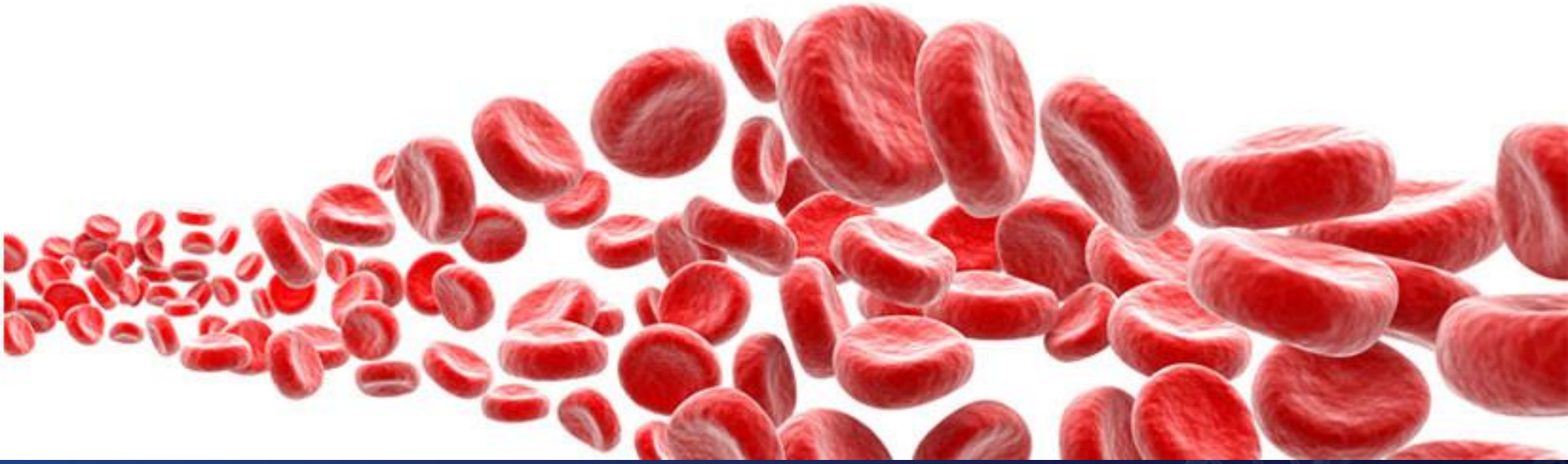
PLASMA RICO EM PLAQUETAS

PERSPECTIVAS DO USO EM ORTOPEDIA E MEDICINA REGENERATIVA

Dr José Fabio Lana

O QUE É

PRP (PLASMA RICO EM PLAQUETAS) ?



