

Histoire et expérience du PRP

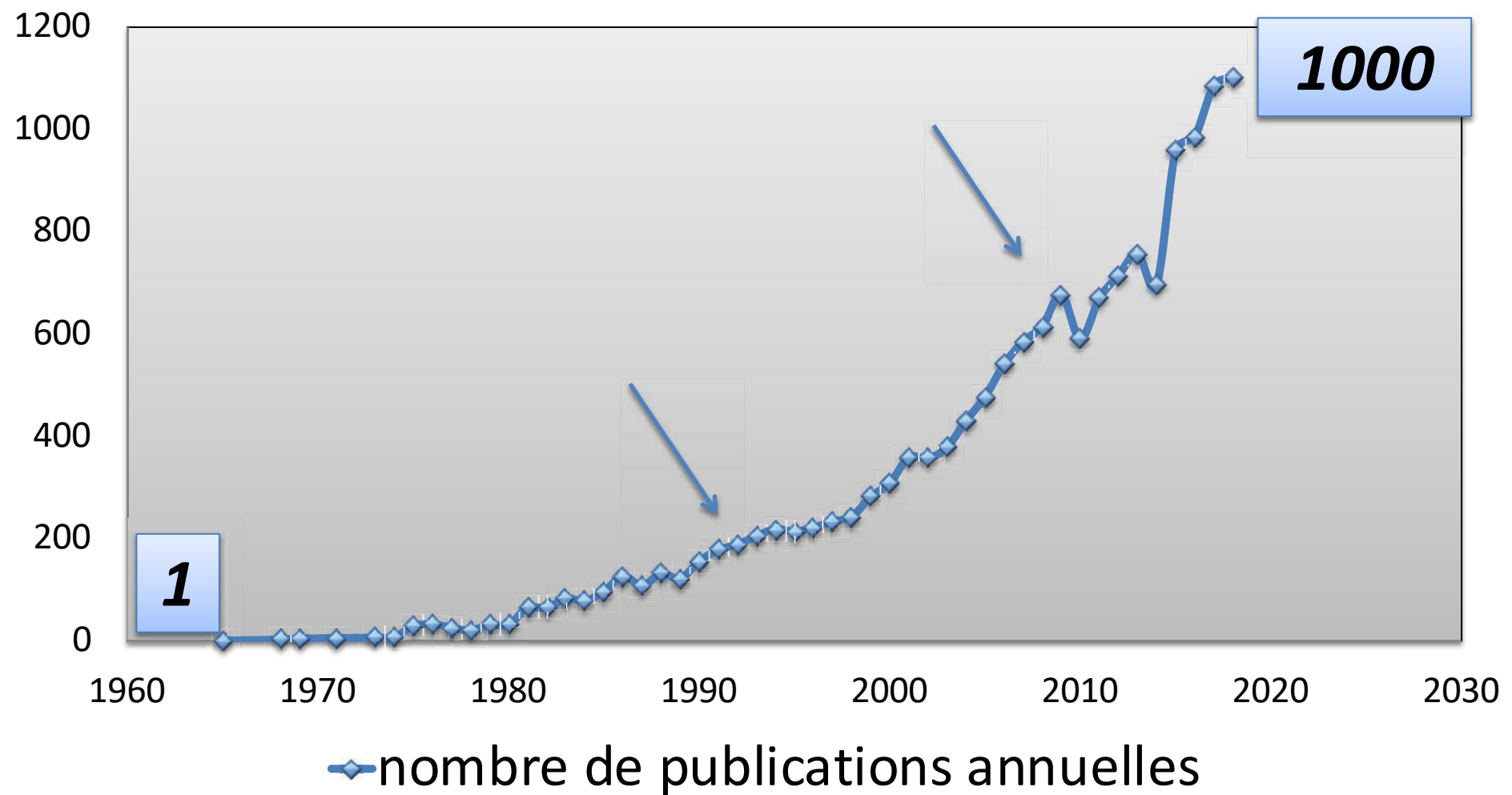


Christophe – Charousset

Institut Ostéo Articulaire Paris Courcelles

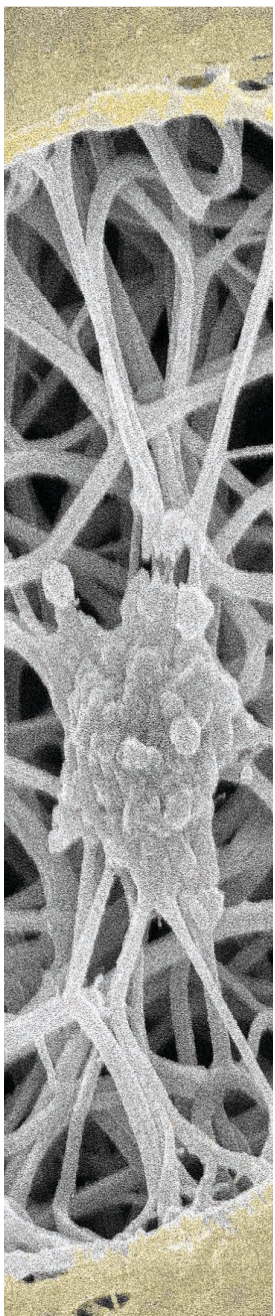
PARIS - FRANCE

PUBMED depuis 50 ans..



Ma première expérience: début 2007





Premières applications cliniques: « plasma concentré »

- Développé par Marx en **1998** pour la chirurgie maxillo-faciale
- Anitua : résultats préliminaires pour l'implantologie en **1999**
- Utilisé en chirurgie plastique par Eppeley en **2004**

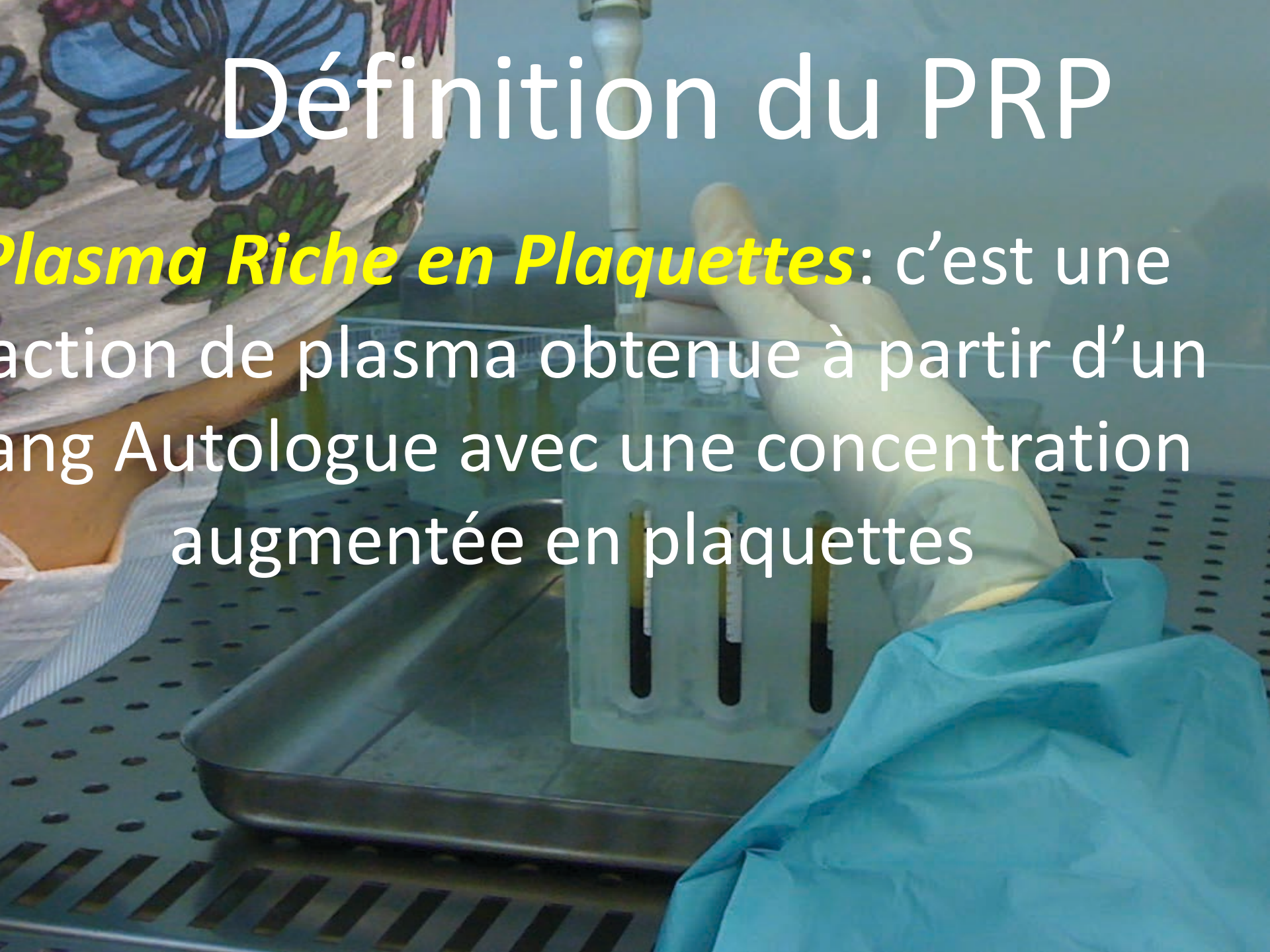
Marx RE, Carlson ER, Eichstaedt RM, Schimmele SR, Strauss JE, Georgeff KR. Platelet-rich plasma: Growth factor enhancement for bone grafts. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1998;85:638–646.

Anitua E. Plasma rich in growth factors: Preliminary results of use in the preparation of future sites for implants. *Int J Oral Maxillofac Implants* 1999;14:529–535.

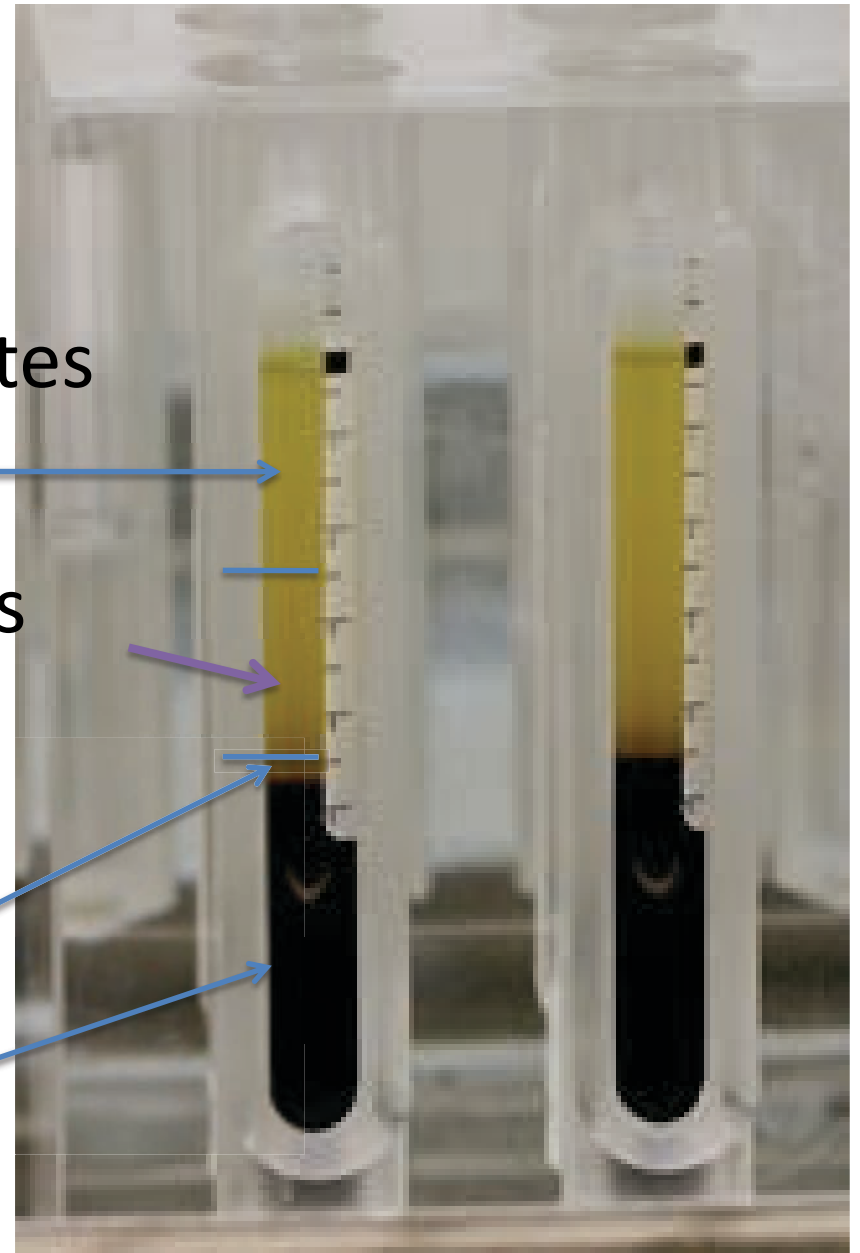
Eppeley BL, Woodell JE, Higgins J. Platelet quantification and growth factor analysis from platelet-rich plasma: implications for wound healing. *Plast Reconstr Surg* 2004;114:1502–8.

Définition du PRP

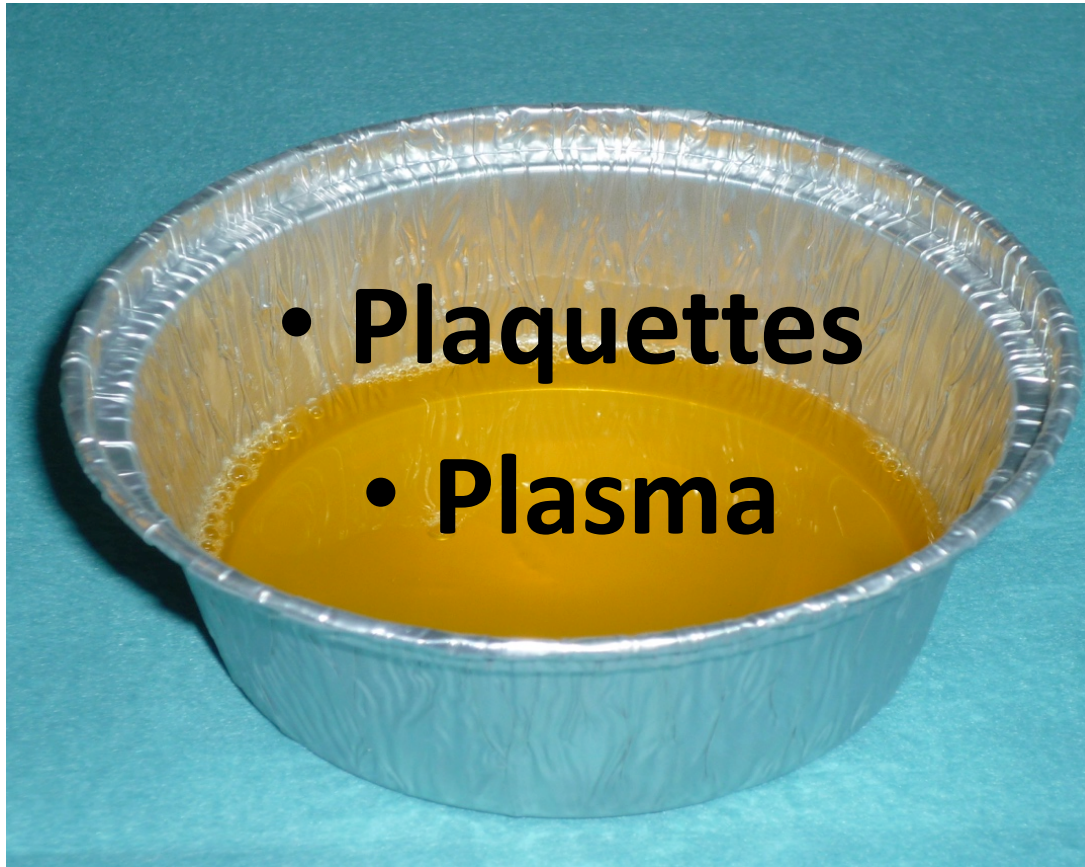
Plasma Riche en Plaquettes: c'est une fraction de plasma obtenue à partir d'un sang Autologue avec une concentration augmentée en plaquettes

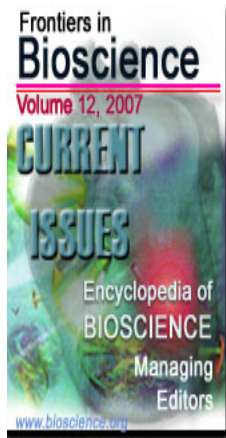


- Plasma pauvre en plaquettes
- Plasma riche en plaquettes
- Globules blancs
- Globules rouges



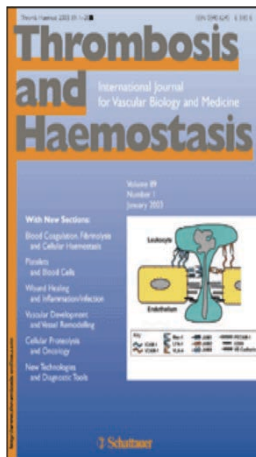
Les facteurs de croissance sont contenus dans le
P.R.P. (Plasma Riche en Plaquettes)?



