PRP AND UCL INJURIES

Thomas J. Noonan, MD
Associate Professor
Department of Orthopedic Surgery
University of Colorado
Steadman Hawkins Clinic Denver
Head Team Physician, Colorado Rockies

WHY CONSIDER PRP?

- Very popular in a wide variety of medical fields
- A lot of interest in biologic therapy to improve healing
- Much better scientific evidence than many other biologic treatments- stem cells, amniotic proteins

WHY CONSIDER PRP?

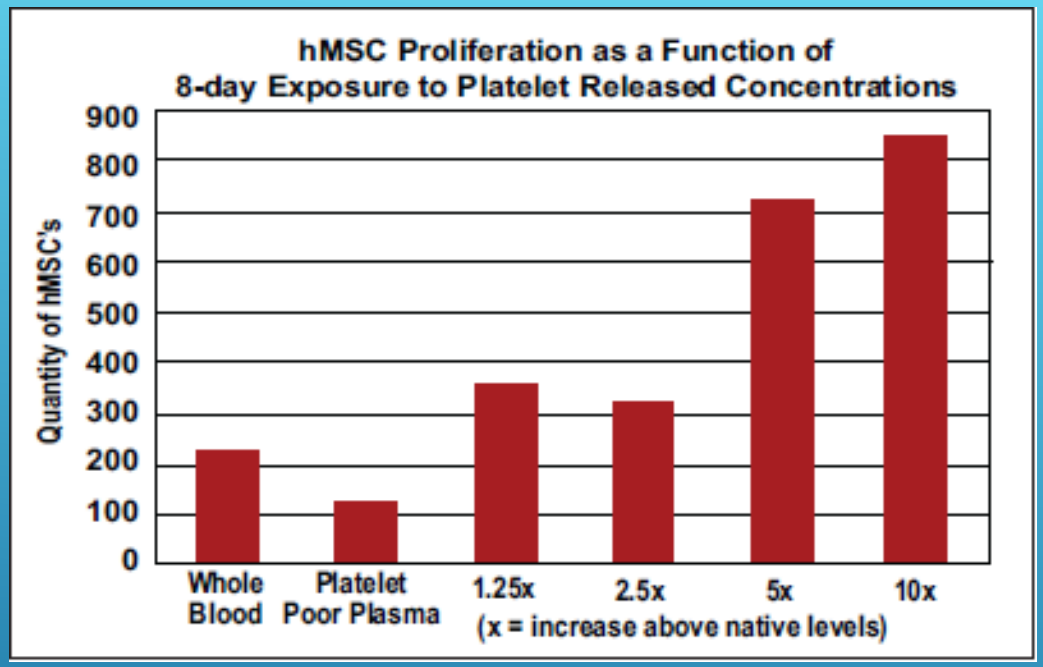
- During the inflammatory phase of healing, the functions of activated platelets include:
  - Anti-microbial
  - Adhesion
  - Aggregation
  - Clot retraction
  - Pro-coagulation
  - Cytokine signaling
  - Chemokine release
  - Growth factor release

Bioactive Molecules Found in the α-Granules of Platelets[a]

General Activity Categories	Specific Molecules	Biologic Activities
Growth factors	TGF-β	Promotes matrix synthesis
	PDGF	Chemoattraction, cell proliferation
	IGF-I, II	Cell proliferation, maturation, bone matrix synthesis
	FGF	Angiogenesis, fibroblast proliferation
	EGF	Cell proliferation
	VEGF	Angiogenesis
	ECGF	Endothelial cell proliferation, angiogenesis
Adhesive proteins	Fibrinogen	Blood clotting cascade (fibrin clot formation)
	Fibronectin	Binds to cell-surface integrins, affecting cell adhesion, cell growth, migration, and differentiation
	Vitronectin	Cell adhesion, chemotaxis
	Thrombospondin-1	Inhibition of angiogenesis
Clotting factors	Factor V, factor XI, protein S, antithrombin	All play a role in thrombin activation and eventual fibrin clot formation
Fibrinolytic factors	Plasminogen	Plasmin production (leads to fibrinolysis)
	Plasminogen activator inhibitor	Regulation of plasmin production
	α-2 antiplasmin	Inactivation of plasmin
Proteases and antiproteases	TIMP-4	Regulation of matrix degradation
	Metalloprotease-4	Matrix degradation
	α1-antitrypsin	Inhibits a wide variety of proteases and enzymes
Basic proteins	Platelet factor 4	Inhibition of angiogenesis
	β-thromboglobulin	Platelet activation, inhibition of angiogenesis
	Endostatins	Inhibitors of endothelial cell migration and angiogenesis
Membrane glycoproteins	CD40 ligand	Inflammation, synthesis of interleukins, and integrin production; platelet endothelial cell adhesion, cell signaling, modulation of integrin activation molecule-1 (PECAM-1) on leukocytes
	P-selectin	Vascular cell adhesion molecule, aids in binding and recruitment of leukocytes to inflamed tissue

