Orthobiologic Injections for Osteoarthritis

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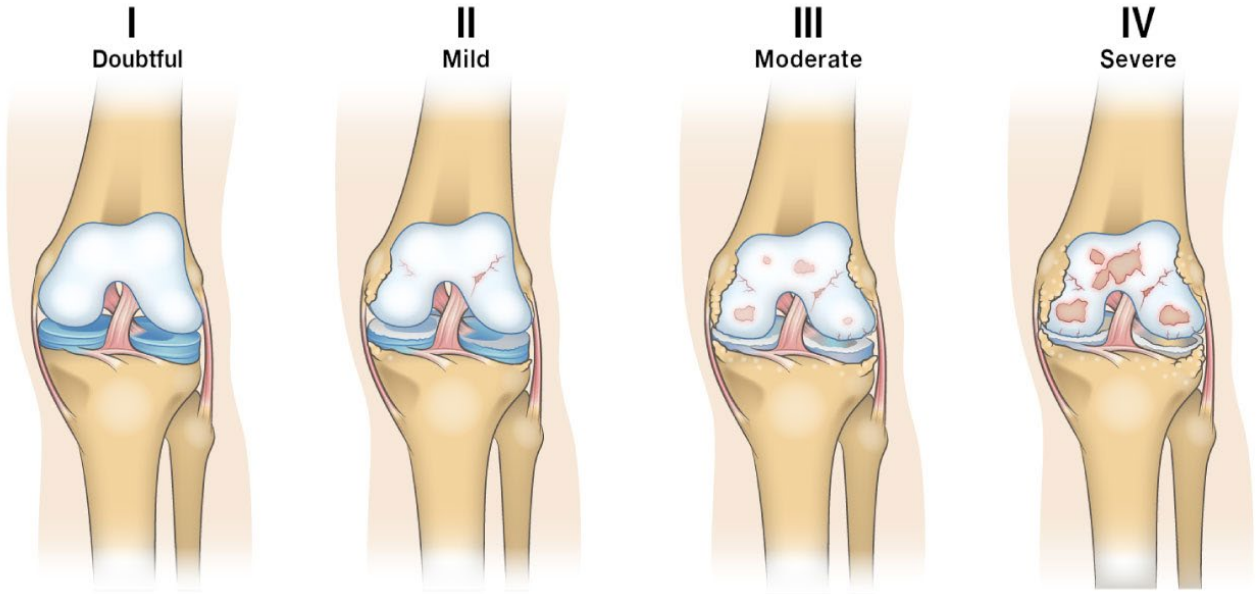
No Conflicts of Interests or Disclosures to report

Learning Objectives

- Understand the background of Osteoarthritis
- Understand the traditional treatment course of Osteoarthritis
- Understand the term Orthobiologics
- Understand the indications for Orthobiologics

Epidemiology of Osteoarthritis

- Greater than 30 million symptomatic adults in the US
- Increasing with increasing elderly population and medical co-morbidities
- Estimated annual costs exceed $300 billion



Pathogenesis of Osteoarthritis

- Indeed an inflammatory process
  - Macrophage predominance
  - Increased presence of certain cytokines and proteases
- Injury to the surface chondrocyte leading to loss of smooth articular cartilage
- Bone sclerosis and osteophyte formation
- Synovitis
- Deterioration of surrounding structures