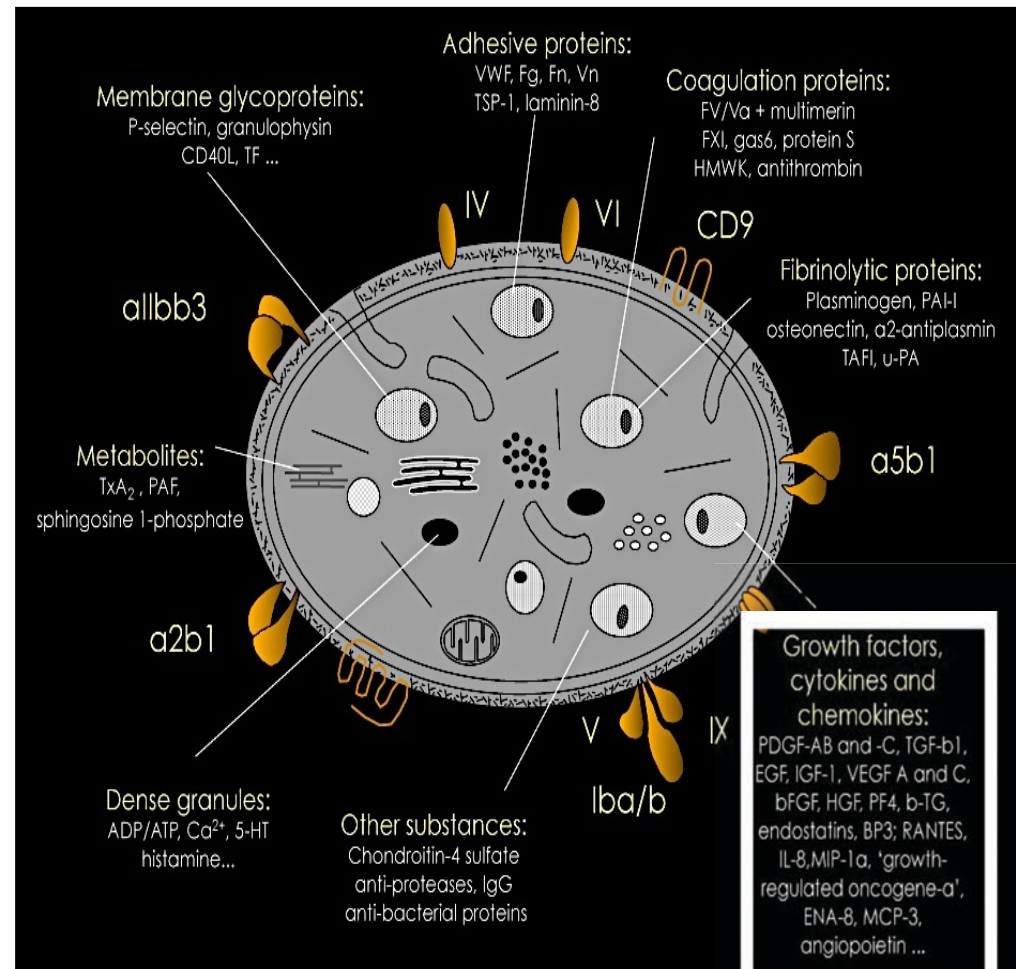


Plaquettes: plus de 1.300 proteines ou facteurs de croissance

Nurden AT, Nurden P, Sanchez M, Andía I, Anitua E. Platelets and wound healing
Frontiers in BioScience. 2008; 13:3525-3548



Anitua E, et al. Autologous platelets as a source of proteins for healing and tissue regeneration.
Thrombosis&Haemostasia. 2004; 35(10): 1648-1652.



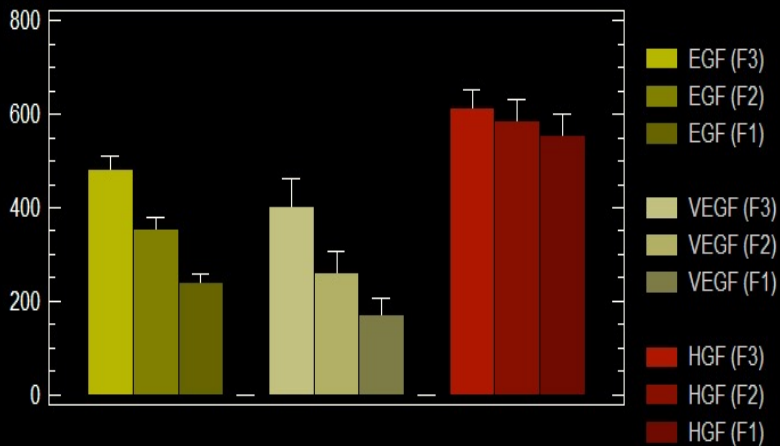
Plaquettes

PDGF, TGF-beta1, VEGF, EGF, bFGF

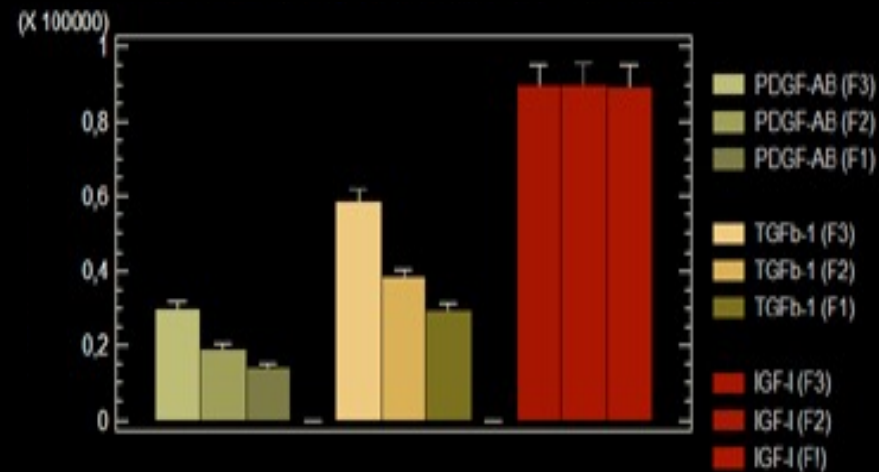
Plasma

IGF-I, HGF

EGF, VEGF and HGF concentrations in the three plasma fractions



PDGF-AB, TGF-beta 1 and IGF-1 concentrations in the three plasma fractions



Messagers pour une réponse cellulaire

- Growth Factors represent one of the most important molecular families present in tissue healing.
- They act as signaling agents to support and speed up tissue healing

PDGF

(platet-derived growth factor)

bFGF

(basic fibroblast growth factor)

TGF- β

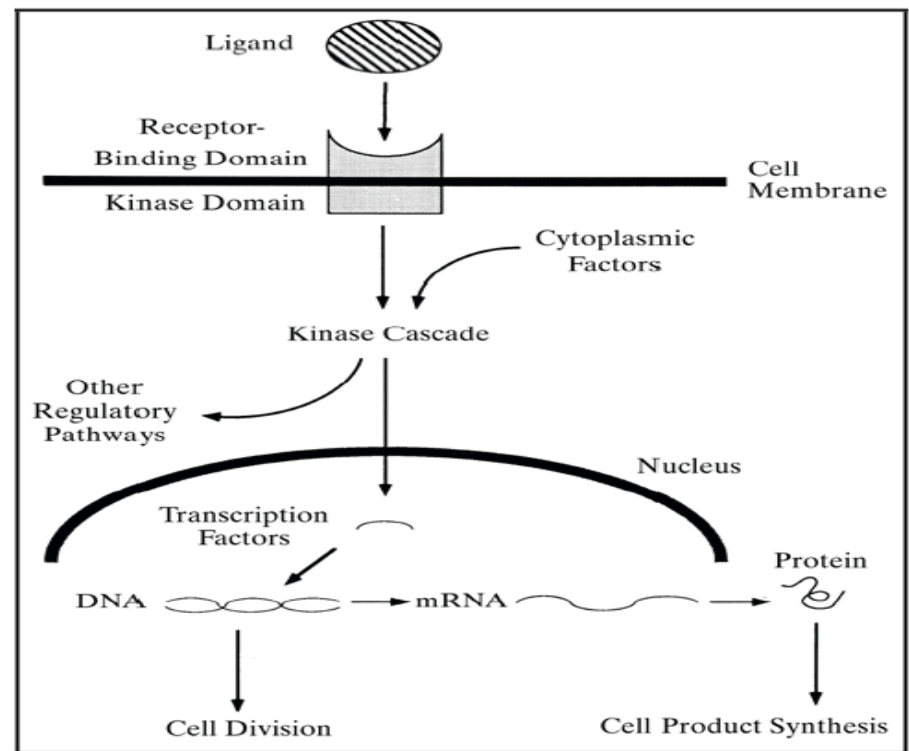
(transforming growth factor)

VEGF

(vascular endothelial growth factor)

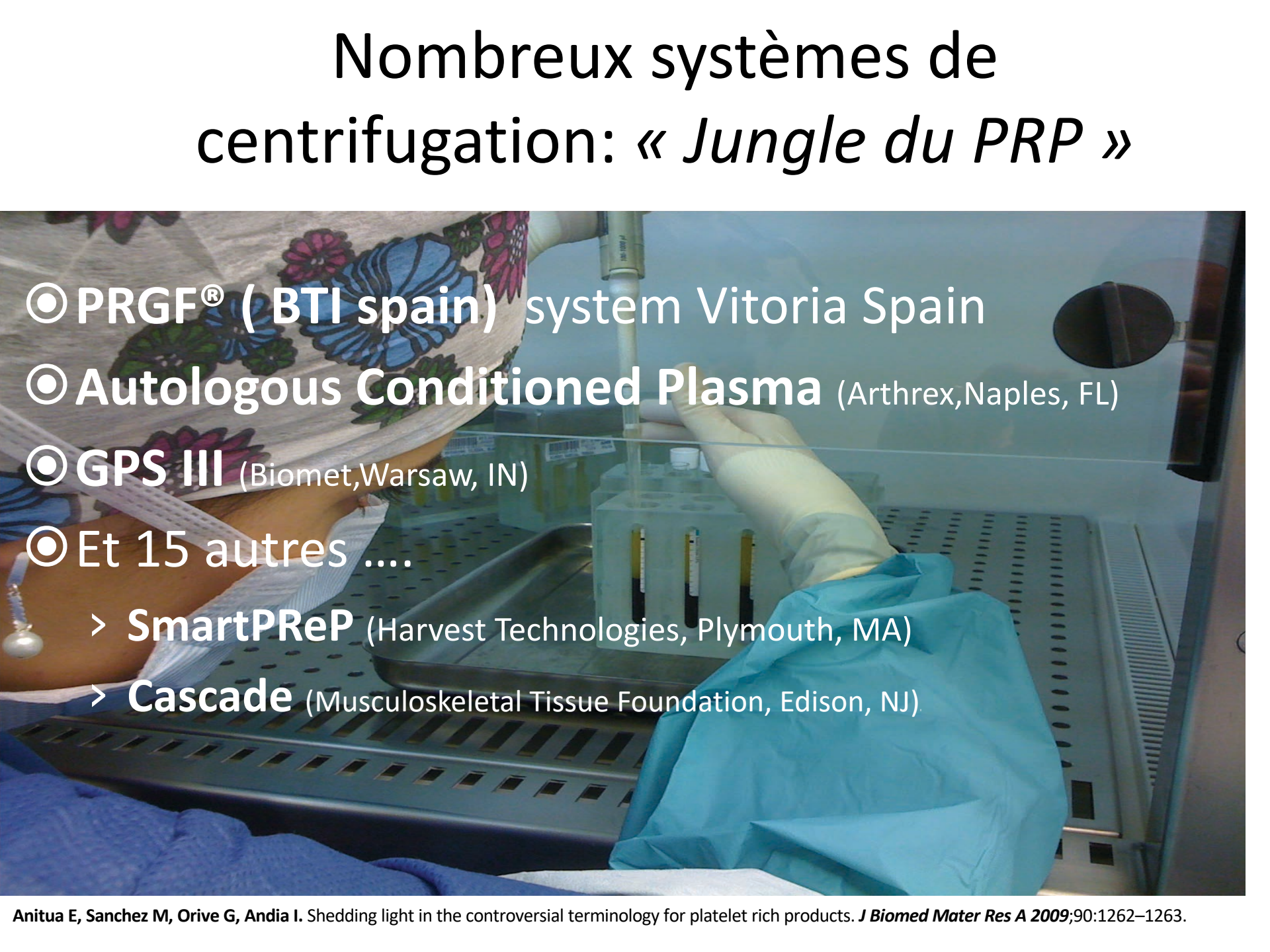
IGF-I

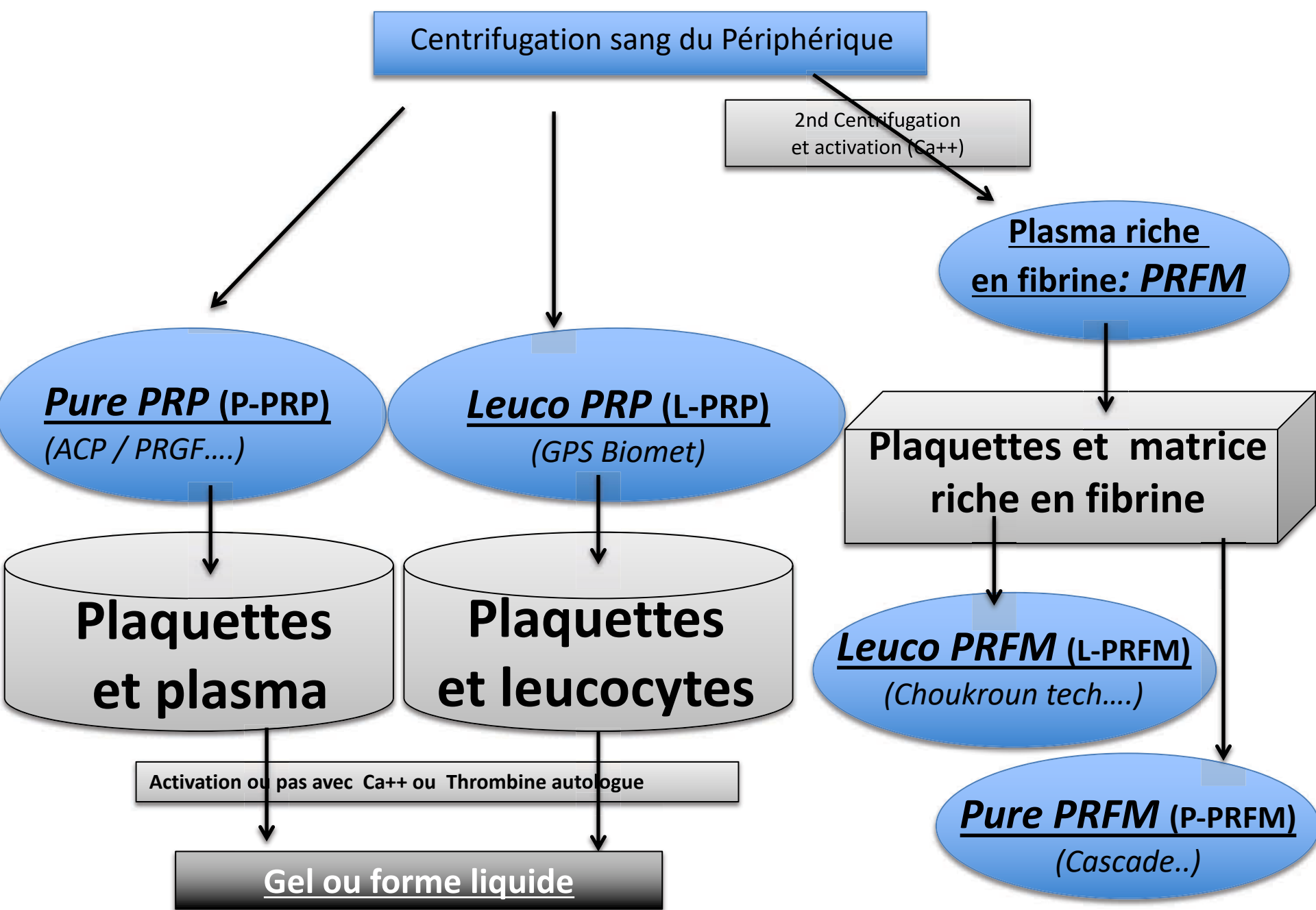
(insulin-like growth factor)



Trippel SB et al., *JBJS*1996;78-A:1272-86

Nombreux systèmes de centrifugation: « *Jungle du PRP* »

- 
- A photograph showing a gloved hand using a pipette to transfer liquid into a multi-well plate inside a centrifuge. The centrifuge is open, and the plate is being held in place. The background shows a patient's leg with a floral patterned bandage.
- ◎ PRGF® (BTI Spain) system Vitoria Spain
 - ◎ Autologous Conditioned Plasma (Arthrex, Naples, FL)
 - ◎ GPS III (Biomet, Warsaw, IN)
 - ◎ Et 15 autres
 - > SmartPreP (Harvest Technologies, Plymouth, MA)
 - > Cascade (Musculoskeletal Tissue Foundation, Edison, NJ)



Concentration finale

sytem	Plaquettes	PDGF	EGF	VEGF	TGF-b1	IGF-1	HGF
Pure PRP ACP® Arthrex USA	2-3*	25*	5-11*	5-11*	1-5*	1-5*	?
Leucocytes PRP GPS III® Biomet USA	4-8*	6*	3,9*	6,2*	3,6*	1*	0
PRGF® system Vitoria Spain	3*	10*	4*	3*	2*	94 (ng/ml)	593 (ng/ml)

Eppley BL, Woodell JE, Higgins J. Platelet quantification and growth factor analysis from platelet-rich plasma: implications for wound healing. *Plast Reconstr Surg* 2004;114:1502–8.