[a]TGF, transforming growth factor; PDGF, platelet-derived growth factor; IGF, insulin-like growth factor; FGF, fibroblast growth factor; EGF, epidermal growth factor; VEGF, vascular endothelial growth factor; ECGF, endothelial cell growth factor; TIMP-4, tissue inhibitor of metalloprotease-4.

WHY CONSIDER PRP?



- PRP Definition:3-5 fold increase concentration of platelets

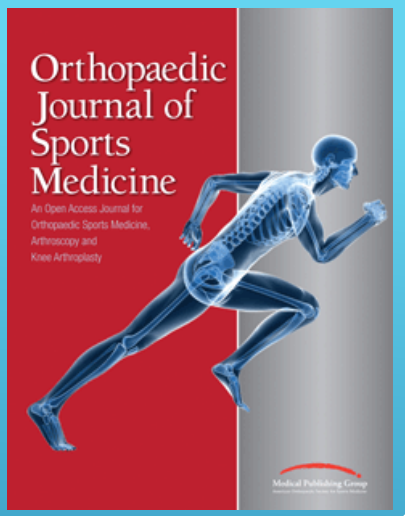
WHY CONSIDER PRP?

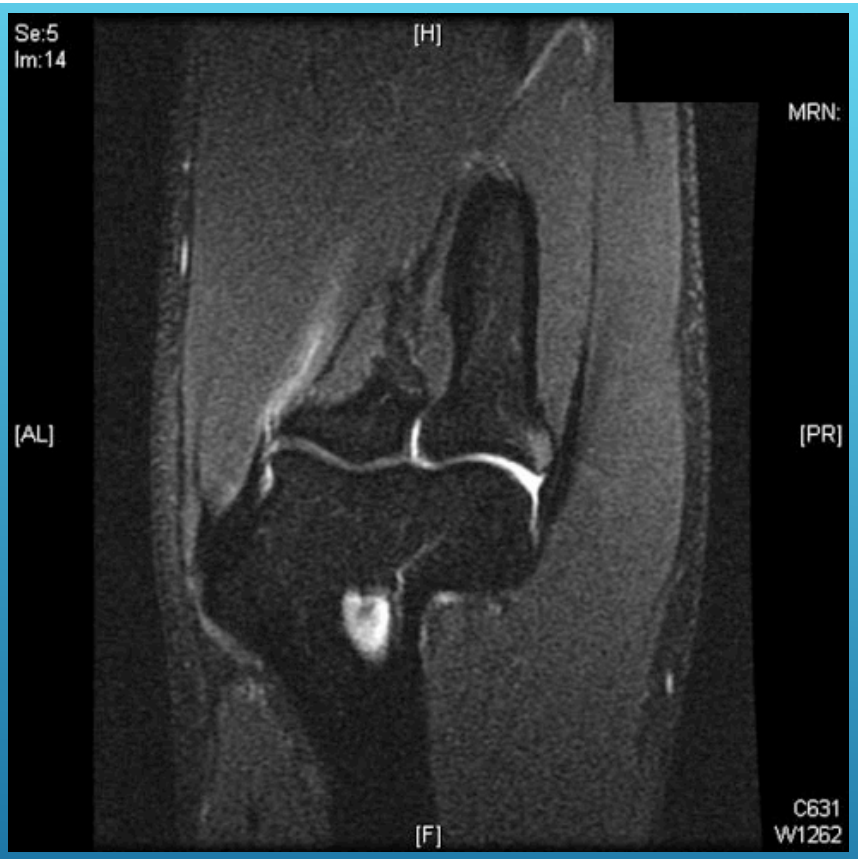
WHY CONSIDER PRP?