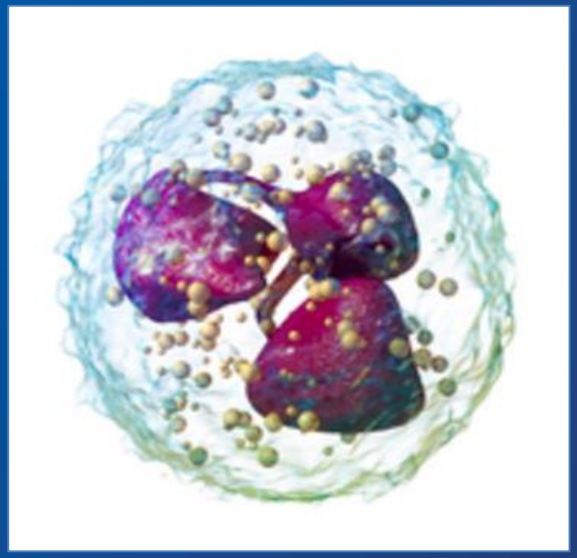
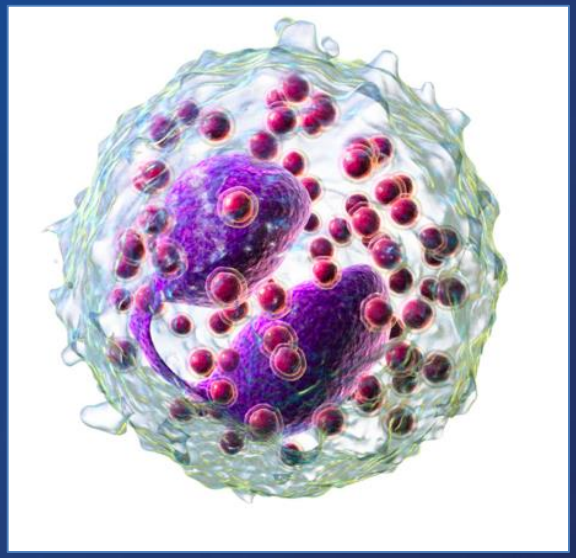
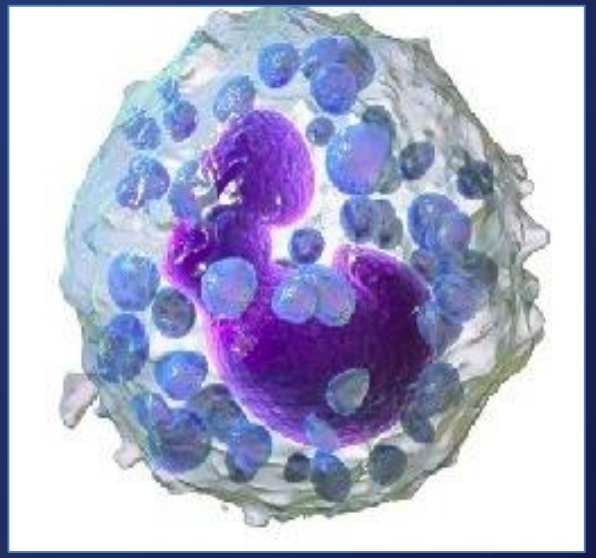
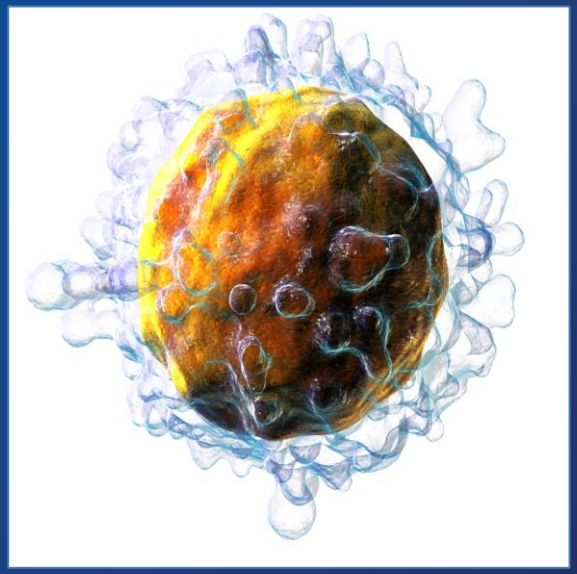
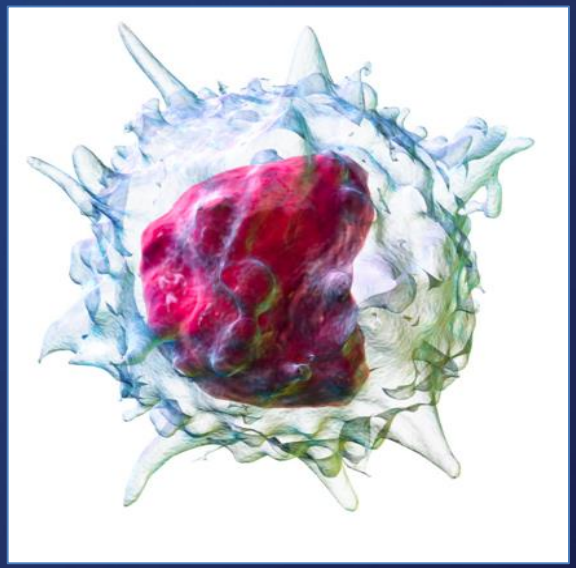
O QUE É

PRP (Platelet Rich Plasma)?

É o plasma com elevada concentração de plaquetas (3-5 x o valor basal), derivado da centrifugação do sangue autólogo

Cellular Components

ORTHOREGEN


QUAIS SÃO OS PRINCIPAIS COMPONENTES E CÉLULAS ALVO DO PRP?