M. Sánchez, E. Anitua et al. Comparison of Surgically Repaired Achilles Tendon Tears Using Platelet-Rich Fibrin Matrices. *American Journal of Sports Medicine*, 35: 245-251, 2007.

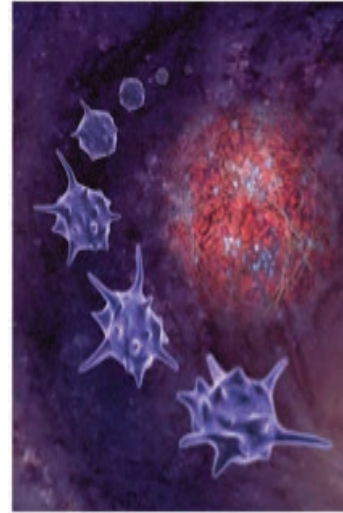
Une classification en 2019 ?

Table 2 Application of DEPA score to 20 PRP preparations in which biological characteristics are available on publications indexed in PubMed

		DEPA classification										Final DEPA score
		Dose of injected platelets (billions)			Efficiency of the process (platelet recovery rate %)			Purity of the PRP (relative composition in platelets %)				
		A	>5	Very high dose	A	>90	High	A	>90	Very pure PRP		
		B	3–5	High dose	B	70–90	Medium	B	70–90	Pure PRP		
		C	1–3	Medium dose	C	30–70	Low	C	30–70	Heterogeneous PRP		
D	<1	Low dose	D	<30	Poor	D	<30	Whole blood PRP				
Kaux <i>et al</i> ¹⁵	Homemade	D	0.74	Low dose	C	46.2	Low	A	90.3	Very pure PRP	DCA	
	Curasan	D	0.55	Low dose	C	32.4	Low	A	97.7	Very pure PRP	DCA	
	Plateltex	D	0.23	Low dose	D	19.4	Poor	B	87.5	Pure PRP	DDB	
	GPS II	C	2.28	Medium dose	D	22.8	Poor	D	6.0	Whole blood PRP	CDD	
Castillo <i>et al</i> ¹⁴	RegenLab	D	0.95	Low dose	B	79.3	Medium	A	97.5	Very pure PRP	DBA	
	Cascade	C	2.43	Medium dose	C	67.5	Low	B	81.5	Pure PRP	CCB	
	GPS III	C	2.48	Medium dose	D	22.6	Poor	D	27.0	Whole blood PRP	CDD	
	Magellan	B	3.41	High dose	C	65.8	Low	C	60.4	Heterogeneous PRP	BCC	
Magalon <i>et al</i> ¹²	Selphyl	D	0.95	Low dose	C	59.5	Low	B	73.9	Pure PRP	DCB	
	RegenPRP	D	0.99	Low dose	C	61.7	Low	C	46.0	Heterogeneous PRP	DCC	
	Mini GPS III	C	2.56	Medium dose	C	34.6	Low	C	51.8	Heterogeneous PRP	CCC	
	Arthrex	C	1.06	Medium dose	C	48.0	Low	B	81.0	Pure PRP	CCB	
	Homemade	C	1.81	Medium dose	C	30.2	Low	B	80.7	Pure PRP	CCB	
Kushida <i>et al</i> ¹⁴	JP200	C	1.04	Medium dose	D	26.0	Poor	D	19.6	Whole blood PRP	CDD	
	GLO	D	0.64	Low dose	C	37.4	Low	C	38.2	Heterogeneous PRP	DCC	
	Magellan	A	5.43	Very high dose	C	45.3	Low	C	32.9	Heterogeneous PRP	ACC	
	Kyocera	B	3.12	High dose	B	78.1	Medium	D	29.4	Whole blood PRP	BBD	
	Selphyl	D	0.21	Low dose	D	13.1	Poor	A	99.7	Very pure PRP	DDA	
	MyCells	D	0.98	Low dose	C	48.8	Low	B	87.3	Pure PRP	DCB	
	Dr. Shin	D	0.78	Low dose	C	45.9	Low	D	18.8	Whole blood PRP	DCD	
DEPA, Dose of injected platelets, Efficiency of production, Purity of the PRP, Activation of the PRP; PRP, platelet-rich plasma.												

Magalon J et al DEPA classification: a proposal for standardising PRP use and a retrospective application of available devices.. **BMJ Open Sport Exerc Med. (2016)**

L'importance de la concentration en plaquettes

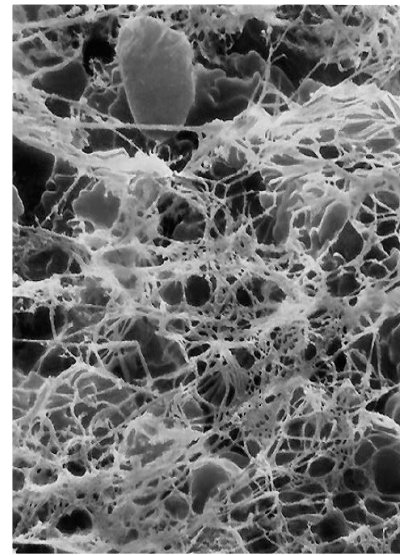


Faibles doses: pas d'effet biologique

Fortes doses: « Side Effects »

Weibrich G et al. *Bone* 2004;34:665-671

Faut il utiliser les Leucocytes ?



Augmente la presence de MMPs et TNF
Diminue la stabilité de la fibrine

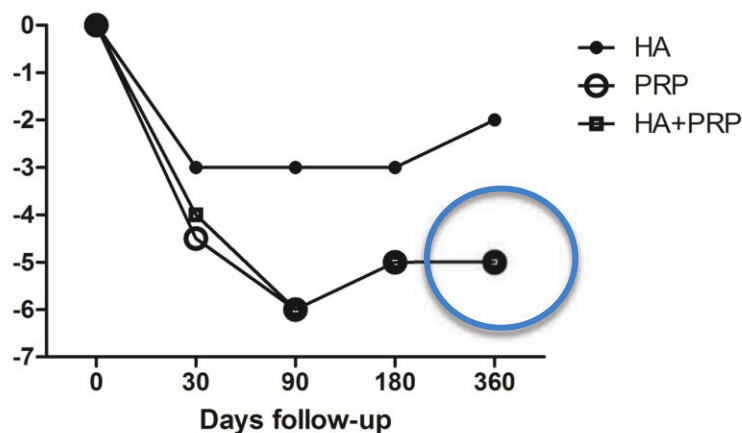
Augmente l'inflammation

- Wadhwa M et al, Vox Sang 2002; 83(2):125-136
- Bramono DS et al. Clin Orthop Rel Res 2005; 4(5):434-439
- Schnabel LV et al. J Orthop Res 2007;25:230-240

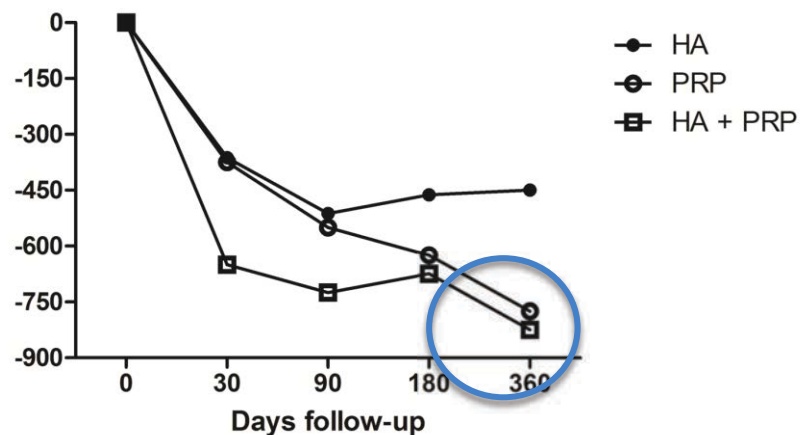
PRP et acide hyaluronique ?

Potentialise les effets ?

Median VAS change from baseline (pre = zero)



Median WOMAC PA change from baseline



Lana Jf et al. Randomized controlled trial comparing hyaluronic acid, platelet-rich plasma and the combination of both in the treatment of mild and moderate osteoarthritis of the knee.

J Stem Cells Regen Med. 2016 Nov 29;12(2):69-78.

L'aspect légal



Autorisation: « JO »

- L. 1211-7, ni les éléments et produits du corps humain ***prélevés et utilisés à des fins thérapeutiques autologues dans le cadre d'une seule et même intervention médicale,*** sans être conservés ou préparés à aucun moment au sein d'un organisme ou d'un établissement autorisé en application de l'article L. 1243-2. »

Avis de l'AFSSAPS

« le produit final obtenu ***n'est pas un produit sanguin labile*** au sens de l'article L1221-8 du code de la santé Publique et ne correspond pas aux caractéristiques des PSL ... »



Dopage ?

**Retiré de la liste en 2011
(autorisé en intra tendineux et
intra musculaire)**

Non dopant

Non soumis à une déclaration

« Un procédé admis par l'AMA »

Tolérance et sécurité d'utilisation

La tolérance du traitement par PRP = satisfaisante.

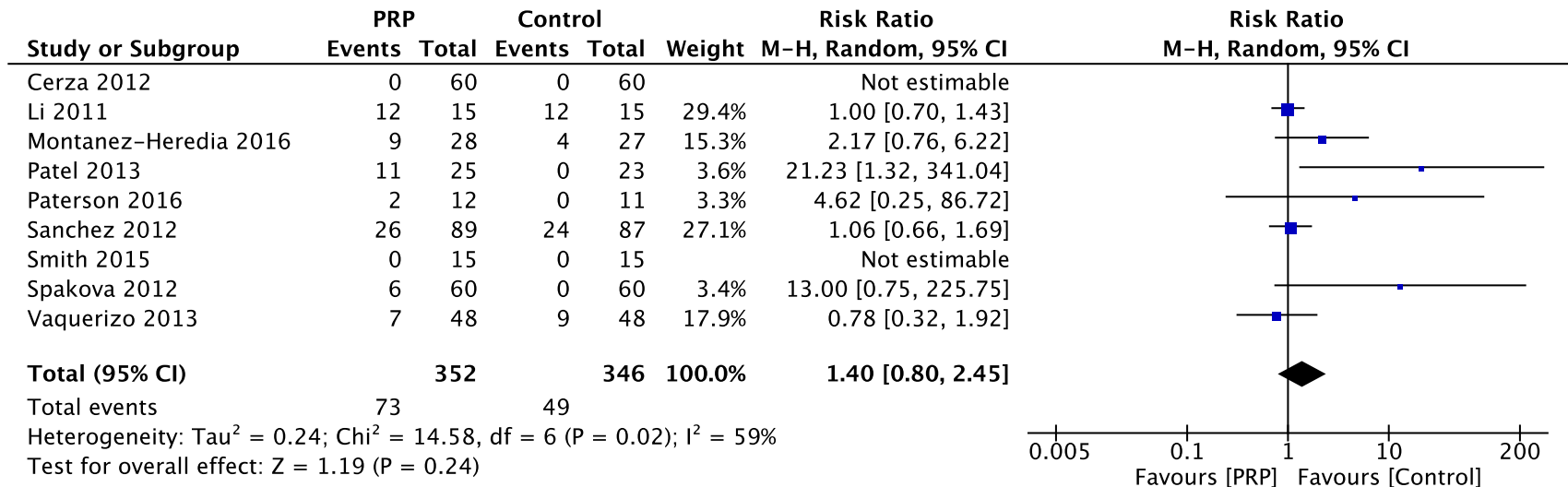


Fig. 6 Forest plots comparing the risk of adverse events between PRP and control. (M-H, Mantel-Haenszel; CI, confidence interval)

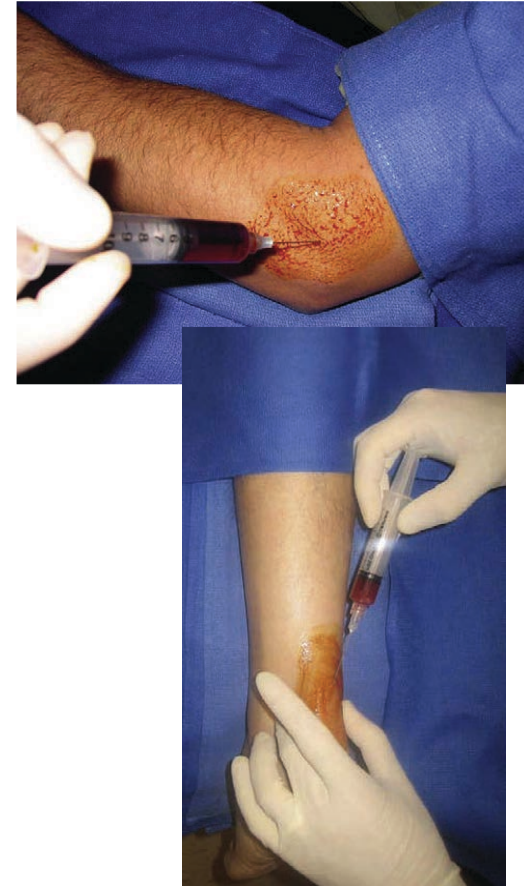
Shen L. The temporal effect of platelet-rich plasma on pain and physical function in the treatment of knee osteoarthritis: systematic review and meta-analysis of randomized controlled trials. **J Orthop Surg Res.** 2017 Jan 23;12(1):16.

Les tendinopathies

Ma Pratique et les résultats

Premiers résultats pour les lésions tendineuses en 2006

- Nouvelles applications
 - Anitua en 2006
- Epicondylite (GPS III® Biomet)
 - Alan Mishra (Am J sports 2006)
 - Randomization:+++
- Tendinite d'Achille (PRGF® system Vitoria Spain)
 - M Sanchez (Am J sports 2007)
 - Augmente la cicatrisation



Anitua E, Sanchez M, Nurden AT, et al. New insights into and novel applications for platelet-rich fibrin therapies. Trends Biotechnol 2006;24:227–34.

Mishra A, Pavelko T. Treatment of chronic elbow tendinosis with buffered platelet-rich plasma. Am J Sports Med. 2006 Nov;34(11):1774-8.

M. Sánchez, E. Anitua et al. Comparison of Surgically Repaired Achilles Tendon Tears Using Platelet-Rich Fibrin Matrices. American Journal of Sports Medicine, 35: 245-251, 2007.