Pathogenesis of OA

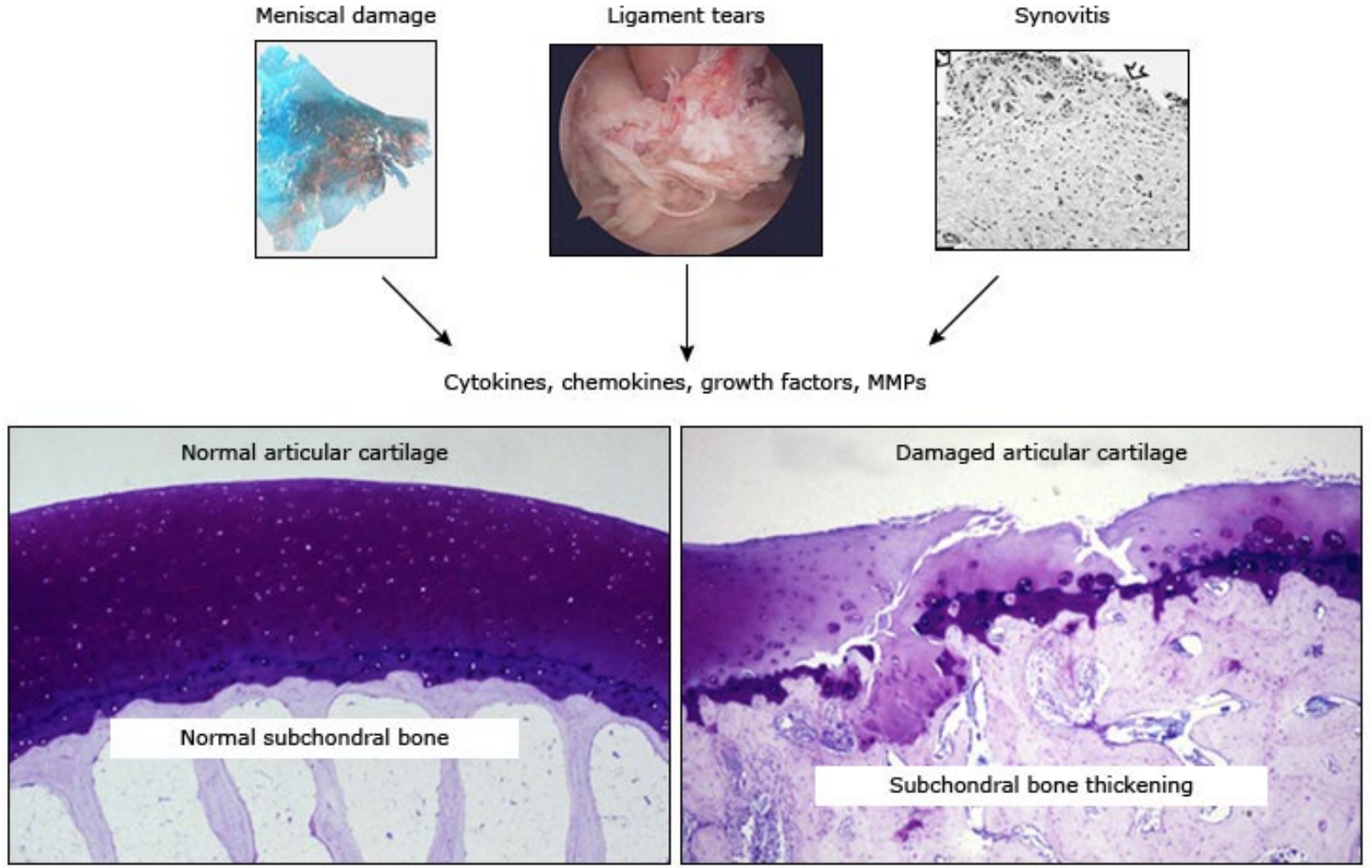


photo adapted from UpToDate, Richard Loeser MD

Risks Factors for Osteoarthritis

- Aging
- Joint Injury
- Obesity
- Genetics
- Anatomy
- Gender

Traditional Treatments

- Rest
- Ice
- Medications
  - Topicals
  - Supplements
  - Orals
    - Tylenol
    - NSAIDs
- Physical Therapy
- Injectables
- Bracing
- Nerve blocks

Traditional Treatments (cont.)

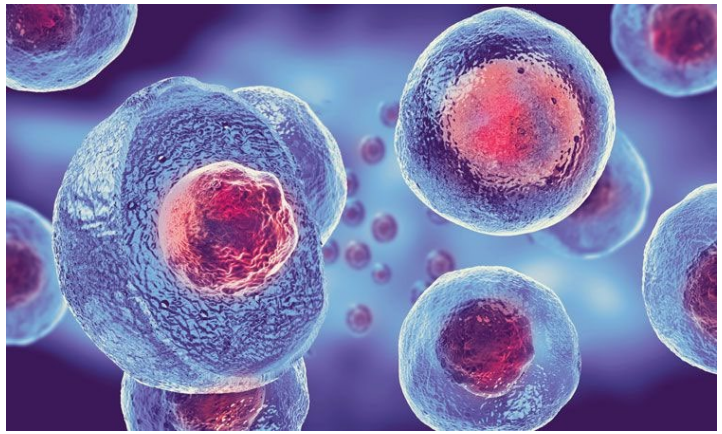
- Insoles
- Nutritional supplements
- Opioids
- Hyaluronans
- Tylenol
- TENS unit
- Acupuncture
- Heat/Ice