Chemokines/cytokines
- IL-1β
- PBP
- PF4

PRP

Proteases/antiproteases
- α-2-macroglobulin
- ADAMTSs
- MMPs

Small molecules
- Ca^{2+}
- ADP
- Serotonin
- Epinephrine
- Histamine

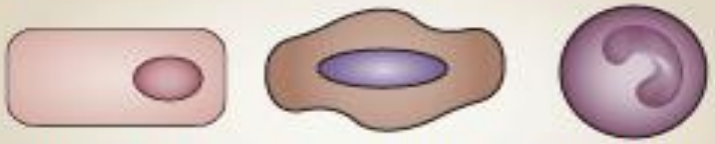
Growth factors
- CTGF
- HGF
- IGF
- PDGF
- VEGF
- TGF-β
- FGF-2

Connective Tissue Growth Factor
Hepatocyte Growth Factor
nsulin-like Growth Factor
Platelet Derived Growth Factor
Vascular Endothelial Growth Factor
Transforming Growth Factor b
Fibroblastic Growth Factor

Cartilage/bone

Chondrocyte Osteoblast

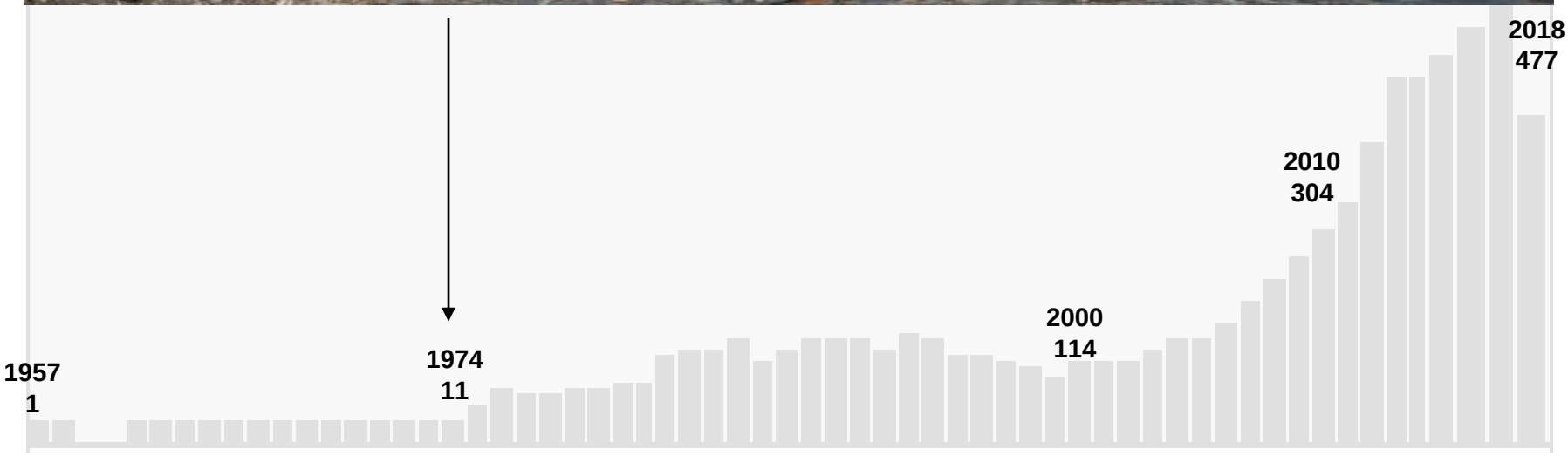
Vascular



Endothelial cell | Circulating mesenchymal cell | Monocyte

Synovium

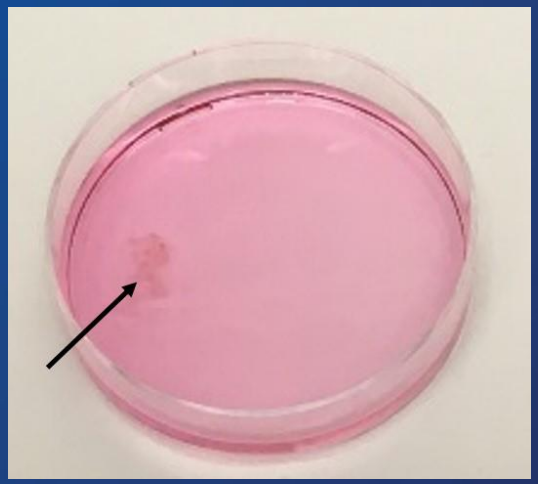
Macrophage Synoviocyte


1957
1
1974
11
2000
114
2010
304
2018
477

HISTÓRIA DA DESCOBERTA DO EFEITO DO PRP NA PROLIFERAÇÃO CELULAR

Década de 70

Pesquisadores avaliaram a proliferação de células do músculo liso em cultura para investigar porque essas células se acumulam na aterosclerose



Observaram que as células só proliferavam na cultura na presença do soro sanguíneo


QUAL COMPONENTE DO SORO SANGUINEO
ERA RESPONSÁVEL PELA PROLIFERAÇÃO
CELULAR EM CULTURA

DEMONSTRARAM QUE ERA UM COMPONENTE DAS PLAQUETAS.....

