis of the discordance between radiographic changes and knee pain in osteoarthritis of the knee. *Br J Rhematol.* 2000;27:1513-1517.

Neogi T, Felson D, Niu J, et al. Association between radiographic features of knee osteoarthritis and pain: results from two cohort studies. *BMJ.* 2009;339:b2844.

Creamer P, Hochberg MC. Why does osteoarthritis of the knee hurt - sometimes? *Br J Rhematol.* 1997;36:726-728.

Chronic Pain Post Joint Replacement

- Some patients continue to have pain despite replacements 20% of knee replacements
  - 10% of hip replacements
- Can we identify who may respond poorly?
- Subgroup of patients who have central sensitivity present –This [knee] one is replaced. . .the other one is not yet. . . But I get as much pain with the one that has been replaced as I get with the one that hasn't been replaced… so there is no point

Beswick AD, Wylde V, Gooberman-Hill R, Blom A, Dieppe P. What proportion of patients report long-term pain after total hip or knee replacement for osteoarthritis? A systematic review of prospective studies in unselected patients. *BMJ Open.* 2012;2(1):e000435.

Smith TO, Purdy R, Lister S, Salter C, Fleetcroft R, Conaghan PG. Attitudes of people with osteoarthritis towards their conservative management: a systematic review and meta-ethnography. *Rheumatol Int.* 2014;34(3):299-313.

Lluch Girbés E, Nijs J, Torres-Cueco R, López Cubas C. Pain treatment for patients with osteoarthritis and central sensitization. *Phys Ther.* 2013;93(6):842-851.

Lluch E, Torres R, Nijs J, Van Oosterwijck J. Evidence for central sensitization in patients with osteoarthritis pain: a systematic literature review. *Eur J Pain.* 2014;18(10):1367-1375.

Petersen KK, Arendt-Nielsen L, Simonsen O, Wilder-Smith O, Laursen MB. Presurgical assessment of temporal summation of pain predicts the development of chronic postoperative pain 12 months after total knee replacement. *Pain.* 2015;156(1):55-61.

Looking beyond the joint

Updated Definition of Pain 2020

- An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage
  - NOTES
    - Pain is always a personal experience that is influenced to varying degrees by biological, psychological, and social factors.
    - Pain and nociception are different phenomena. Pain cannot be inferred solely from activity in sensory neurons.
    - Through their life experiences, individuals learn the concept of pain. c A person's report of an experience as pain should be respected.*
    - Although pain usually serves an adaptive role, it may have adverse effects on function and social and psychological well-being.
    - Verbal description is only one of several behaviors to express pain; inability to communicate does not negate the possibility that a human or a nonhuman animal experiences pain.

Raja SN, Carr DB, Cohen M, et al. The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises. *Pain.* 2020.

Nociplastic mechanisms

- Pain that arises from altered nociception despite no clear evidence of actual or threatened tissue damage causing the activation of peripheral nociceptors or evidence for disease or lesion of the somatosensory system causing the pain.

IASP Task Force on Taxonomy IASP Terminology. 2017; https://www.iasp-pain.org/terminology. Accessed August 3rd, 2020.

Nociplastic Dominant

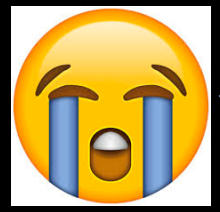
Factor	Odds Ratio
Pain disproportionate to injury	15.19
Disproportionate agg/eases	30.69
Psychosocial symptoms	7.65
Diffuse painful palpation	27.57

SN= 0.92 **SP= 0.98** **+LR=40.64** **-LR=0.08**

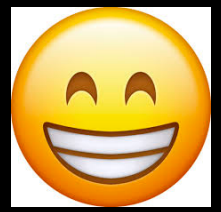
Smart KM, Blake C, Staines A, Thacker M, Doody C. Mechanisms-based classifications of musculoskeletal pain: part 1 of 3: symptoms and signs of central sensitisation in patients with low back (+/- leg) pain. *Man Ther.* 2012;17(4):336-344.

Pain Profiles

Pro-nociceptive



Anti-nociceptive



Higher pain intensity
Higher pain catastrophization
Lower local and distal pain thresholds
Lower temporal summation pain threshold
Lack conditioned pain modulation

Lower pain intensity
Lower pain catastrophization
Higher local and distal pain thresholds
Higher temporal summation pain threshold
Good conditioned pain modulation