Ma prise en charge au cabinet des tendinites

Mon expérience depuis 2010

Mon expérience depuis 2010

548 cas

Épicondylite/épitrochléite = **164 cas**

Désinsertion proximale
ischio jambier = **35 cas**

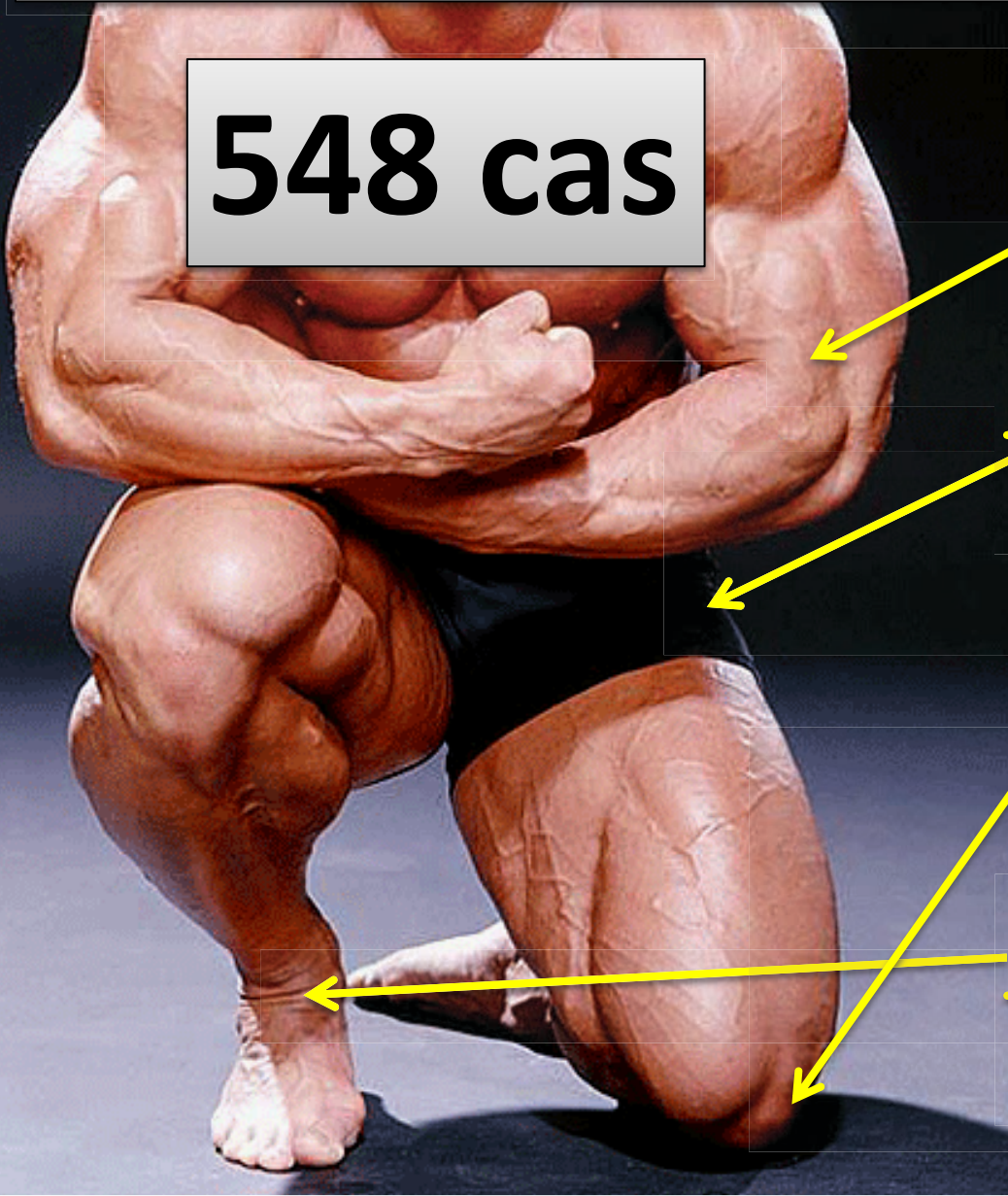
Tendon moyen fessier = **25cas**

Adducteurs= **5 cas**

Tendon rotulien = **124 cas**

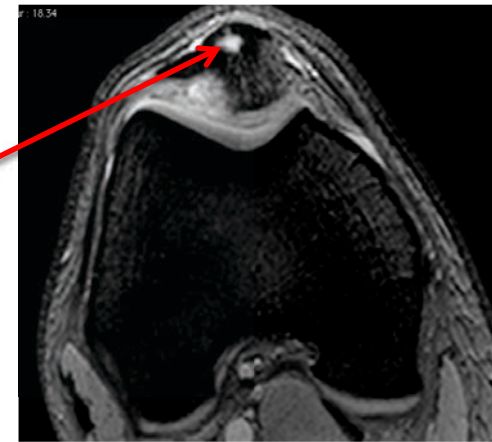
Tendon Achille = **175 cas**

Tendon JP/JA = **25 cas**



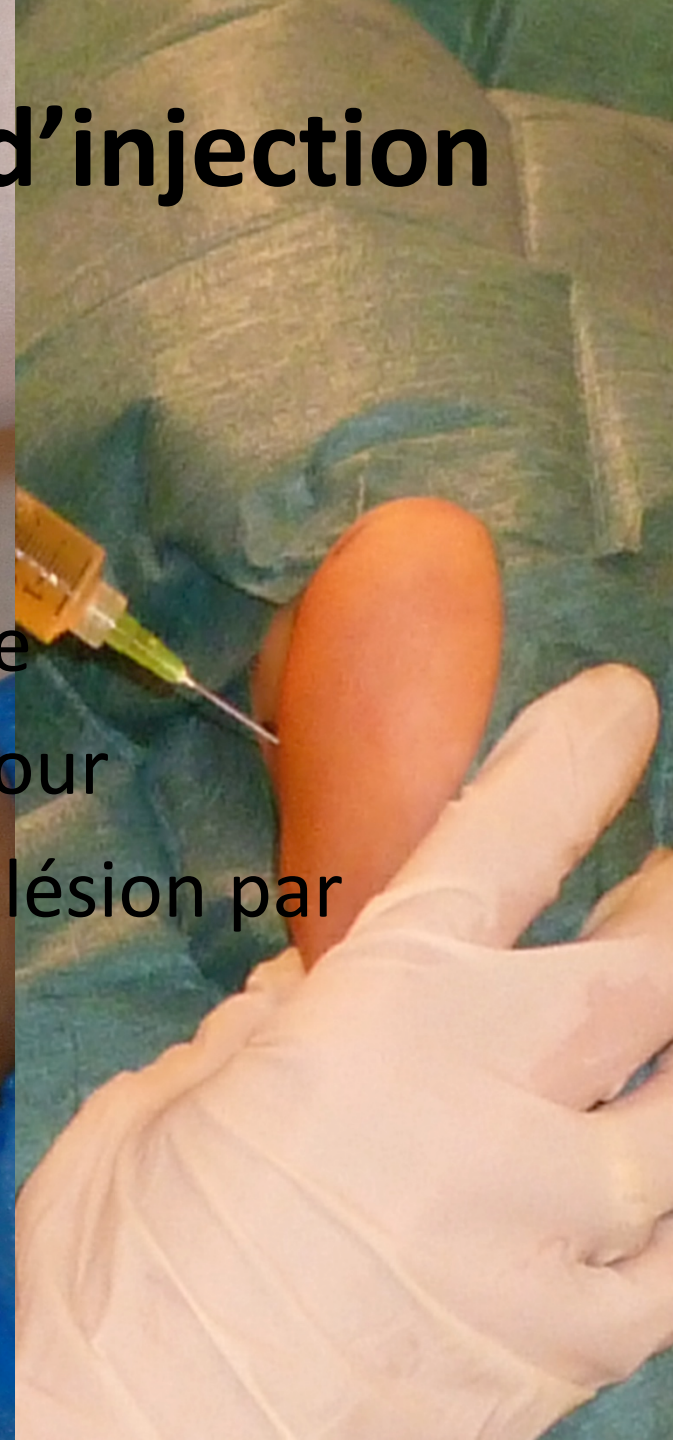
Mon protocole

- **IRM** (systématique) = fissure+
- Information médicale avec consentement
- **Protocole de décontamination** (idem à la Chirurgie)
- **3 injections sous échographie** avec une semaine d'intervalle
- **Pure PRP système** (ACP Arthrex)
 - Prélèvement – Centrifugation – Injection
(en un temps)
- **Traçabilité** et traitement des déchets

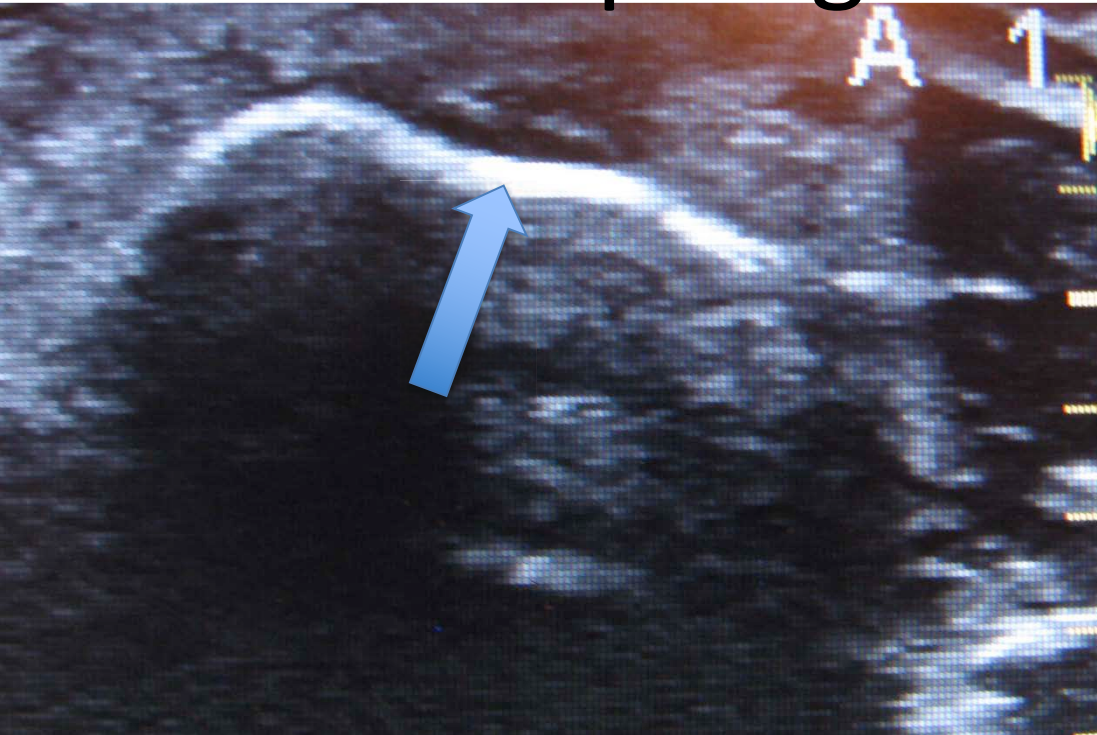


La technique d'injection

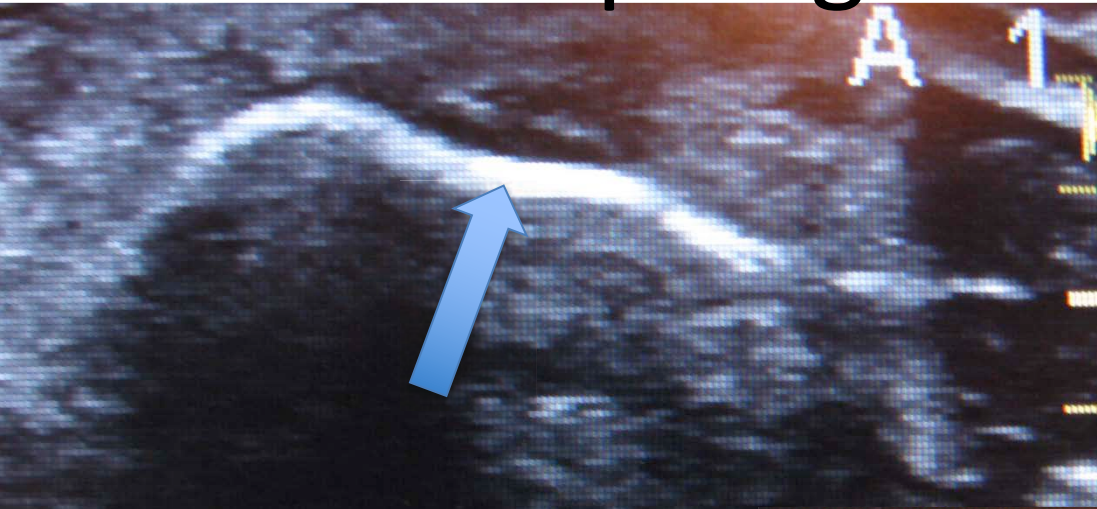
- **Décontamination**
- **Repérage** sous échographie
- **Anesthésie locale** sous cutanée
- Injections en zone lésée et autour
- **Contrôle du remplissage** de la lésion par échographie



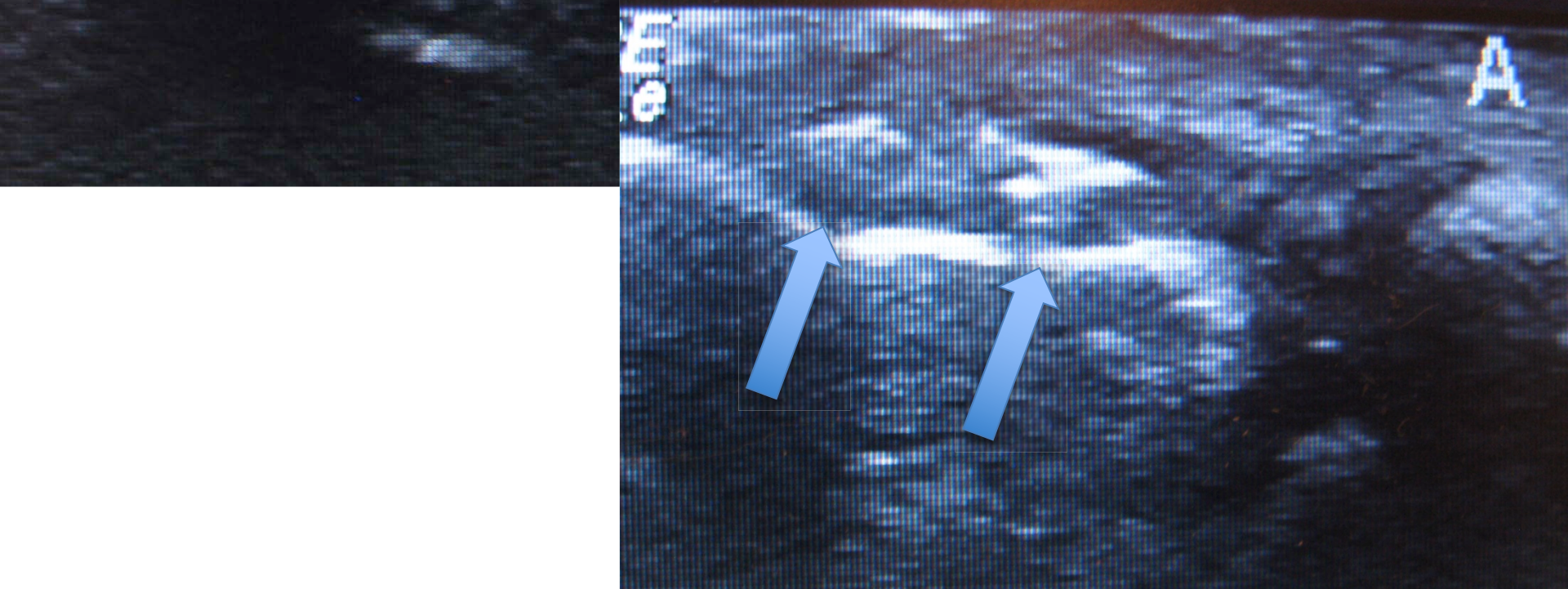
Repérage sous écho



Repérage sous écho



Remplissage



Traitement des tendinopathies rotuliennes chroniques chez les sportifs de haut de niveau (à propos de 28 cas)



Am J sports avril 2014

Christophe Charousset et A. Zaoui

(chirurgien orthopédiste - IOAPC – Paris)

Laurence Bellaïche

(radiologue – centre Bachaumont – Paris)

Blazina: « jumper knee »



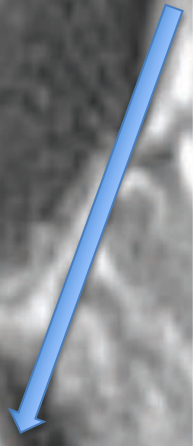
Blazina ME and al. Jumper's knee. *Orthop Clin North Am.* 1973;4(3):665-678.

Richards DP, Ajemian SV, Wiley JP, Zernicke RF. Knee joint dynamics predict patellar tendinitis in elite volleyball players.

Am J Sports Med. 1996;24(5):676-683.