Proc. Nat. Acad. Sci. USA
Vol. 71, No. 4, pp. 1207–1210, April 1974

A Platelet-Dependent Serum Factor That Stimulates the Proliferation of Arterial Smooth Muscle Cells *In Vitro*

(primate/cell culture/atherosclerosis)

RUSSELL ROSS*, JOHN GLOMSET†, BEVERLY KARIYA*, AND LAURENCE HARKER‡

* University of Washington, School of Medicine, Department of Pathology, Seattle Wash. 98195; † University of Washington, School of Medicine, Department of Medicine, and Regional Primate Research Center, Seattle, Wash. 98195; and ‡ University of Washington, School of Medicine, Department of Medicin e, Seattle, Wash. 98195

Communicated by Sidney Udenfriend, November 21, 1973

1978 - Propuseram o termo ”Platelet derived growth factor” (PDGF)

Circ Res. 1978 Mar;42(3):402-9.

Studies of the release from human platelets of the growth factor for cultured human arterial smooth muscle cells.

Witte LD, Kaplan KL, Nossel HL, Lages BA, Weiss HJ, Goodman DS.

1979 - Demonstraram que os fatores de crescimento eram liberados a partir dos α-grânulos

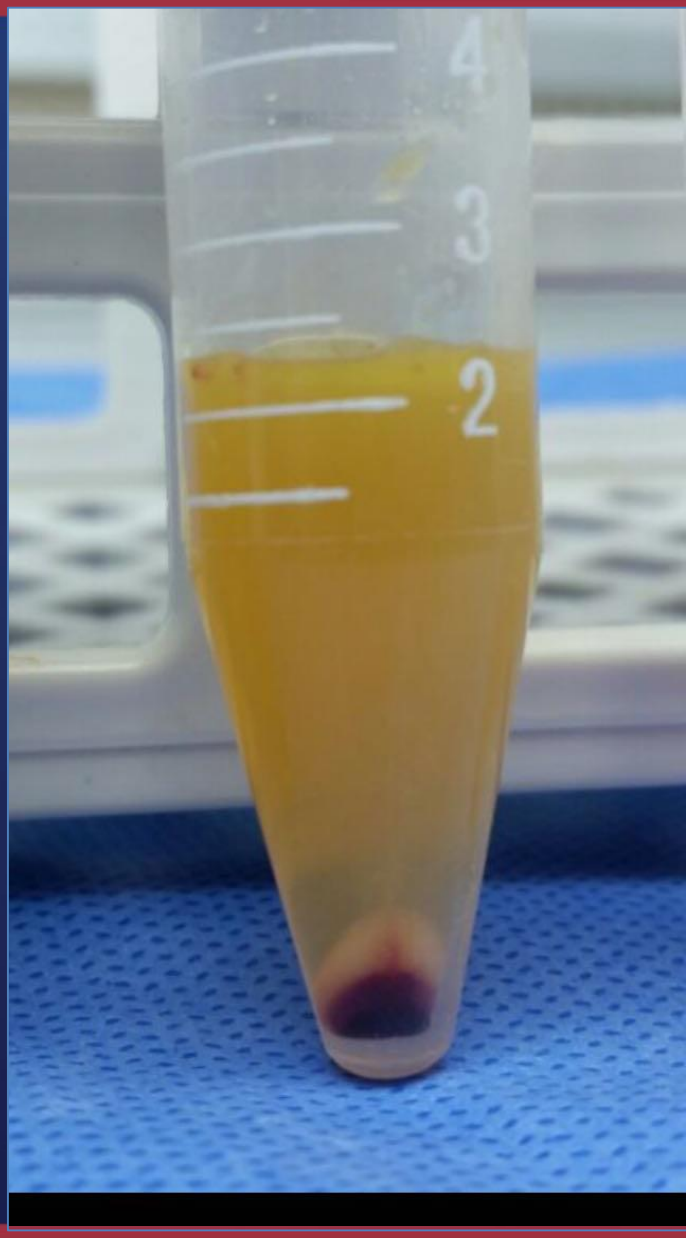
Blood. 1979 Jun;53(6):1043-52.