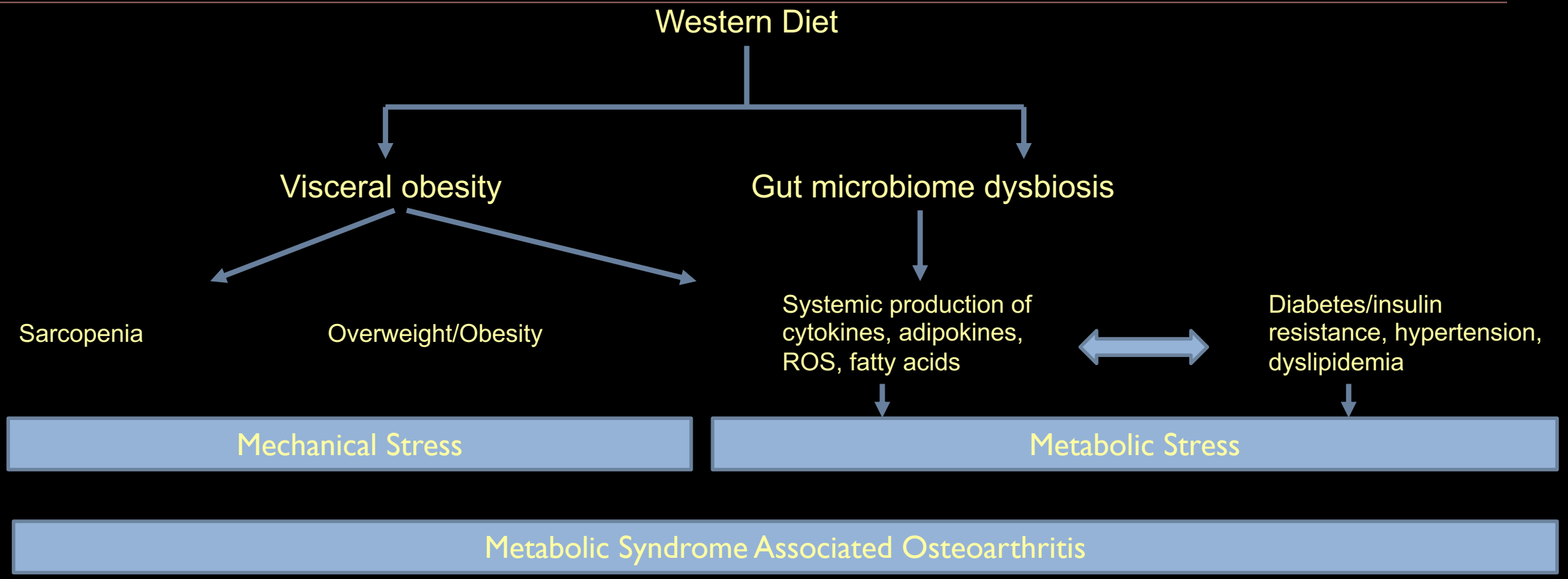
Adapted from:
Arendt-Nielsen L. Joint pain: more to it than just structural damage? *Pain.* 2017;158 Suppl 1:S66-S73.

The CNS Theory of Osteoarthritis

- "Changes to a biologic 'set point' that regulates whole body homeostatic neural, hormonal, inflammatory, and immune 'tone' which can affect disease progression"
- Sympathetic tone increase
- Gut microbiome
- Circadian rhythm changes
  - Cartilage homeostasis is under circadian clock control
- Metabolic

Morris JL, Letson HL, Gillman R, et al. The CNS Theory of Osteoarthritis: Opportunities Beyond the Joint. *Seminars in Arthritis and Rheumatism.* 2019.

Metabolic Syndrome Associated Osteoarthritis



Adapted from: Courties A, Berenbaum F, Sellam J. The Phenotypic Approach to Osteoarthritis: A Look at Metabolic Syndrome-Associated Osteoarthritis. *Joint Bone Spine.* 2019;86(6):725-730.

Barriers to Overcome

Clinician Beliefs

- Trivialization due to perceived inevitability
- Clinicians feel underprepared
  - Lack knowledge about recommended practice
- Personal beliefs
  - Patient adherence
  - Negative view on the disease
  - Doubts about treatment effectiveness