IRM (28)

- **100% = Fissures proximales**
 - Taille moyenne = 19 mm (10 – 50)



Length: 1.781 cm (35.619 pix)

Le protocole de rééducation

- Repos strict 48 heures antalgique
- Rééducation
 - **Travail musculaire excentrique** selon les protocoles de Stanish
- Training:
 - Vélo et piscine (pool buoy)
 - Course au 2è mois vitesse lente

Résultats cliniques:

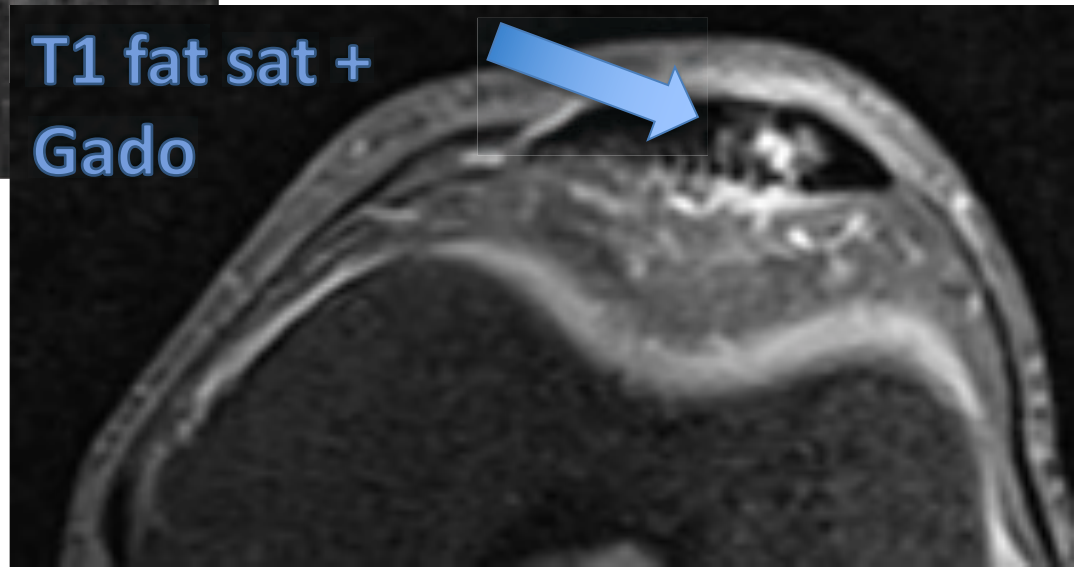
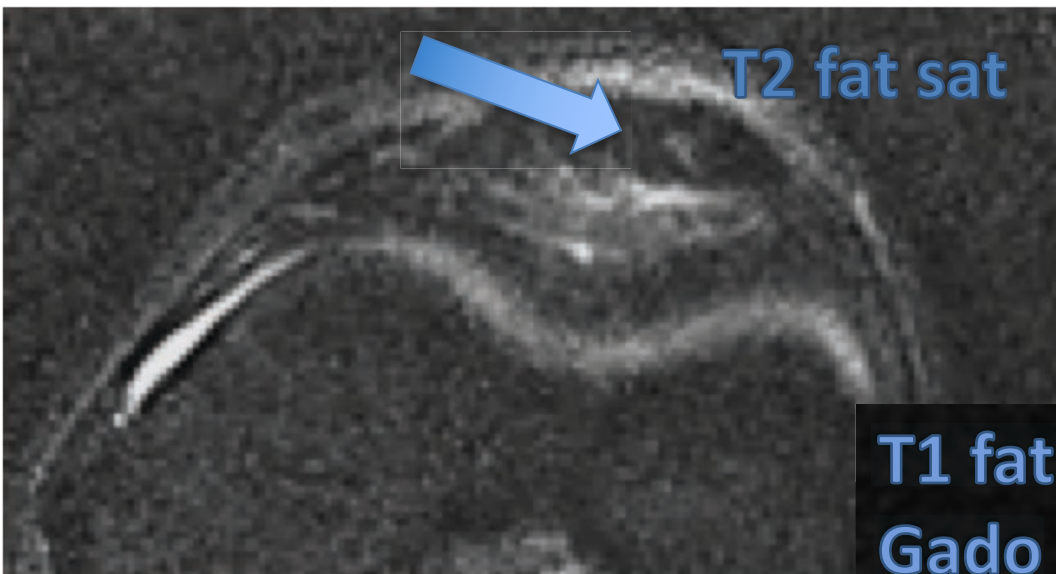
Score	<i>Pre-procedure</i>	<i>2-year follow-up</i>	<i>p value</i>
<i>Lysholm score</i>	60 (40-70) 	96 (70-100)	<0.001
<i>VISA P score</i>	39 (28-60) 	94 (60-100)	<0.001
<i>VAS</i>	7 (4-8) 	0.8 (0-3)	<0.0001

Reprise sportive

- **21 (75%) reprises même niveau**
 - Délai = **3,5 mois (2-6)**
- **3 (10,7%): niveaux inférieurs**
- **4 (14,3%) changements de sport (3 chirurgies)**

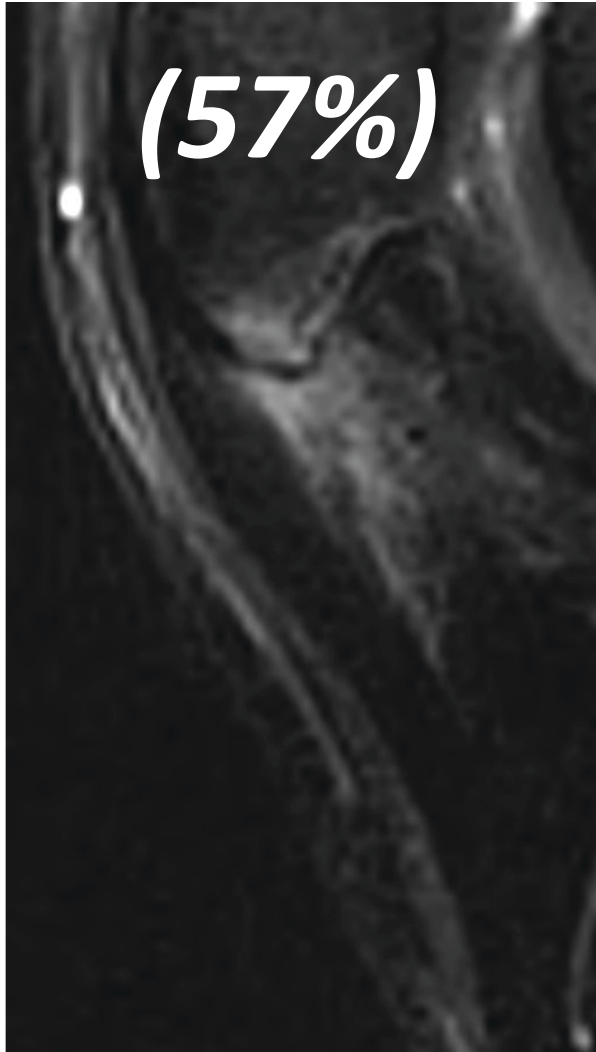
IRM à 1 mois:

82% cicatrisations partielles (gado+)

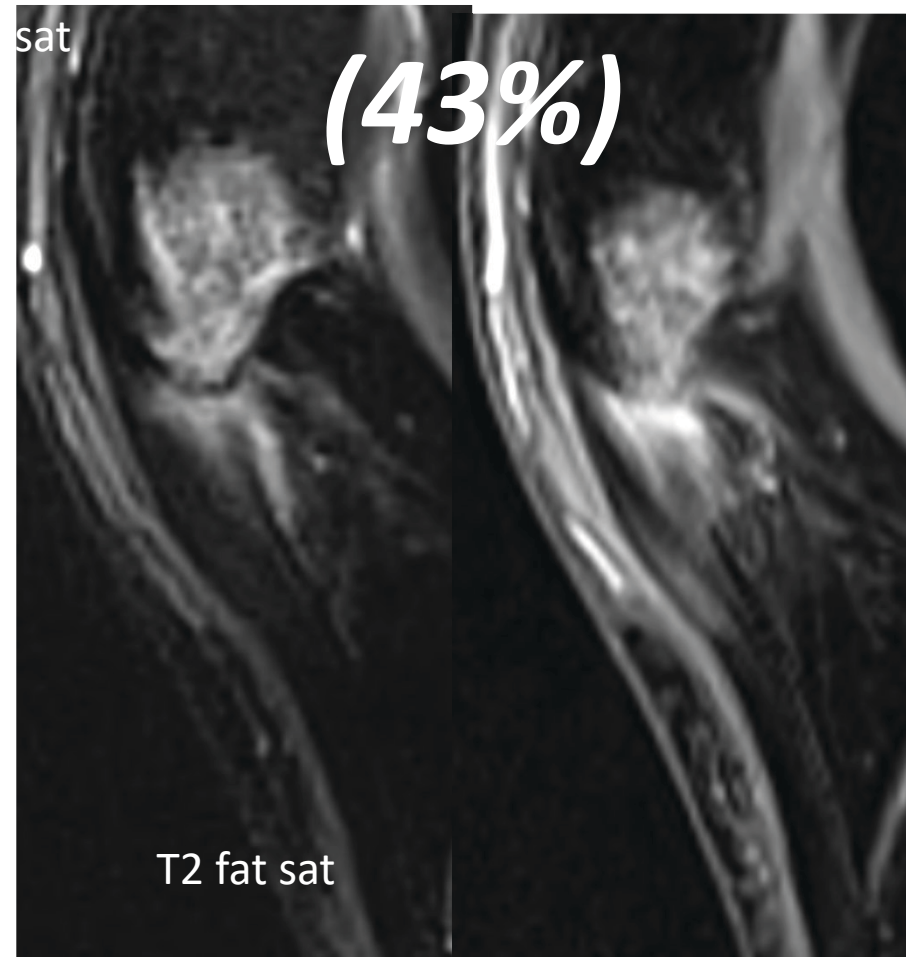


IRM à 3 mois

GUERISON



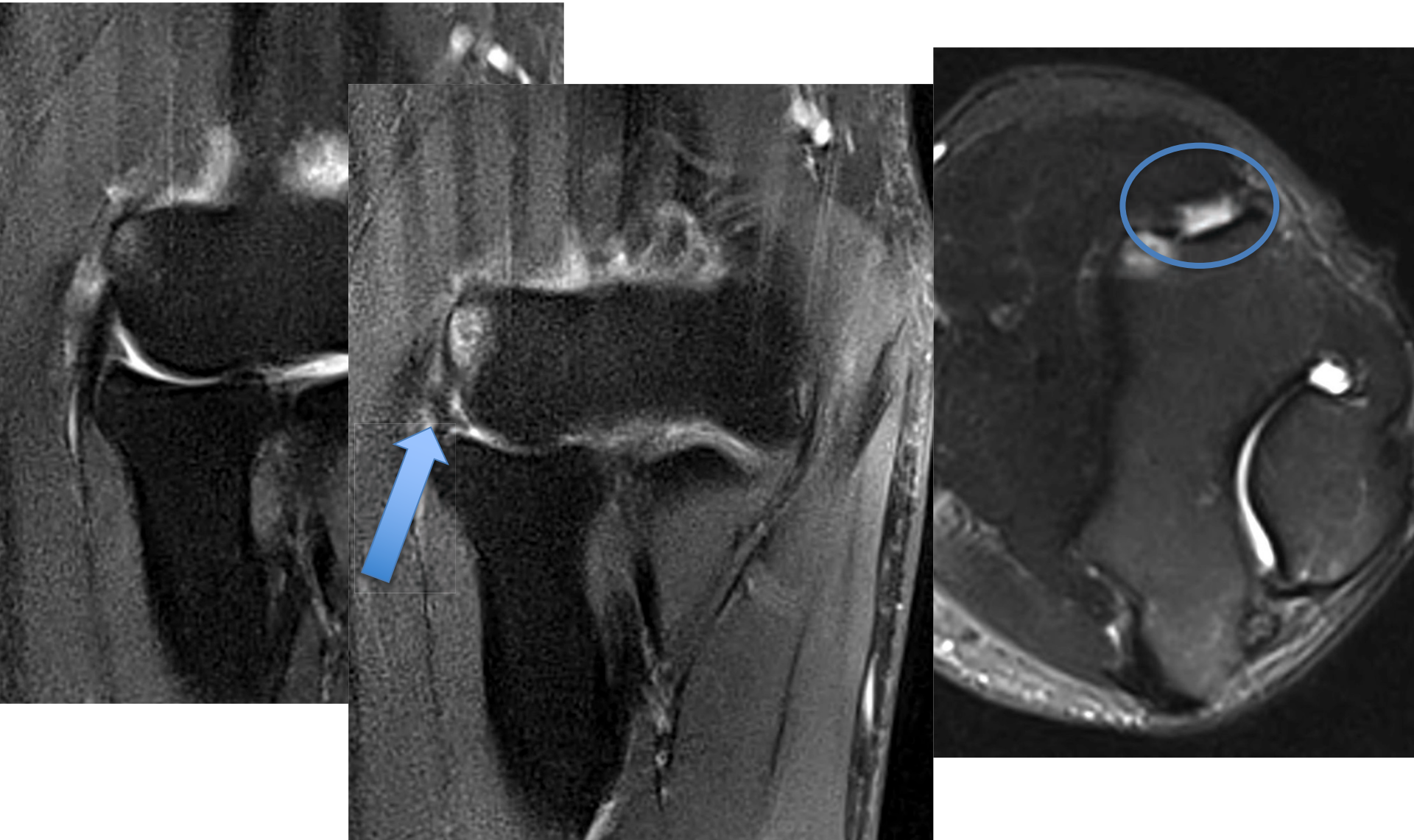
Cicatrisation partielle



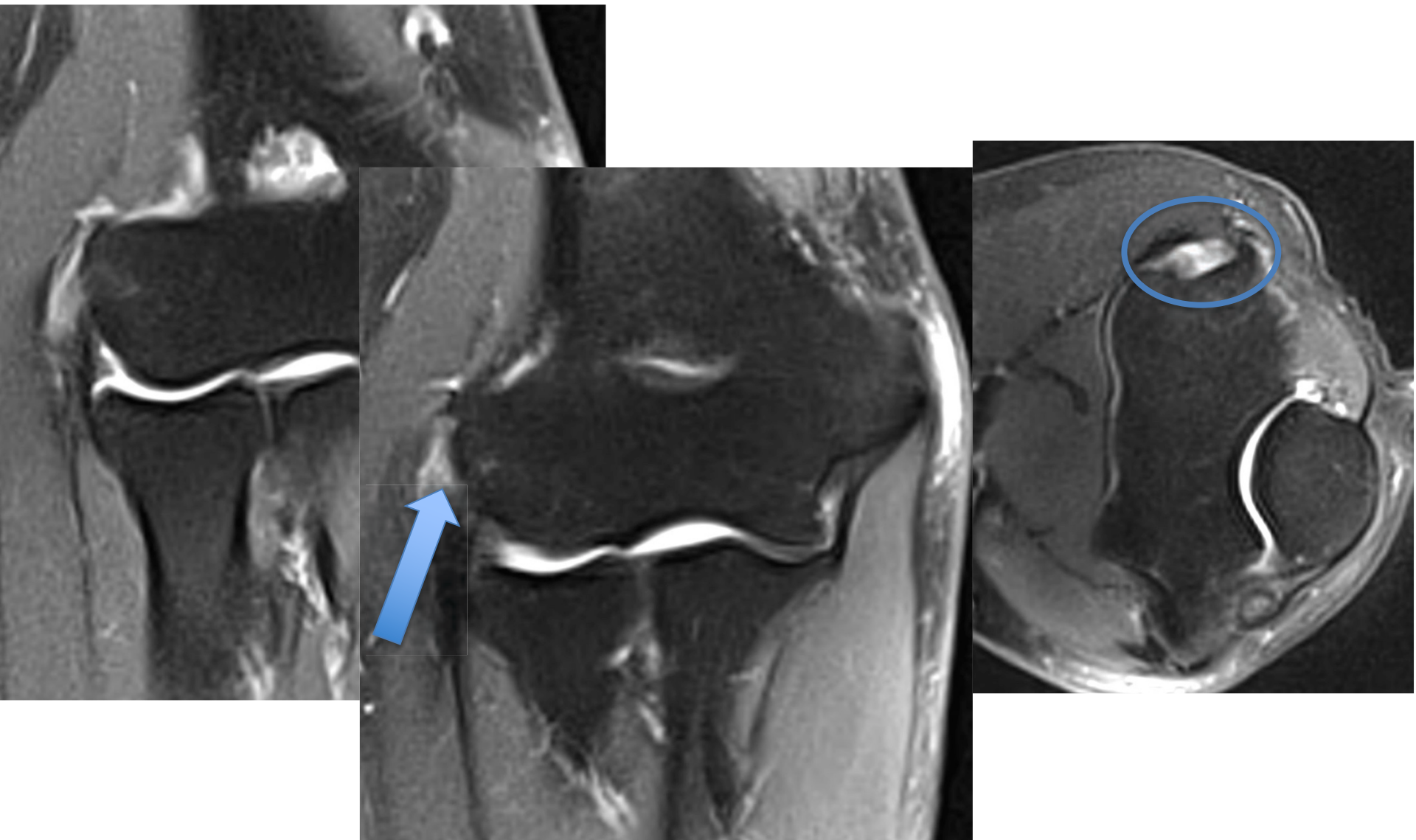
Épicondylite/ Épitrachleite et autres tendons