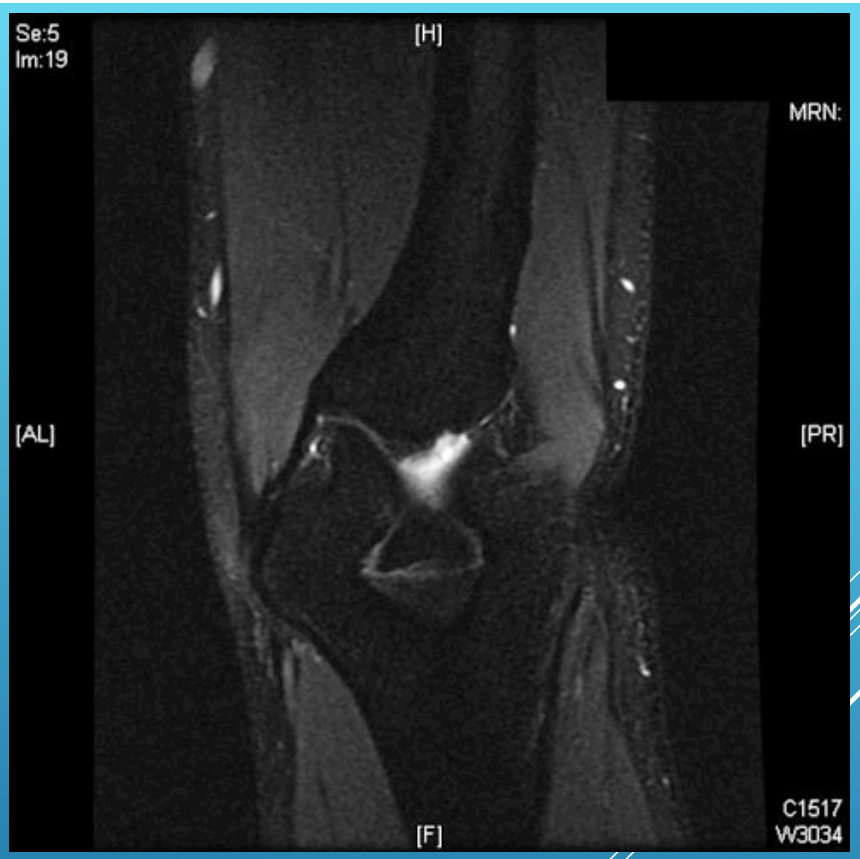
- Chen et al, 2018
- Meta-analysis assessing ability of PRP to decrease pain in tendon and ligament injuries
- 37 articles and 1031 patients
- Rotator cuff injuries/ lateral epicondylitis
- Long-term follow-up – significantly less pain in PRP group

CAN PRP BE USED TO TREAT UCL INJURIES?

- Deal et al, 2017
  - Case series
  - 25 athletes underwent 2 LR-PRP injections and rehabilitation for partial UCL tear
  - MRI repeated 2 weeks after second injection
  - **22/23 with primary injuries returned to play at same level**
  - 1 had prior reconstruction, 1 prior repair- both failed
  - MRI showed reconstitution of UCL in all patients (partial in 2)







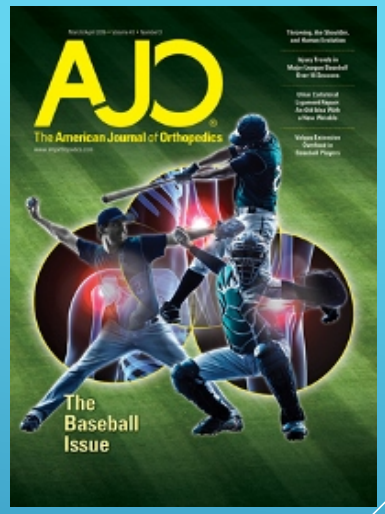
CAN PRP BE USED TO TREAT UCL INJURIES?