Platelet alpha granules contain a growth factor for fibroblasts.

Kaplan DR, Chao FC, Stiles CD, Antoniades HN, Scher CD.

Quais são as evidências científicas para o uso do PRP em Ortopedia e Medicina Regenerativa?

SCIENTIFIC EVIDENCES



EVIDÊNCIAS DE ESTUDOS CLÍNICOS

PRP

EM ESTUDOS CLÍNICOS – OSTEOARTRITE

REFERÊNCIA	Patologia/ Intervenção	Tipo de PRP	Desenho do estudo/ n / Avaliação	Resultados	Follow up/ Nível de evidência
Saegusa et al., 2011	OA joelho/ 3 injeções cada duas semanas	PRP 1,5 a 3x Ativado com CaCl2/ml	Série de casos n=261 WOMAC, EVA, SF – 36, Lequesne	**Melhora significativa em todos os escores**	6 meses/ IV
Sanchez et al, 2012	OA joelho 3 injeções semanalmente	PRP Endoret	Controlado, randomizado, multicêntrico N=187 WOMAC, Lequesne	**Resultados superiores ao do AH**	1, 2 e 6 meses/ I
Smith et al., 2016	OA joelho 3 injeções semanalmente	PRP Arthex	RCT, n=30 WOMAC	**Melhora 78% nos escores**	12 meses/ I
Cole et al 2016	OA joelho 3 injeções semanalmente	PRP Arthex	RCT, n=111 WOMAC, IKDC,EVA	**Melhora significativa nos escores**	52 semanas/ I
Lana et al, 2016	OA joelho 3 injeções cada duas semanas de PRP, AH ou PRP+AH	PRP 4 a 6 x	RCT, n=105 WOMAC, EVA	**Melhora significativa nos escores**	12 meses/ I
Gormeli et al 2017	OA joelho – 4 grupos 3 injeções de PRP 1 injeção de PRP, AH ou Salina	PRP 5x valor basal	RCT, n=182 IKDC, EVA	**Grupos tratados apresentaram melhores escores**	6 meses/ I

PRP EM ESTUDOS CLÍNICOS - OSTEOARTRITE

Journal of Stem Cells & Regenerative Medicine
ISSN 0973 - 7154

RESEARCH ARTICLE

JSRM Code: 012030200002EPA050716

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

Lana JFSD[1,4], Weglein A[3], Sampson S[2], Vicente EF[1], Huber SC[1,7], Souza CV[4], Ambach MA[5], Vincent H[6], Urban-Paffaro A[7], Onodera CMK[7], Annichino-Bizzacchi JM[7], Santana MHA[8], Belangero WD[8]

Conclusões: Resultados corroboram o uso do PRP autólogo como um tratamento efetivo para o tratamento de OA leve a moderada.

A combinação de AH+PRP apresentou melhores resultados do que o AH sozinho até 1 ano e PRP sozinho até 3M. AH+PRP – melhores escores funcionais nos primeiros 30 dias quando comparados ao AH ou PRP isolados.

PRP EM ESTUDOS CLÍNICOS - OSTEOARTRITE

Shen *et al. Journal of Orthopaedic Surgery and Research* (2017) 12:16
DOI 10.1186/s13018-017-0521-3

Journal of Orthopaedic Surgery and Research

RESEARCH ARTICLE Open Access

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

Longxiang Shen[1†], Ting Yuan[1†], Shengbao Chen[2], Xuetao Xie[1*] and Changqing Zhang[1]

Conclusões: Injeções intra-articulares de PRP são mais eficazes no tratamento da OA de joelho em termos de alívio da dor e auto-relato de melhora funcional em 3, 6 e 12 meses de seguimento, comparado com outras injeções, como salina, HA, ozônio e corticóides

PRP EM ESTUDOS CLÍNICOS - TENDINOPATIA

Nonsurgical Treatments of Patellar Tendinopathy: Multiple Injections of Platelet-Rich Plasma Are a Suitable Option

A Systematic Review and Meta-analysis

Luca Andriolo,* MD, Sante Alessandro Altamura,* MD, Davide Reale,*† MD, Christian Candrian,‡ MD, Stefano Zaffagnini,* MD, Prof., and Giuseppe Filardo,§ MD, PhD
Investigation performed at Rizzoli Orthopaedic Institute, Bologna, Italy; and Ospedale Regionale di Lugano—EOC, Lugano, Switzerland