Même expérience

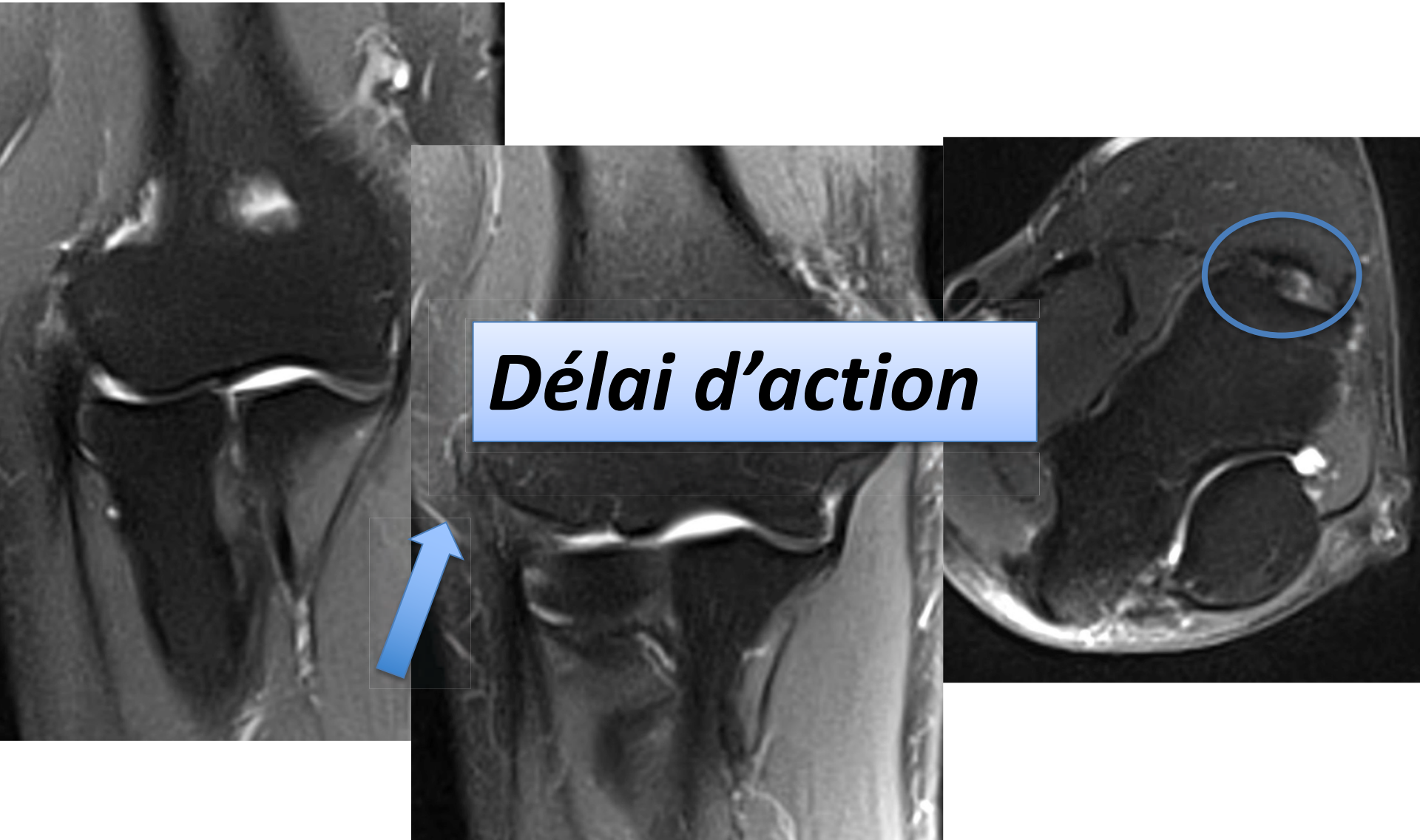
IRM avant injection



Premier contrôle à 1 mois

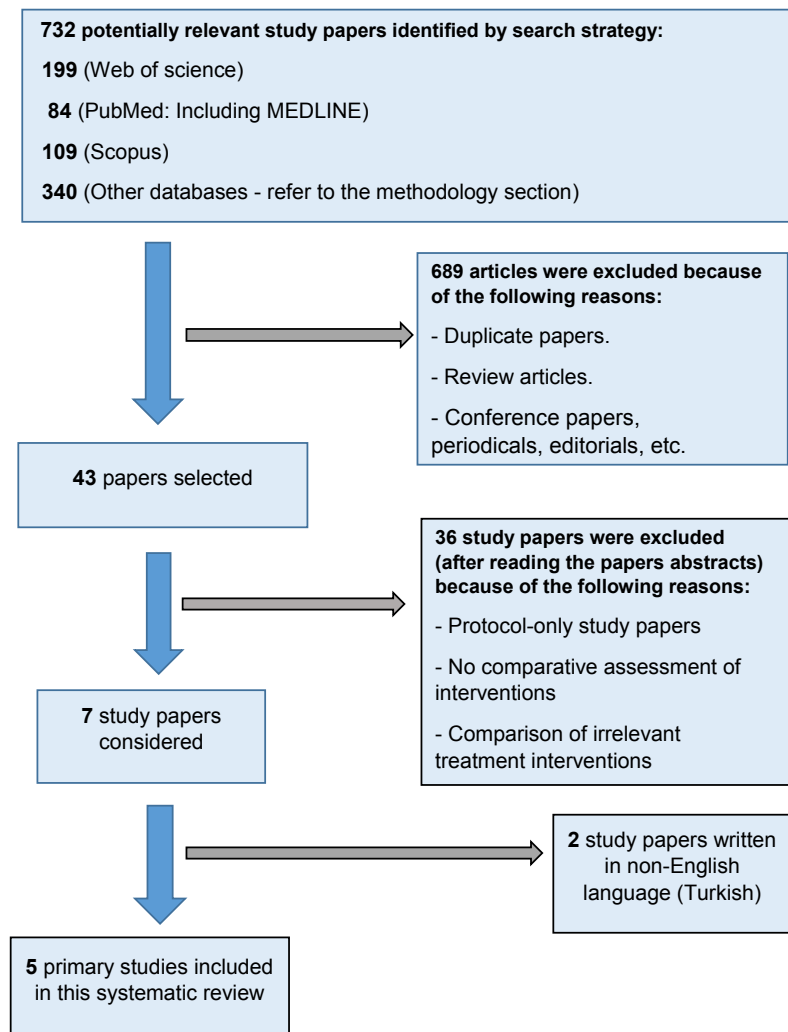


Dernier contrôle à 4 mois



Résultats

(revue de la littérature)



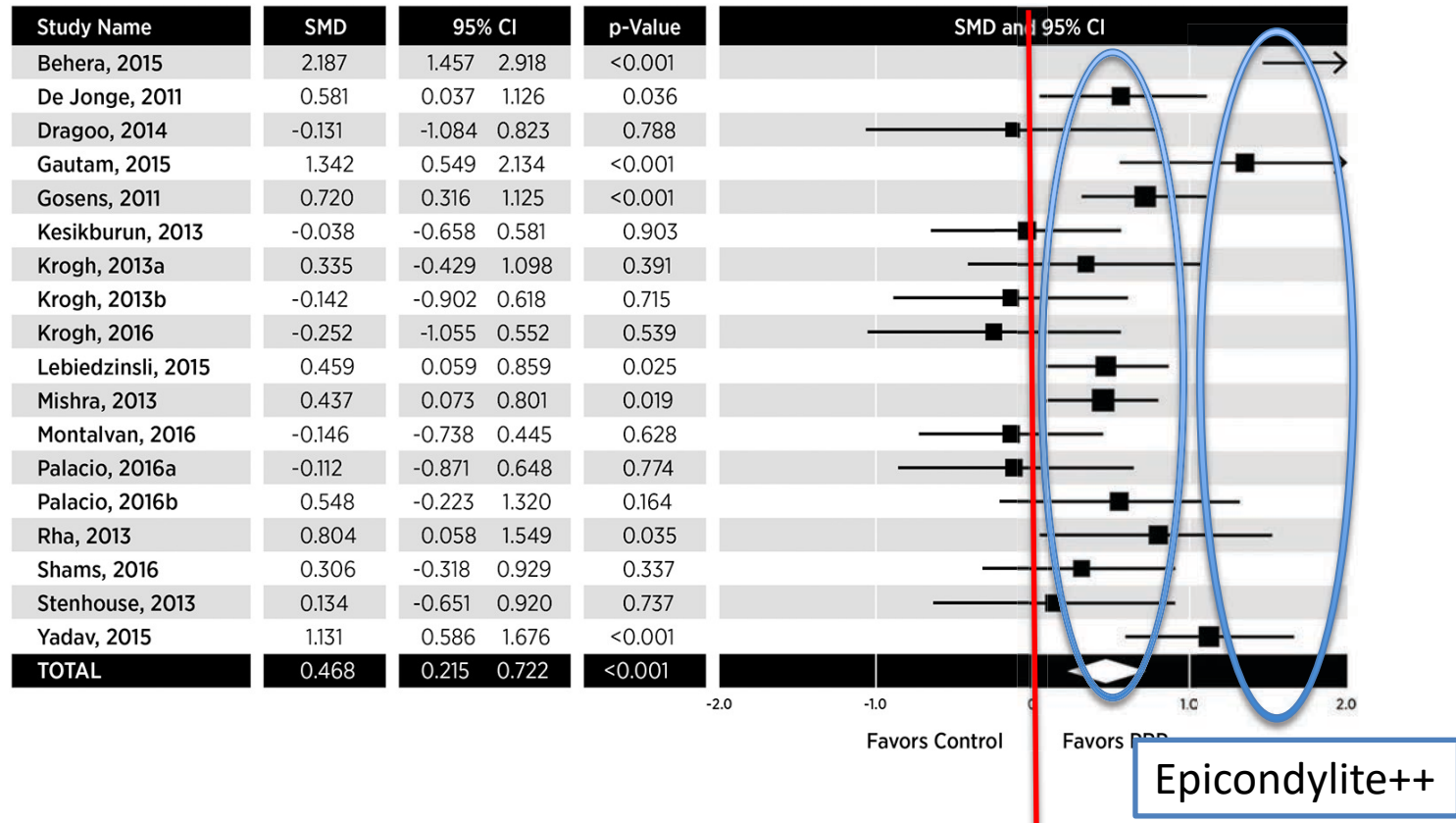
Ben-Nafa W, Munro W. The effect of corticosteroid versus platelet-rich plasma injection therapies for the management of lateral epicondylitis: A systematic review. **SICOT J. 2018;4:11**

Visual analogue scale (VAS)																					
Follow-up intervals study name & interventions used		Baseline Value ±SD(1)		2 Weeks		1 month (4weeks)		6 weeks		8 weeks		3 months (12 weeks)		6 months (26 Weeks)		52 weeks		104 weeks		Scale used	
Peerbooms et al. (2010)	CS(2)	65.8 ±13.8				44.2 ±26.4				42.9 ±29.2		44.2 ±27.1		56.6 ±23.2		50.1 ±28.1				(0 - 100)	
	PRP(3)	70.1 ±15.1				55.4 ±24.2				46.9 ±24.9		38.7 ±27.2		32.6 ±31.5		25.3 ±31.2					
Gosen et al. (2011) (Data according to intention-to-treat analyses)	CS	66.2 ± 14.0	(P: 0.340)			44.3 ± 26.3	(P: 0.023)			43.4 ± 28.9	(P: 0.411)	45.5 ± 27.1	(P: 0.319)	55.8 ± 24.1	(P: < 0.001)	48.8 ±27.0	(P: < 0.001)	42.4 ±26.8	(P: < 0.001)	(0 - 100)	
	PRP	69.0 ± 15.9				55.7 ± 24.1				47.7 ± 25.0				40.2 ± 27.5				32.9 ± 30.8			
Krogh et al. (2013)	CS	Not applicable																			
	PRP																				
Gautam et al. (2015)	CS	7.0 ±0.8	(P: 0.650)	2.1 ±0.7	(P: 0.000)			1.4 ±0.5	(P: 0.000)			1.7 ±0.5	(P: 0.493)	2.9 ±1.2	(P: 0.001)					(0 - 10)	
	PRP	7.1 ±0.8		4.5 ±1.1				2.7 ±0.8				1.8 ±0.6				1.6 ±0.5					
Omar et al. (2012)	CS	8.6 ±1.6						4.3 ±2.1 (P:<0.001)												(0 - 10)	
	PRP	8.0 ±1.4						3.8 ±1.9 (P:<0.001)													

Corticoïde = + mais court terme
PRP = + long terme

Études comparatives sur les tendinites

(épicondylites/Achille/Tendon rotulien/coiffe)



Miller LE, Parrish WR, Roides B, Bhattacharyya S.

Efficacy of platelet-rich plasma injections for symptomatic tendinopathy: systematic review and meta-analysis of randomised injection-controlled trials. **BMJ Open Sport Exerc Med.** 2017 Nov 6;3(1):e000237.

Takehome message (1)

Multiple injections (3) de PRP
= une option **médicale** pour le traitement des
tendinites fissuraires validée scientifiquement
pour les **épicondylites**



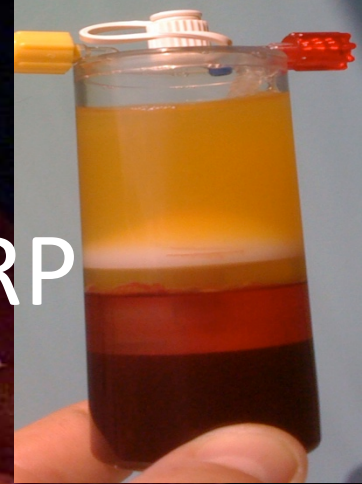
Délai d'action de 3 mois

75 à 80 % de réussite

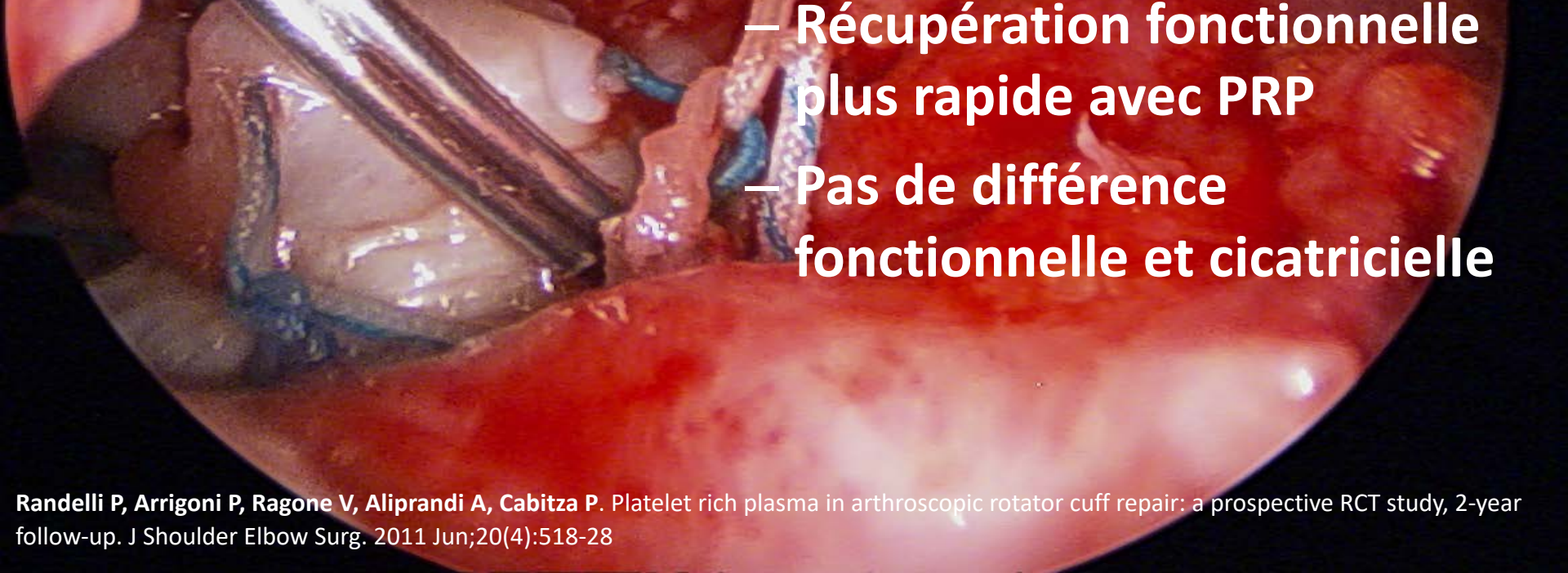
LES RÉPARATIONS SOUS ARTHROSCOPIE DES RUPTURES DE LA COIFFE DES ROTATEURS ?