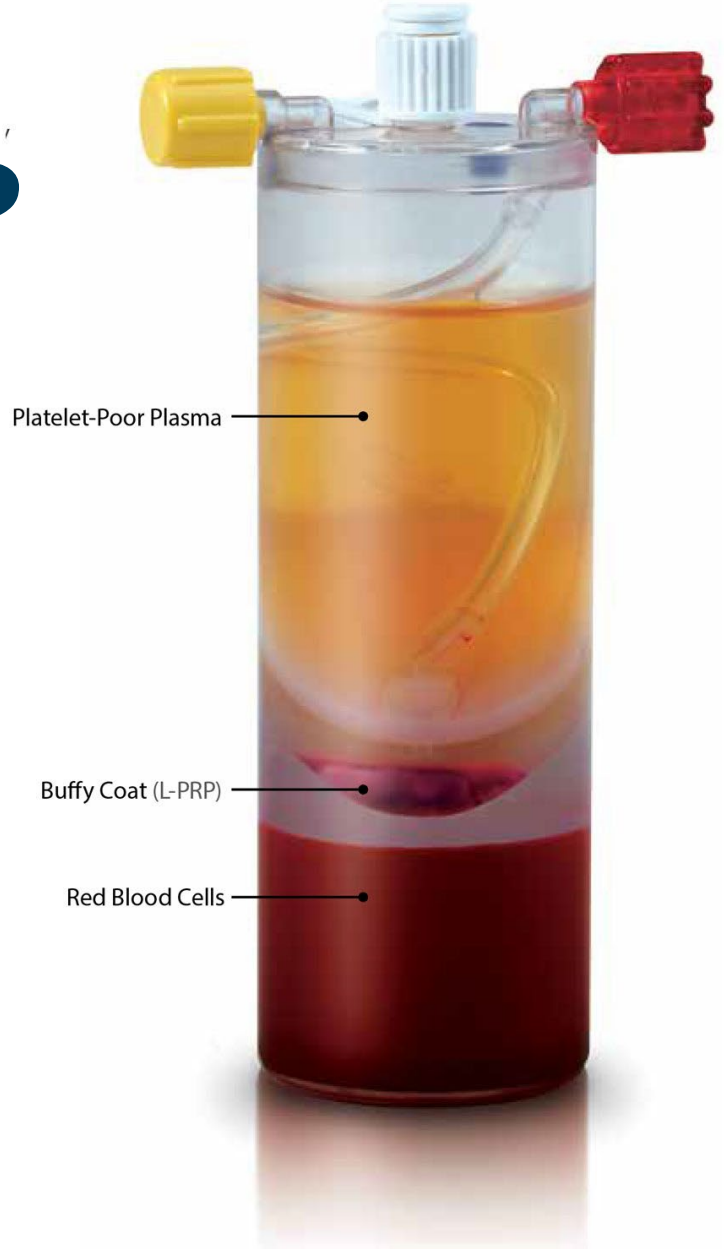
Why Orthobiologics?

- Need for slowing or reversal of disease progression
- Knee Arthroplasty has its limitations

Why Orthobiologics?

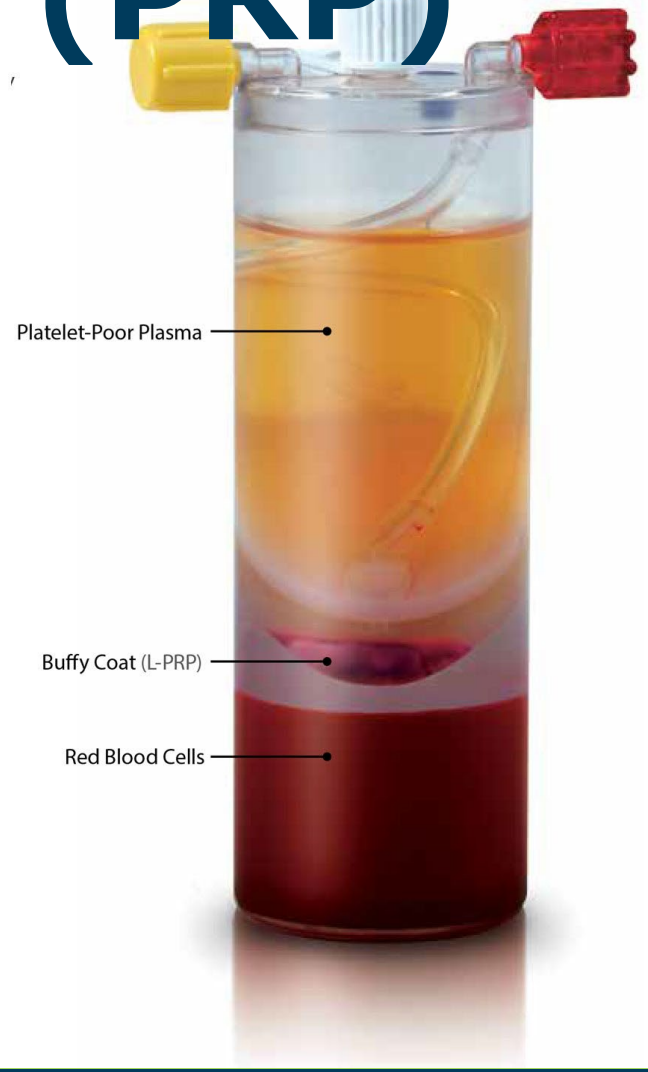
- Why not “Regenerative Medicine”
- What are Orthobiologics
  - PRP
  - Stem Cells
- Cost versus benefit