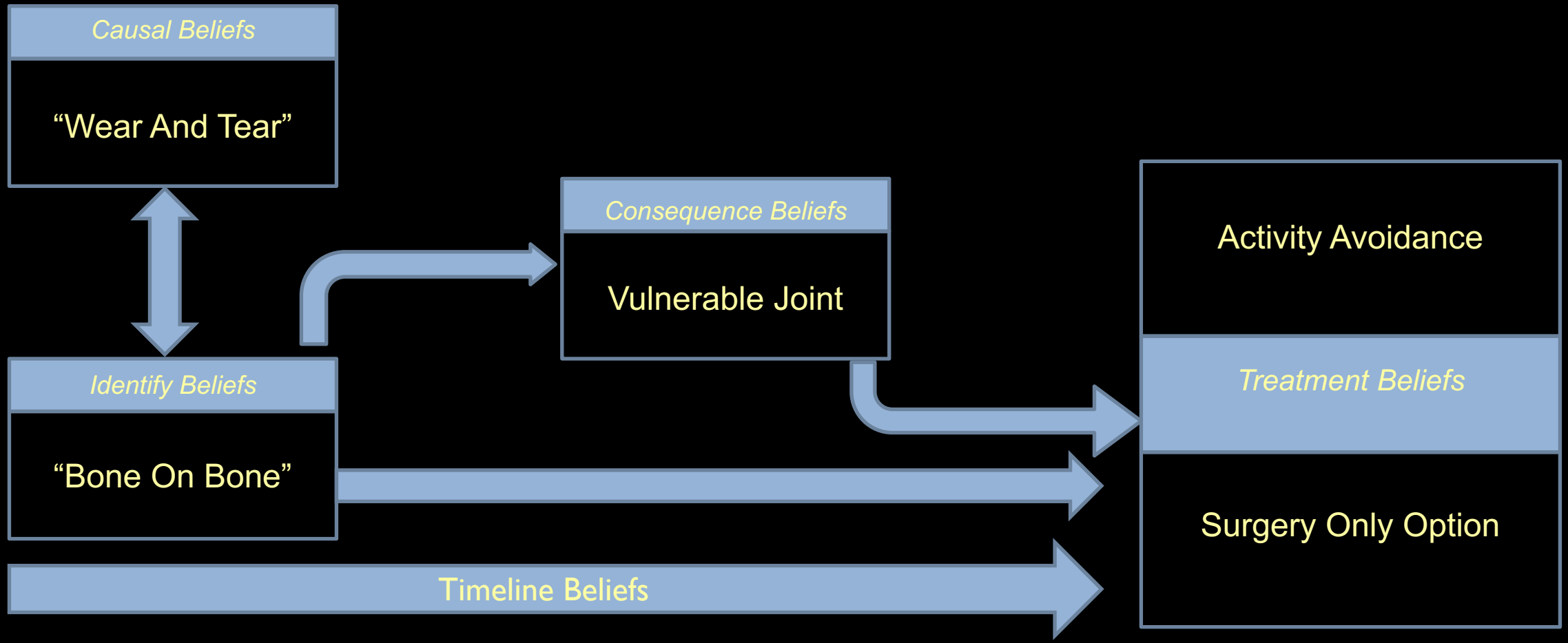
Egerton T, Diamond LE, Buchbinder R, Bennell KL, Slade SC. A systematic review and evidence synthesis of qualitative studies to identify primary care clinicians' barriers and enablers to the management of osteoarthritis. *Osteoarthritis Cartilage.* 2017;25(5):625-638.

Patient Beliefs

- Biomechanical explanation of symptoms and expectations of inevitable decline
  - Got them often from CLINCIANS through their language and explanations
- Joint replacement inevitable
- 'Structural model of progressive degeneration
  - Avoiding, reducing, and pacing activities to limit wear and tear

Darlow B, Brown M, Thompson B, et al. Living with osteoarthritis is a balancing act: an exploration of patients' beliefs about knee pain. *BMC Rheumatology.* 2018;2(1).

Smith TO, Purdy R, Lister S, Salter C, Fleetcroft R, Conaghan PG. Attitudes of people with osteoarthritis towards their conservative management: a systematic review and meta-ethnography. *Rheumatol Int.* 2014;34(3):299-313.



Adapted from: Bunzli S, O'Brien P, Ayton D, et al. Misconceptions and the Acceptance of Evidence-based Nonsurgical Interventions for Knee Osteoarthritis. A Qualitative Study. *Clin Orthop Relat Res.* 2019;477(9):1975-1983.

A Person-Centered and Evidence-Based Way Forward

Loading Is Medicine

- Mechanical loading of cartilage inhibits release of pro-inflammatory mediators
- Research tells us loading is good but what do our patients think????
- Possible barriers
  - Our implicit beliefs
  - Our patient's beliefs

Fu S, Thompson CL, Ali A, et al. Mechanical loading inhibits cartilage inflammatory signalling via an HDAC6 and IFT-dependent mechanism regulating primary cilia elongation. *Osteoarthritis Cartilage.* 2019.

Exercise in Those Deemed TKA Candidates

- Subjects deemed eligible (≥ 2 on Kellgren Lawrence scale) for TKA placed on simple exercise program
  - At one year 75% declined surgery
  - At two years 68% declined surgery
- Beliefs again can be large barriers to engaging in such a program

Skou, S. T., et al. (2015). "A Randomized, Controlled Trial of Total Knee Replacement." N Engl J Med **373**(17): 1597-1606

Skou, S. T., et al. (2018). "Total knee replacement and non-surgical treatment of knee osteoarthritis: 2-year outcome from two parallel randomized controlled trials." Osteoarthritis Cartilage **26**(9): 1170-1180