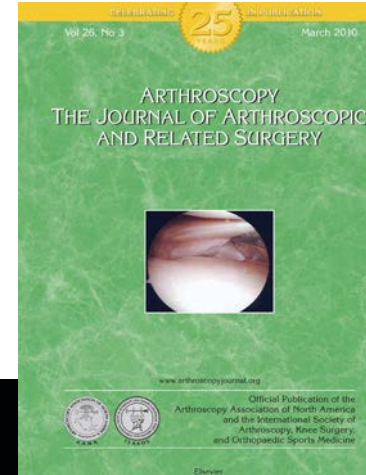
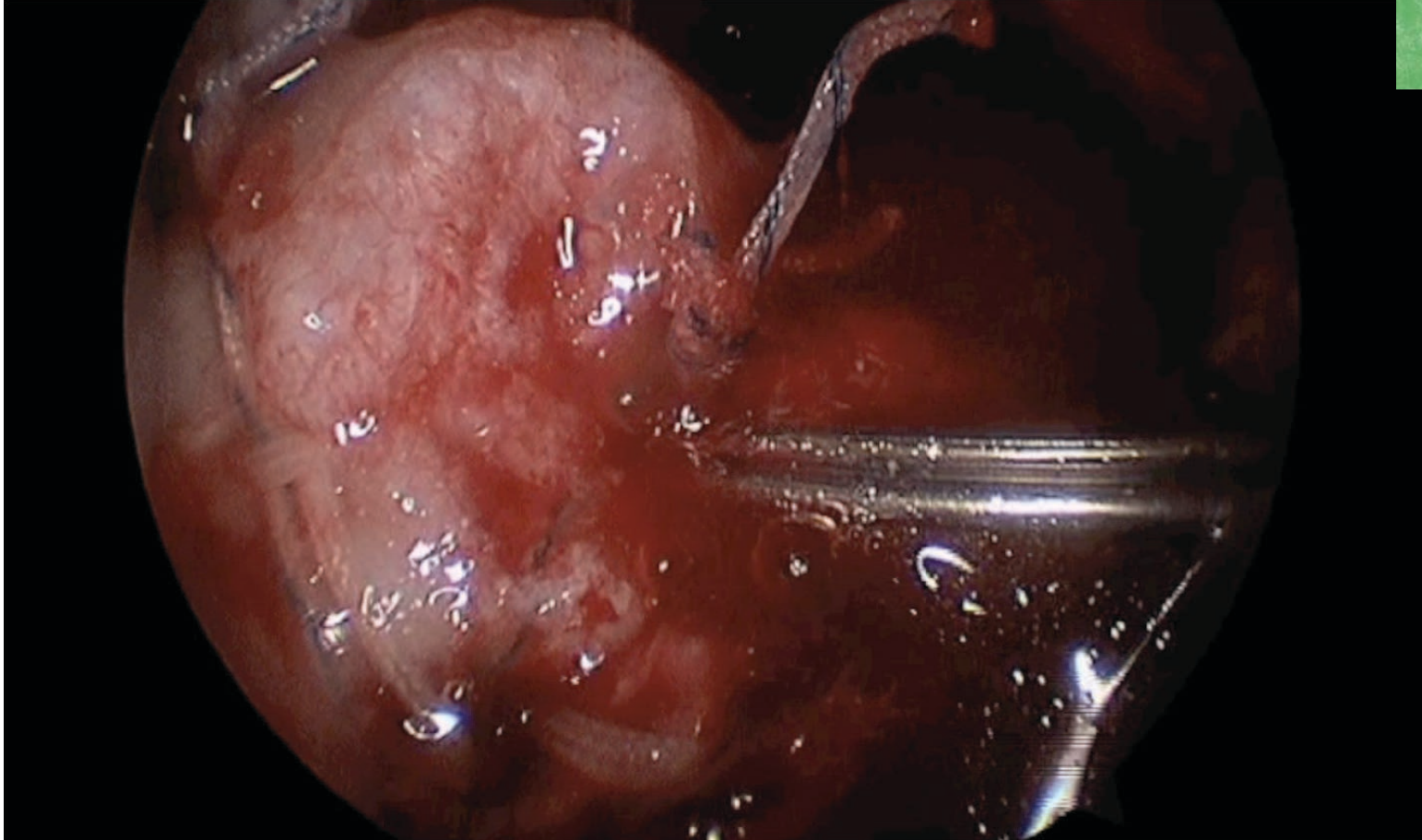
Technique avec une injection de Leuco- PRP



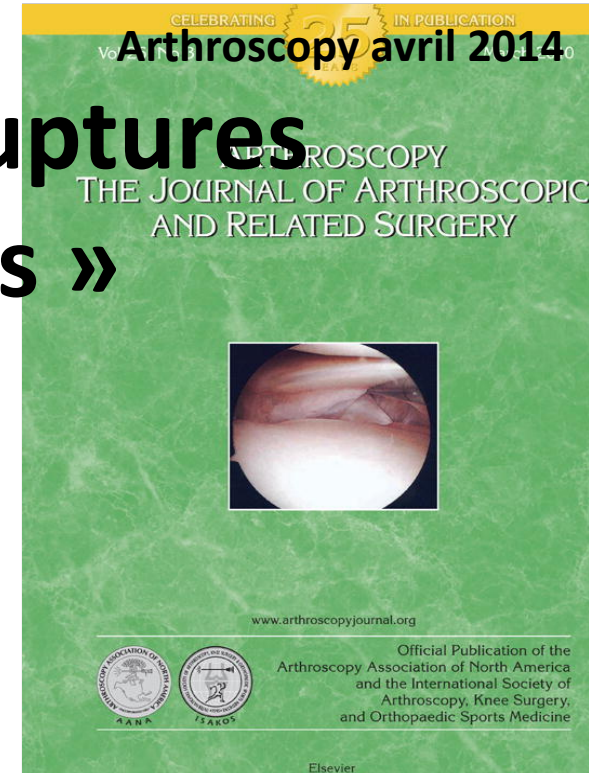
- Randelli (JSES 2011)
 - 54 patients randomisés
 - Récupération fonctionnelle plus rapide avec PRP
 - Pas de différence fonctionnelle et cicatricielle



Les réparations sous arthroscopie des ruptures de la coiffe des rotateurs



Notre objectif sur des ruptures « larges ou massives »



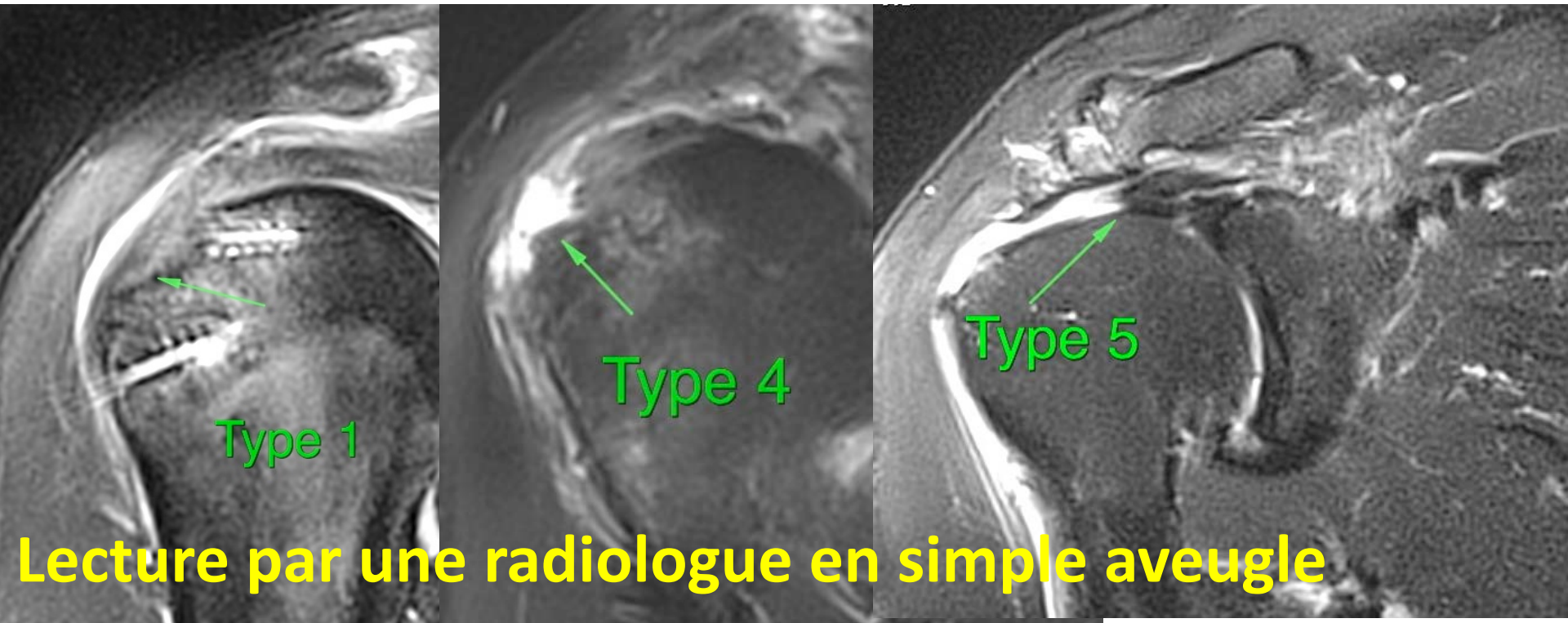
Étude de 2 cohortes identiques (juin 2008 – juin 2010)

35 réparations avec injection de PRP (groupe PRP)

35 réparations sans injection (groupe contrôle)

Critère principal d'évaluation

Cicatrisation IRM selon les critères de Sugaya



Critères secondaires d'évaluation

- évolution fonctionnelle prospective
 - avec le **SST**,
 - le **score de Constant**
 - et la **mesure de la force**
- Révision clinique
 - 3/6/12 mois et à **2 ans**

Conclusion de cette étude

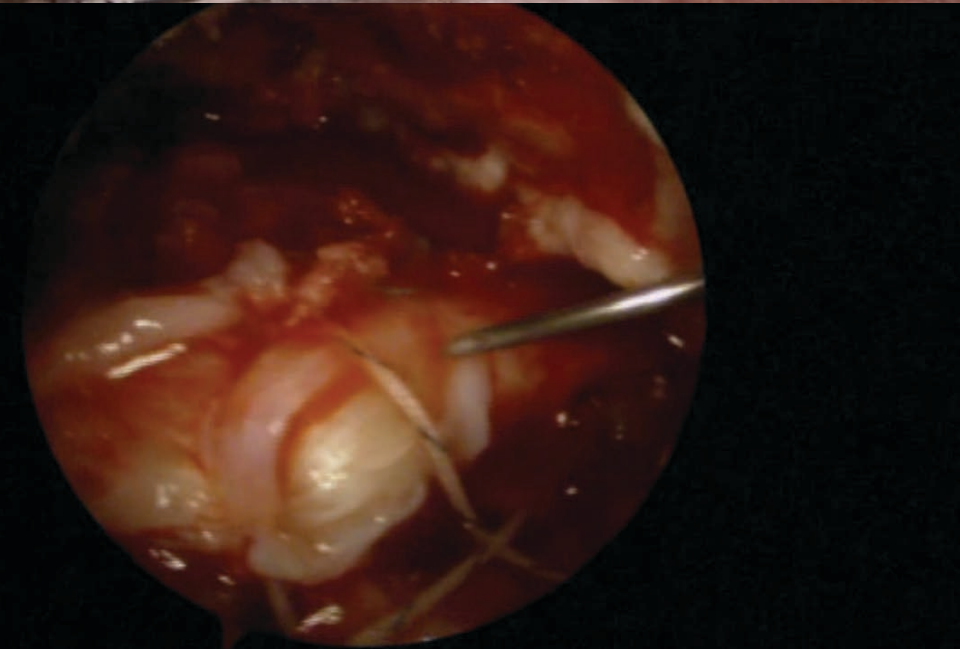
- **Aucune différence**
 - **64,5% de cicatrisation** (groupe PRP) contre **60%** (groupe témoin)
- **Amélioration significative de la qualité de la cicatrisation**
 - **Plus de cicatrisation anatomique (type 1)**
 - **Rupture itérative plus petite (type 4 versus type 5)**
- **Amélioration de la technique ?:**
 - **2è (ou plus) injection** à 2 ou 3 semaines sous échographie
 - Utilisation d'un Pure PRP



Répéter les injections?

- Éviter l'effet lavage de l'arthroscopie
- Produire un rebond dans la cicatrisation

(Une étude est en cours de réalisation)



Les résultats actuels

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Volume 2014, Article ID 129515, 9 pages
<http://dx.doi.org/10.1155/2014/129515>

Review Article

Regenerative Medicine in Rotator Cuff Injuries

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TABLE 1: Controlled clinical studies investigating the use of PRP in rotator cuff lesions.

Author	Evidence	Surgical use of PRP in arthroscopic rotator cuff repair			Comments
		PRP formulation	Surgical technique	Number of patients	
Randelli et al. (2011) [5]	Level 1 Randomized controlled	Injectable PRP (GPS system)	Single row	53	Better clinical outcomes at 3 mo; better clinical outcomes at 12, 24 months for smaller tears with PRP
Ruiz-Moneo et al. (2013) [6]	Level 1 Randomized controlled	Injectable PRP (PRGF Endoret system)	Double row	63	No differences in rotator cuff healing or function at 1 year
Antuña et al. (2013) [7]	Level 2 Randomized controlled	Injectable PRP (Vivostat system)	Single row	28	No differences in clinical outcomes and healing rate at 2 years
Charousset et al. (2014) [8]	Level 3 Case control	Injectable PRP (GPS system)	Double row	70	No differences in cuff healing or function at 2 years A significant advantage for the L-PRP patients in terms of smaller iterative tears
Gumina et al. (2012) [9]	Level 1 Randomized controlled	Suturable PRP (RegenKit-THT system)	Single row	76	Lower retear in the PRP group; no differences for clinical outcomes
Jo et al. (2011) [10]	Level 2 Prospective cohort	Suturable PRP (COBE spectra system)	Transosseous equivalent	42	Trend for lower re-tearing in the PRP group; no differences for recovery and function
Jo et al. (2013) [11]	Level 1 Randomized controlled	Suturable PRP (COBE spectra system)	Transosseous equivalent	48	Lower retear and function at 1 year in the PRP group

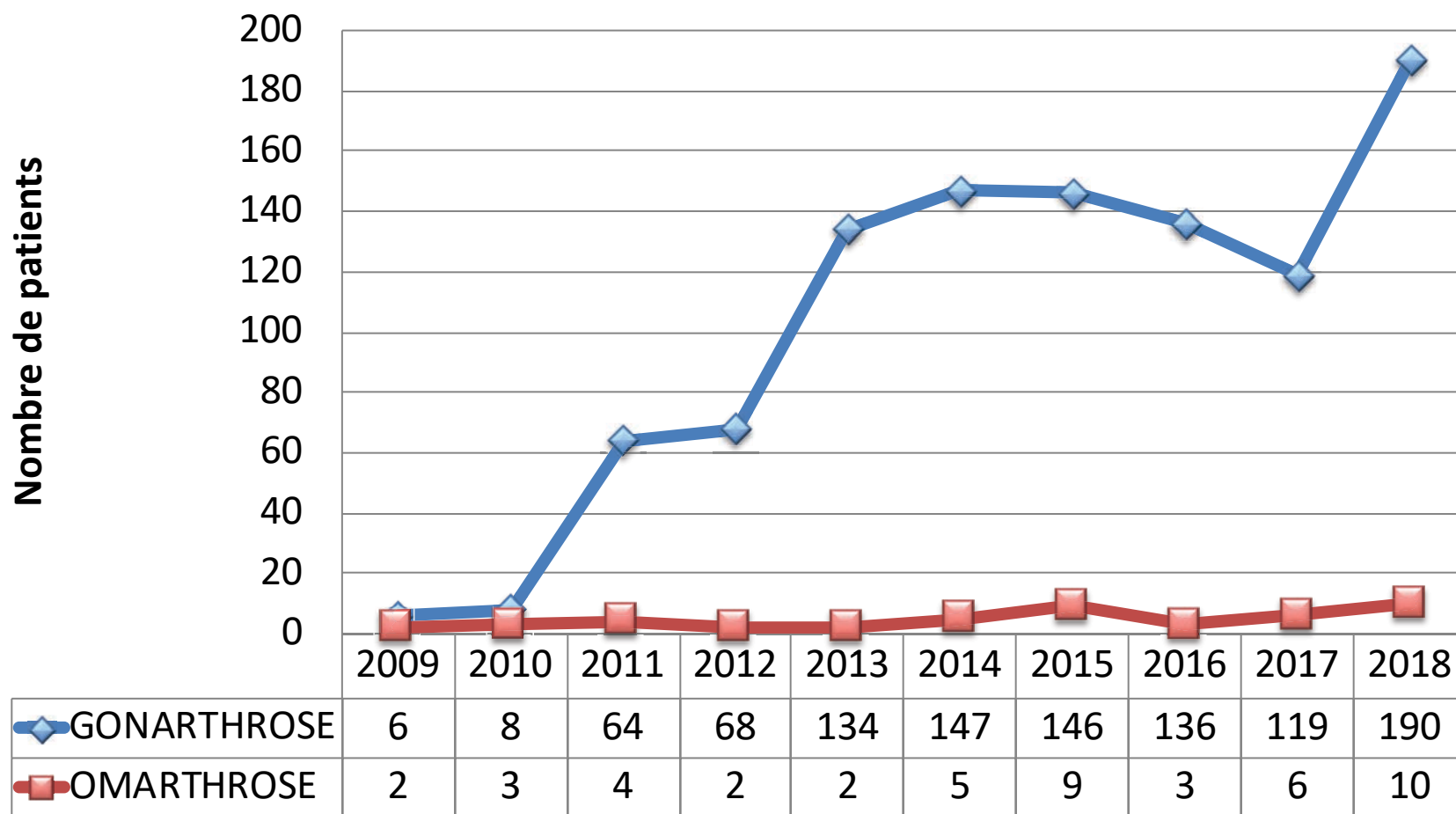
Résultats controversés
Intérêt dans les RDC de petite ou moyenne taille