CAN PRP BE USED TO TREAT UCL INJURIES?

- Podesta et al, 2013
  - Case series
  - 34 athletes with partial UCL tears had failed 2 months of nonoperative treatment and then had LR-PRP US-guided injection
  - **88% returned to same level of play** (average time 12 weeks)
  - Decrease in medial elbow joint space narrowing decreased from 7 to 2.5 mm

CAN PRP BE USED TO TREAT UCL INJURIES?

- Dines et al, 2016
  - Retrospective review of 44 baseball players treated with PRP for partial UCL injuries
  - 16 had 1 injection, 6 had 2, 22 had 3
  - Throwing program once asymptomatic
  - 15 excellent, 17 good, 2 fair, 10 poor outcomes
  - **67% of professional players returned to play**
  - Mean time to return to competition- 12 weeks



CAN PRP BE USED TO TREAT UCL INJURIES?

- Kato et al, 2019
  - Case series
  - 34 baseball players with partial or complete UCL tears treated with PRP (ACP) after failure to improve with rest/physical therapy for 2 months
  - **26/30 returned to preinjury level of play** at average time of **12.4** weeks
  - Medial joint space opening measured by US decreased from 3.81 mm to 3.45 mm (p=0.018)

CAN PRP BE USED TO TREAT UCL INJURIES?

- Chauhan et al, 2019
  - 544 professional baseball players treated nonoperatively for UCL injury identified using MLB injury tracking system
  - 133 received PRP injections prior to nonsurgical treatment program
  - Overall **54% return to play**
  - No difference between PRP and no-PRP
  - No-PRP group had a faster return to throwing

CAN PRP BE USED TO TREAT UCL INJURIES?

- Limitations
  - PRP group was older and more commonly MLB
  - No-PRP group returned to throwing 2 weeks faster (although PRP was injected 2 weeks after last throwing)

CAN PRP BE USED TO TREAT UCL INJURIES?

- Variability in rehab program and type of PRP injected
  - For example, most MLB physicians who used PRP allowed return to throwing in 3 weeks
  - Only 45% of cases had reviewable MRI scans
  - 20% of included cases were grade 3 injuries

PRP AND UCL INJURIES: SUMMARY

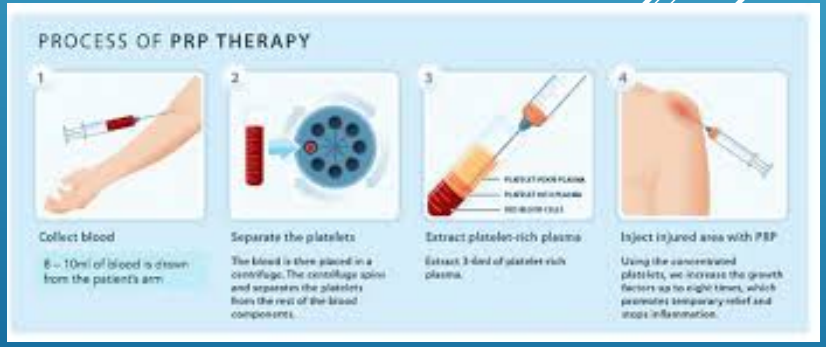
- No great data
- Nothing definitive to prove PRP helps
- Good theoretical basis for treatment from tendinopathy studies
- Probably does no harm
- Does result in more cost

PRP AND UCL INJURIES: MY APPROACH

- Unlikely to work for a complete tear
  - Maybe consider in an athlete who does not want surgery
- Worth considering adding for treatment of a partial tear
  - May augment healing
  - Slows down the rehab process (6 weeks no throwing post injection)

PRP AND UCL INJURIES: MY APPROACH

- LR-PRP
- Ultrasound guided using a “peppering” technique
- Early PT for shoulder strengthening
- Reevaluation in 6 weeks
- If no tenderness and negative moving valgus stress test, initiate interval throwing program



PRP AND UCL INJURIES: MY EXPERIENCE

- I don't have anything scientific
- Generally good results
- Better results in younger athletes

THANK YOU!