Platelet Rich Plasma (PRP)

- What is it?
- Proposed mechanism for benefit
- Types of preparation
  - Leukocyte Rich vs Leukocyte Poor



Does PRP work?

- Currently the evidence is conflicting
- Recent prospective studies demonstrate
  - Reduced pain
  - Improved functionality
  - Possible reduction in pro-inflammatory cytokines
- No change in cartilage surface or cellular matrix on biopsy results

How is PRP administered for OA?

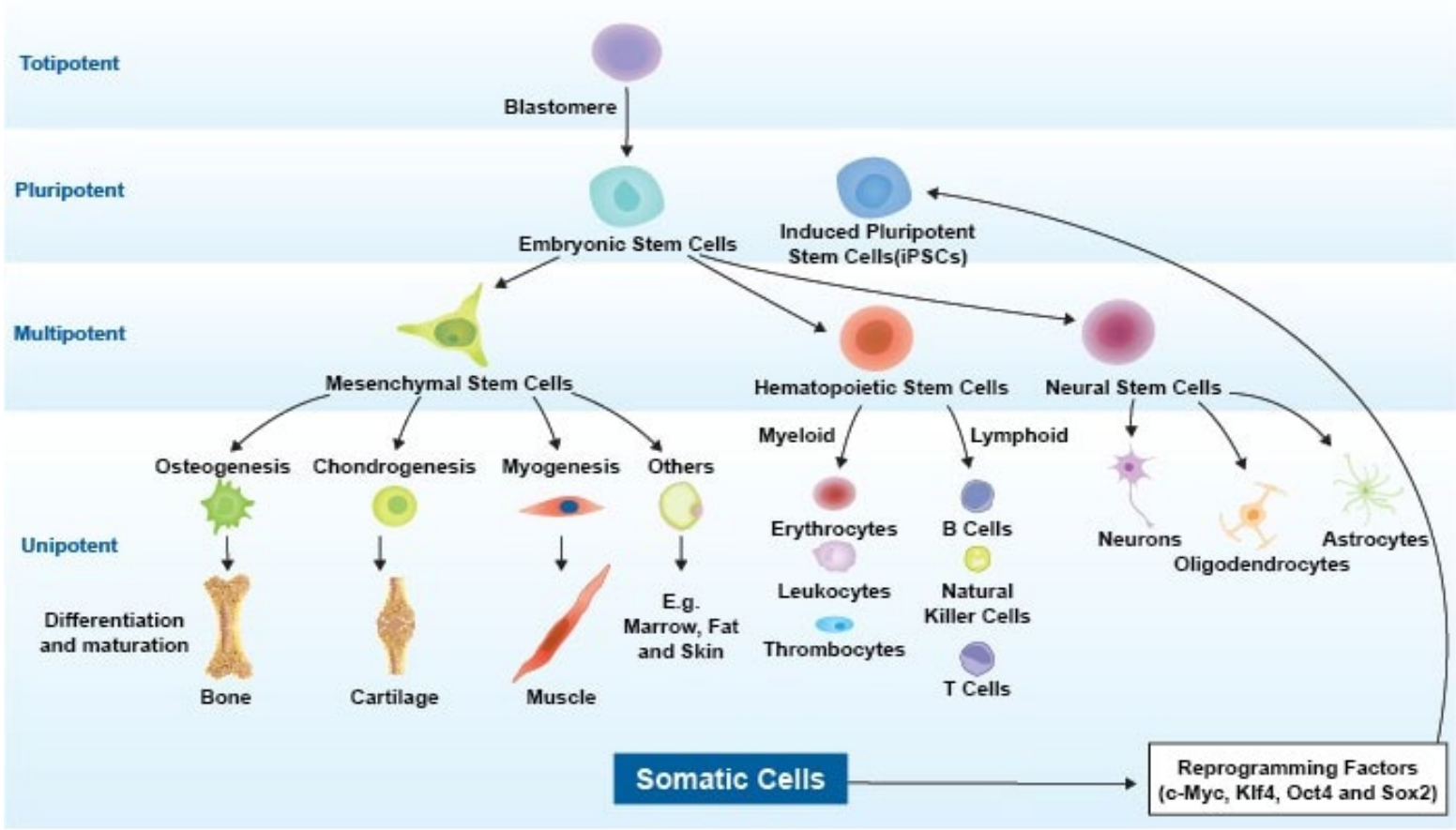
- Alone or Co-administered with hyaluronic acid
- Single injection versus 3 injections, 10 days apart
- Can be repeated if successful

What are the costs and risks?