Rodeo et al. (2012) [15]	Level 2 Randomized controlled	Suturable PRP (Cascade system)	Single OR double row/transosseous equivalent	67	No difference in tendon healing, tendon vascularity, and clinical scores at 1 year
Barber et al. (2011) [16]	Level 3 Case-control study	Suturable PRP (Cascade system)	Single row	40	Lower retear in the PRP group; better healing for smaller tears with PRP
Bergeson et al. (2012) [17]	Level 3 Cohort study	Suturable PRP (Cascade system)	Single or double row	37	Higher retear rate in patients with at-risk rotator cuff tears with PRFM; no difference in functional outcome scores Historical control group
Weber et al. (2013) [18]	Level 1 Randomized controlled	Suturable PRP (Cascade system)	Single row	60	No difference in perioperative morbidity, clinical outcomes, or structural integrity

L'arthrose

Ma pratique et les résultats

Ma prise en charge de l'arthrose depuis 10 ans

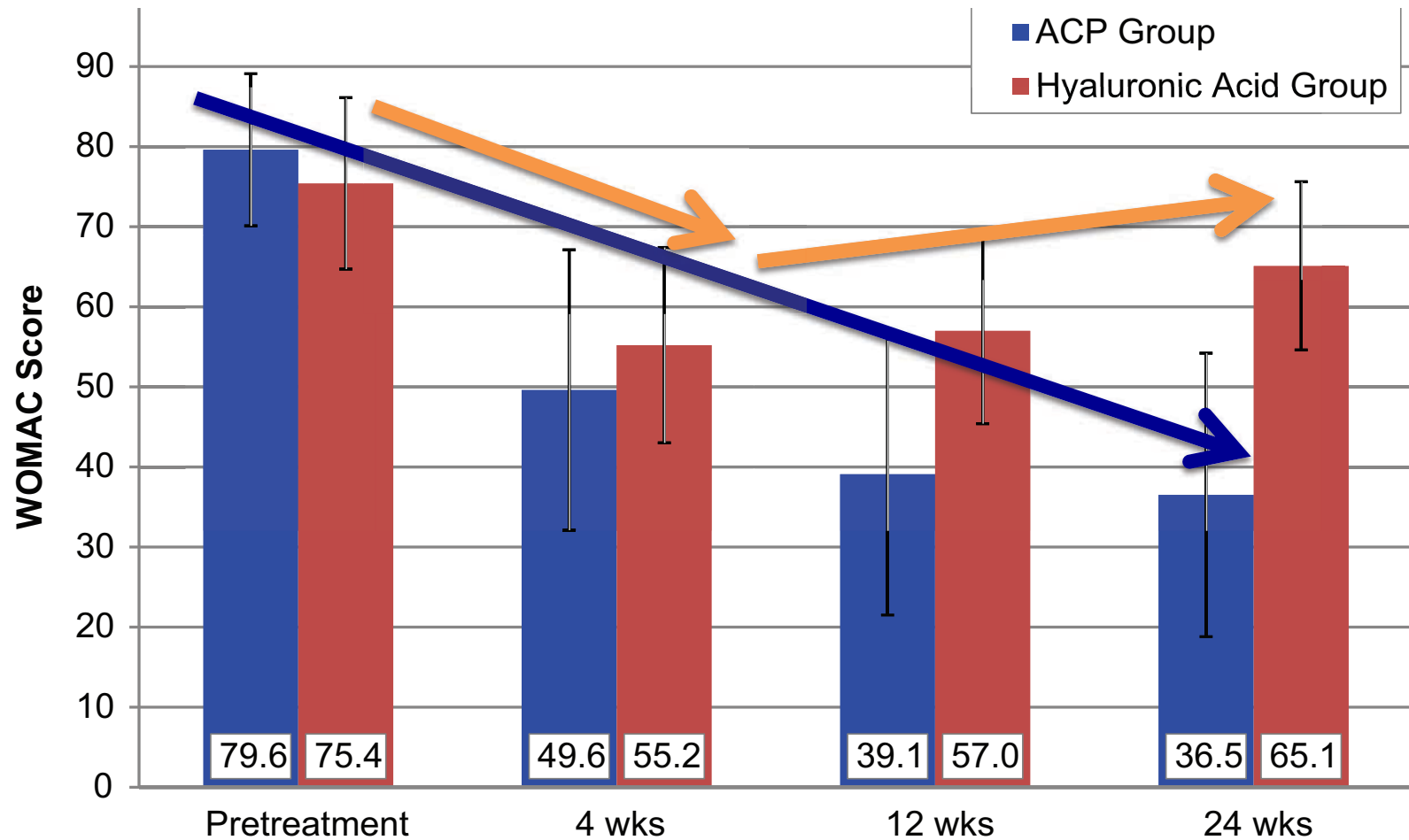


Les études comparatives: PRP/HA (étude de niveau 1)

Etudes	Cerza 2012	Fiilardo 2012	Sanchez 2012	Vaquerizo 2013	Raeissadat 2014
nbre de cas	120	109	176	96	160
Age moyen	66	56	60	63	58
Protocole (nbr d'injection)	4	3	3	3	2
Type PRP	Pure PRP (ACP arthrex)	Leuco PRP	Pure PRP	Pure PRP	Leuco PRP
Groupe contrôle	HA	HA	HA	HA	HA
Classification	grade 2	grade 2	grade 2	grade 3	grade 3
Suivi en nombre de mois	6	12	6	12	24
Score de WOMAC au dernier recul	36/65 ($p<0,01$)	64/61 (NS)	($p=0,04$)	$p<0,001$	18/27 ($p=0,09$)

Meheux CJ. Efficacy of Intra-articular Platelet-Rich Plasma Injections in Knee Osteoarthritis: A Systematic Review. **Arthroscopy.** 2016 Mar;32(3):495-505.

Les études comparatives



Cerza F, Carni S, Carcangiu A, Di Vavo I, Schiavilla V, Pecora A, De Biasi G, Ciuffreda M. Comparison between hyaluronic acid and platelet-rich plasma, intra-articular infiltration in the treatment of gonarthrosis. *Am J Sports Med*. 2012 Dec;40(12):2822-7.

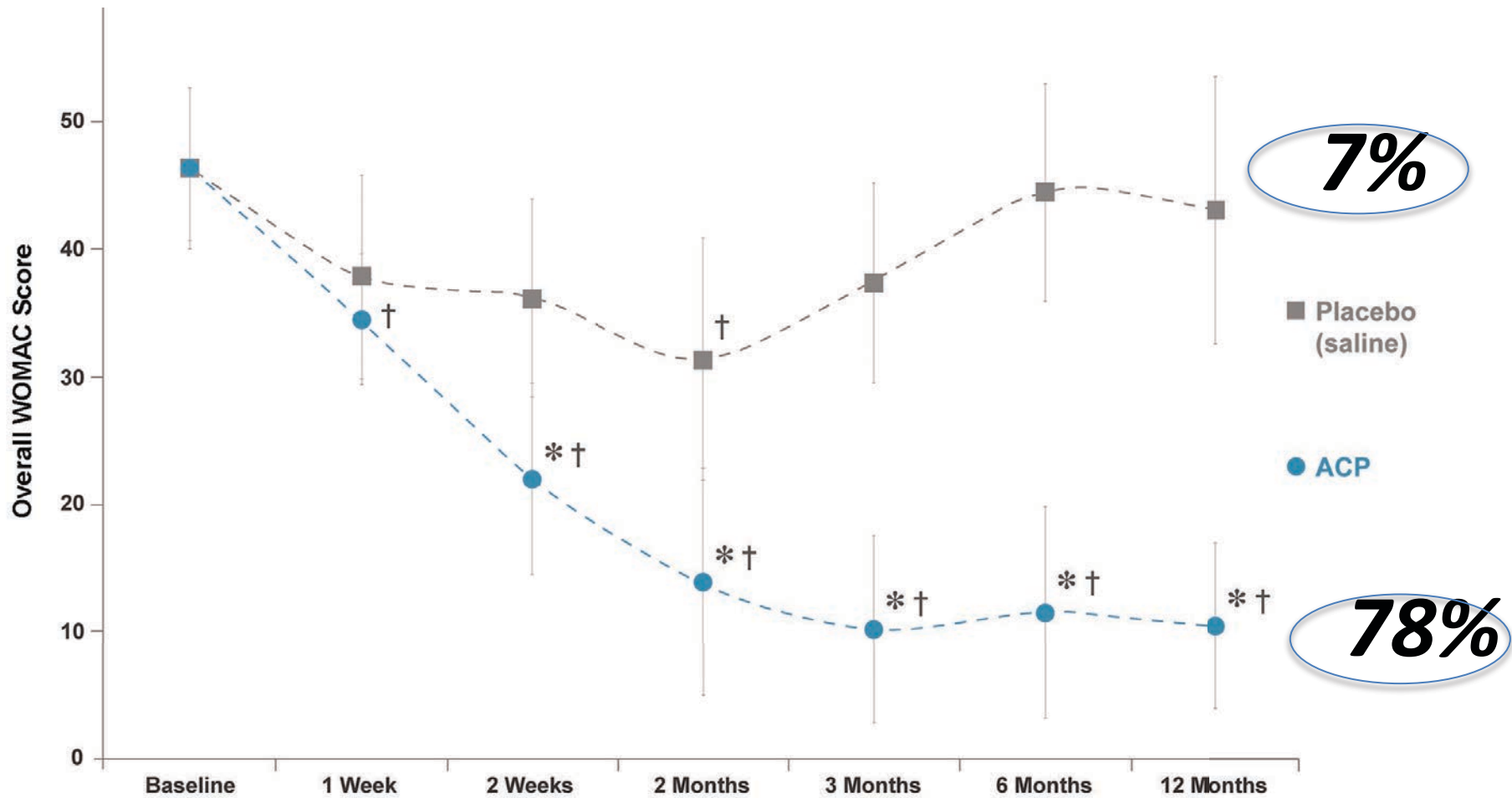
Effet Placebo: ? (PRP/versus Saline)

Etudes	Patel 2013	Smith 2016
nbre de cas	78	30
Age moyen	52	50
Protocole (nbr d'injection)	2 et 3	3
Type PRP	Pure PRP	Pure PRP (ACP)
Groupe contrôle	Saline	Saline
Classification	grade 2	grade 3
Suivi en nombre de mois	6	24
Score de WOMAC au dernier recul	22/50 ($p<0,01$)	10/30 ($p<0,001$)

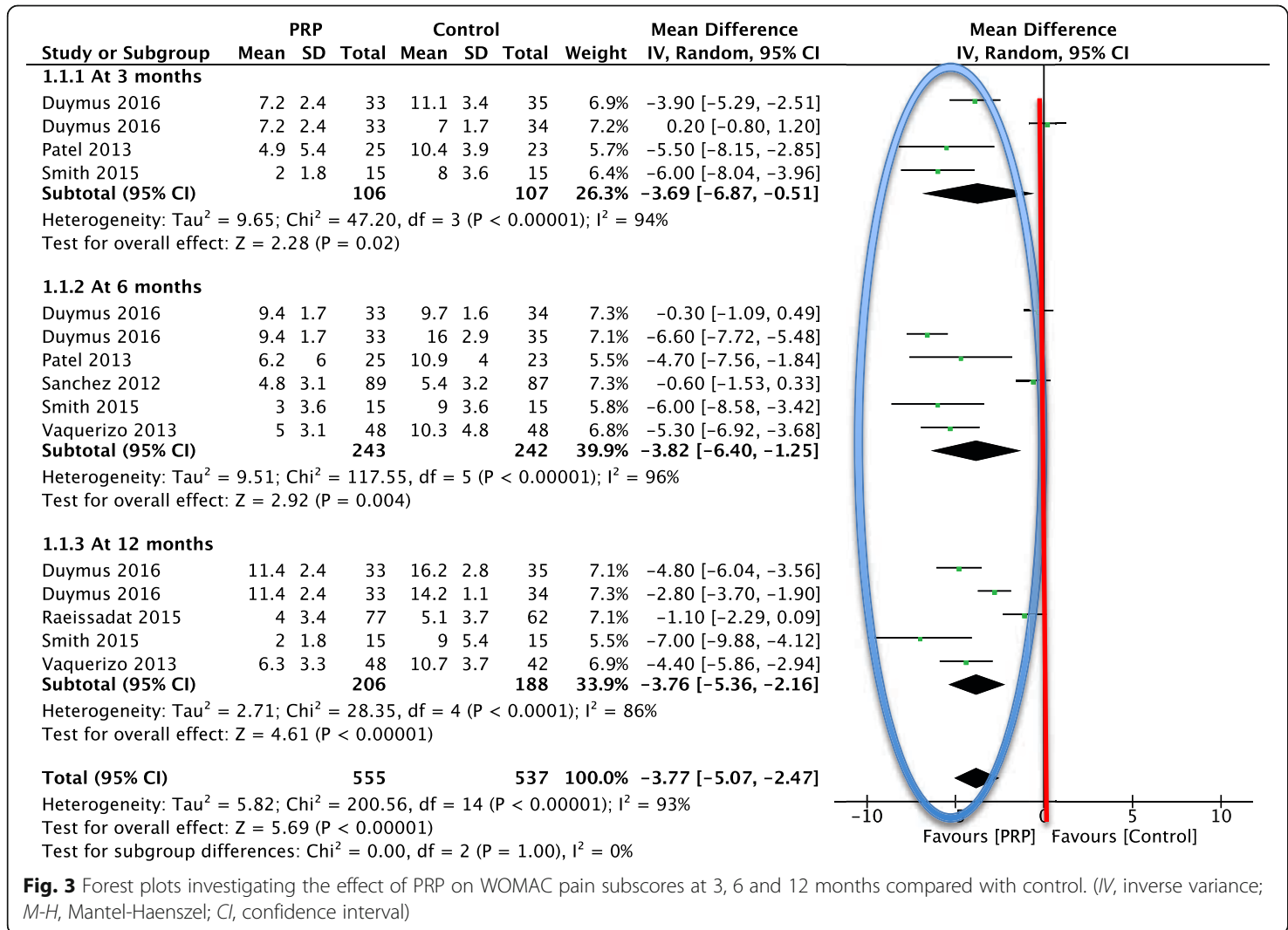
Patel S, Dhillon M, Aggarwal S, Marwaha N, Jain A. Treatment with platelet-rich plasma is more effective than placebo for knee osteoarthritis: a prospective, double-blind, randomized trial. *Am J Sports Med* 2013;41: 356-364.

Patrick A. Smith Intra-articular Autologous Conditioned Plasma Injections Provide Safe and Efficacious Treatment for Knee Osteoarthritis: An FDA-Sanctioned, Randomized, Double-blind, Placebo-controlled Clinical Trial *Am J Sports Med* published online February 1, 2016

Etude randomisée en double aveugle



Patrick A. Smith Intra-articular Autologous Conditioned Plasma Injections Provide Safe and Efficacious Treatment for Knee Osteoarthritis: An FDA-Sanctioned, Randomized, Double-blind, Placebo-controlled Clinical Trial *Am J Sports Med* published online **February 1, 2016**



Shen L, Yuan T, Chen S, Xie X, Zhang C. The temporal effect of platelet-rich plasma on pain and physical function in the treatment of knee osteoarthritis: systematic review and meta-analysis of randomized controlled trials. **J Orthop Surg Res.** 2017 Jan 23;12(1):16.

Omarthrose: Aucune publication !

Une étude en cours « Shoulder Friends Institute »



Takehome message (2)

Multiple injections (3) de PRP
= une option **médicale** pour le traitement de
l'arthrose validée scientifiquement pour la
gonarthrose

Délai d'action de 2 mois

85 à 90 % de réussite

Effet durable



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