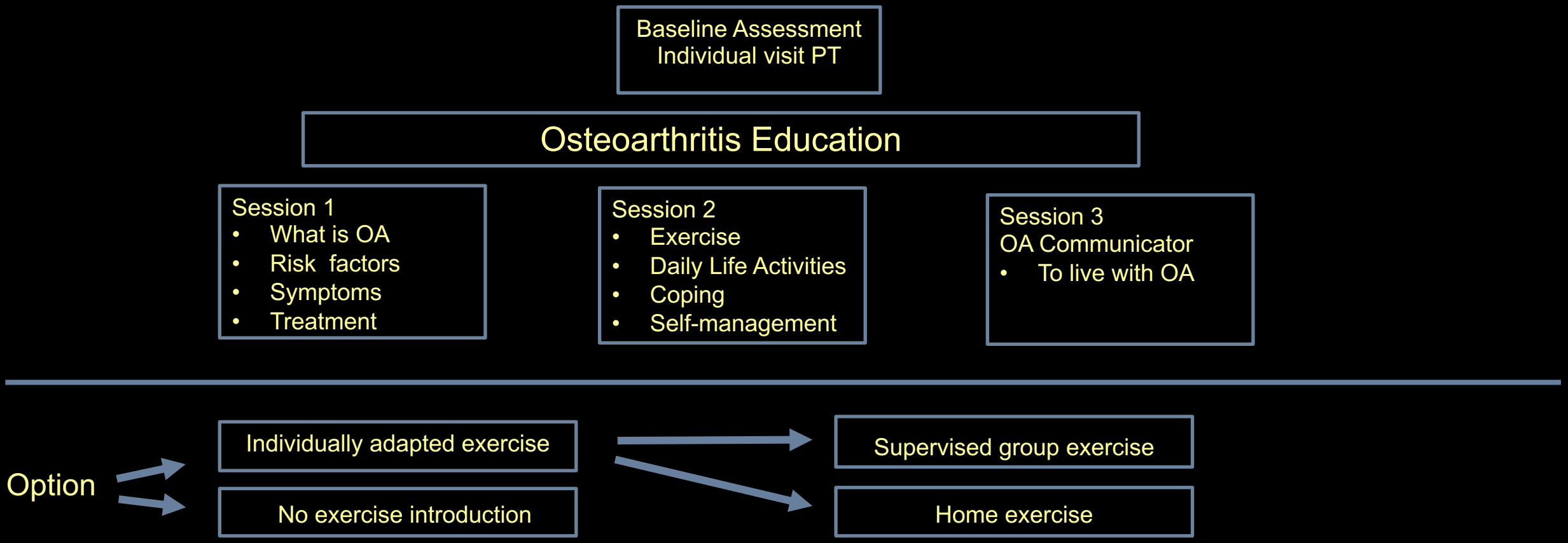
Anti-inflammatory effects of exercise

- Healthy recreational runners
  - Decreases pro-inflammatory markers post run
  - Decreased Cartilage oligomeric matrix protein (COMP) levels in joint post run
- Dose matters
  - Animal studies have shown a relationship of dose to OA progression versus protection

Hyldahl RD, Evans A, Kwon S, et al. Running decreases knee intra-articular cytokine and cartilage oligomeric matrix concentrations: a pilot study. *Eur J Appl Physiol.* 2016;116(11-12):2305-2314.

Mazor M, Best TM, Cesaro A, Lespessailles E, Toumi H. Osteoarthritis biomarker responses and cartilage adaptation to exercise: A review of animal and human models. *Scand J Med Sci Sports.* 2019;29(8):1072-1082.

Better Management of Patients with Osteoarthritis Program - Sweden



Thorstensson CA, Garellick G, Rystedt H, Dahlberg LE. Better Management of Patients with Osteoarthritis: Development and Nationwide Implementation of an Evidence-Based Supported Osteoarthritis Self-Management Programme. *Musculoskeletal Care.* 2015;13(2):67-75.

Better Management of Patients with Osteoarthritis Program - Sweden

- Knee OA – N=30,392
- Hip OA - N=13,811
- At 12 months significantly fewer patients
  - Took OA medications
  - Reported daily pain
  - Had willingness to undergo surgery
  - Reported fear avoidance behavior
  - Were physically inactive

Jonsson T, Eek F, Dell'Isola A, Dahlberg LE, Ekvall Hansson E. The Better Management of Patients with Osteoarthritis Program: Outcomes after evidence-based education and exercise delivered nationwide in Sweden. *PLoS One.* 2019;14(9):e0222657.

What is the best way forward?

- Clinicians need to update their understanding of OA and options
- Educate our patients in ways that engender positive beliefs and behaviors
- Look at more than films
  - Obesity
  - Metabolic health
  - Sarcopenia
  - Lifestyle
  - Stress / coping abilities
- Evidence based application of exercise
  - Prescribed and dosed to the individual

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THANK YOU!