- Unreimbursed benefit
  - $350-750 per injection
- Risks
  - Few if any at this time

Stem Cells

- Different ways of obtaining
  - Bone Marrow Aspirate
  - Fat tissue
  - Synovium
  - Umbilical Cord Blood
- Traditionally thought of as totipotent/pluripotent cell



Stem Cell Injections of Osteoarthritis

- What does the evidence say?
  - Currently no reliable evidence to support use
- What are the costs and risks?
  - Unreimbursable benefit
    - $2500-5000
  - Morbidity from donor site if autologous

- Not to be confused with use as adjunct to surgical intervention

Summary

- Orthobiologics vs Regenerative medicine
- More evidence for PRP as compared to Stem Cell injections
- Caution with correct preparations and tissue sources
- How should we currently manage Osteoarthritis in our patients?
- Use in those not responsive to traditional treatments or those with progressed disease hoping to avoid arthroplasty

Thank You

Citations

- Chu CR, et al. Optimizing Clinical Use of Biologics in Orthopaedic Surgery: Consensus Recommendations From the 2018 AAOS/NIH U-13 Conference. *J Am Acad Orthop Surg*. 2019 Jan 15;27(2):e50-e63
- Cisternas MG et al. Alternative methods for defining osteoarthritis and the impact on estimating prevalence in a US population-based survey. *Arthritis Care Res* 2016;68:574-580.
- Cole BJ, et al. Hyaluronic Acid Versus Platelet-Rich Plasma: A Prospective, Double-Blind Randomized Controlled Trial Comparing Clinical Outcomes and Effects on Intra-Articular Biology for the Treatment of Knee Osteoarthritis. *The American Journal of Sports Medicine*, vol. 45, no. 2, 2016, pp. 339–346.

Citations

- Fortier LA, Cole BJ. Anti-Inflammatory and Matrix Restorative Mechanisms of Platelet-Rich Plasma in Osteoarthritis: Response to Andia and Maffulli. *The American Journal of Sports Medicine*, vol. 42, no. 6, 2014.
- Lim, Hong-Chul, et al. Allogeneic Umbilical Cord Blood–Derived Mesenchymal Stem Cell Implantation Versus Microfracture for Large, Full-Thickness Cartilage Defects in Older Patients: A Multicenter Randomized Clinical Trial and Extended 5-Year Clinical Follow-Up. *Orthopaedic Journal of Sports Medicine*, vol. 9, no. 1, 2021, p.1-15.
- Maheshwer B, et al. Regenerative Potential of Mesenchymal Stem Cells for the Treatment of Knee Osteoarthritis and Chondral Defects: A Systematic Review and Meta-Analysis. *Arthroscopy: The Journal of Arthroscopic & Related Surgery*, vol. 37, no. 1, 2021, pp. 362–378., doi:10.1016/j.arthro.2020.05.037.

Citations

- Murphy LB, et al. Medical expenditures and earnings losses among us adults with arthritis in 2013. *Arthritis Care Res* 2018;70:869-876.
- Riboh JC, et al. Effect of Leukocyte Concentration on the Efficacy of Platelet-Rich Plasma in the Treatment of Knee Osteoarthritis. *The American Journal of Sports Medicine*, vol. 44, no. 3, 2015, pp. 792–800.
- Sanchez M, et al. A randomized clinical trial evaluating plasma rich in growth factors (PRGF-Endoret) versus hyaluronic acid in the short-term treatment of symptomatic knee osteoarthritis. *Arthroscopy* 2012;28(8):1070-1078.
- Sanchez M, Anitua E, Azofra J, Aguirre JJ, Andia I. Intra-articular injection of an autologous preparation rich in growth factors for the treatment of knee OA: a retrospective cohort study. *Clin Exp Rheumatol* 2008;26(5):910-913.

Citations

- Sundman EA, et al. The Anti-Inflammatory and Matrix Restorative Mechanisms of Platelet-Rich Plasma in Osteoarthritis. *The American Journal of Sports Medicine*, vol. 42, no. 1, 2013, pp. 35–41.