The American Journal of Sports Medicine
1–18
DOI: 10.1177/0363546518759674

Conclusões – Múltiplas injeções de PRP apresenta um bom resultado no tratamento da tendinopatia patelar

PRP EM ESTUDOS CLÍNICOS - TENDINOPATIA

The Efficacy of Platelet-Rich Plasma on Tendon and Ligament Healing

A Systematic Review and Meta-analysis With Bias Assessment

Xiao Chen,* BA, Ian A. Jones,* BA, Caron Park,† PhD, and C. Thomas Vangsness Jr,*‡ MD
Investigation performed at Keck School of Medicine of USC, Los Angeles, California, USA

The American Journal of Sports Medicine
2018;46(8):2020–2032
DOI: 10.1177/0363546517743746

Conclusão – PRP pode reduzir a dor associada a epicondilite e lesões do manguito rotador.

PRP EM ESTUDOS CLÍNICOS – LOMBALGIA COM DEGENERAÇÃO DISCAL

PM R 8 (2016) 1-10

www.pmrjournal.org

Original Research—CME

Lumbar Intradiskal Platelet-Rich Plasma (PRP) Injections: A Prospective, Double-Blind, Randomized Controlled Study

Yetsa A. Tuakli-Wosornu, MD, MPH, Alon Terry, MD, Kwadwo Boachie-Adjei, BS, CPH, Julian R. Harrison, BS, Caitlin K. Gribbin, BA, Elizabeth E. LaSalle, BS, Joseph T. Nguyen, MPH, Jennifer L. Solomon, MD, Gregory E. Lutz, MD

Conclusões - Participantes que receberam o PRP intradiscal apresentaram uma melhora significativa na dor e função em comparação com o grupo controle (n total = 47 participantes)

PRP EM ESTUDOS CLÍNICOS – LOMBALGIA COM DEGENERAÇÃO DISCAL

Review Article

J Spine Surg 2018;4(1):115-122

Platelet-rich plasma injections: an emerging therapy for chronic discogenic low back pain

Suja Mohammed[1], James Yu[1,2]

[1]Australian Medical Research Institute, New South Wales, Australia; [2]Sydney Spine and Pain, Hurstville, New South Wales, Australia

Contributions: (I) Conception and design: All authors; (II) Administrative support: S Mohammed; (III) Provision of study materials or patients: All authors; (IV) Collection and assembly of data: All authors; (V) Data analysis and interpretation: All authors; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: James Yu, MD. Sydney Spine and Pain, Suite 706 Level 7, Waratah Private Hospital, 31 Dora St, Hurstville, NSW Australia. Email: drjamesyu@sydneyspinepain.com.au.

Conclusões – PRP é seguro e efetivo no tratamento da dor discogênica lombar

PRP EM ESTUDOS CLÍNICOS – LOMBALGIA

ORIGINAL ARTICLE OPEN ACCESS

Effect of autologous platelet leukocyte rich plasma injections on atrophied lumbar multifidus muscle in low back pain patients with monosegmental degenerative disc disease

Mohamed Hussein[1,*] and Tamer Hussein[2]

[1] Department of Orthopedics and Traumatology, Surgery New Hospital, Zagazig University Hospitals and Faculty of Medicine, Zagazig University, 44519 Zagazig City, Sharkiah, Egypt
[2] Department of Anesthesiology and ICU, Surgery New Hospital, Zagazig University Hospitals and Faculty of Medicine, Zagazig University, 44519 Zagazig City, Sharkiah, Egypt

Received 30 May 2015, Accepted 7 January 2016, Published online 22 March 2016

Conclusão – Injeção de PRP no músculo multifidus lombar foi efetiva e segura no alívio da dor lombar crônica e disfunção com uma taxa de sucesso de 71,2%.

EVIDÊNCIAS DE ESTUDOS DE CIÊNCIAS BÁSICAS

APLICAÇÃO DO PRP EM ESTUDOS *IN VITRO*

PRP EM CULTURA DE CONDRÓCITOS

Pettersson et al., 2009	Condrócitos humanos	Promove a proliferação celular e a Síntese da matriz extracelular
Akeda et al., 2006	Condrócitos de porco	
Spreafico et al, 2009	Condrócitos humanos	
Park et al., 2012	Condrócitos de coelho	
Saito et al 2009	Condrócitos de coelho	
Gaissmaier et al 2005	Condrócitos humanos	
Kaps et al 2002	Condrócitos bovino	

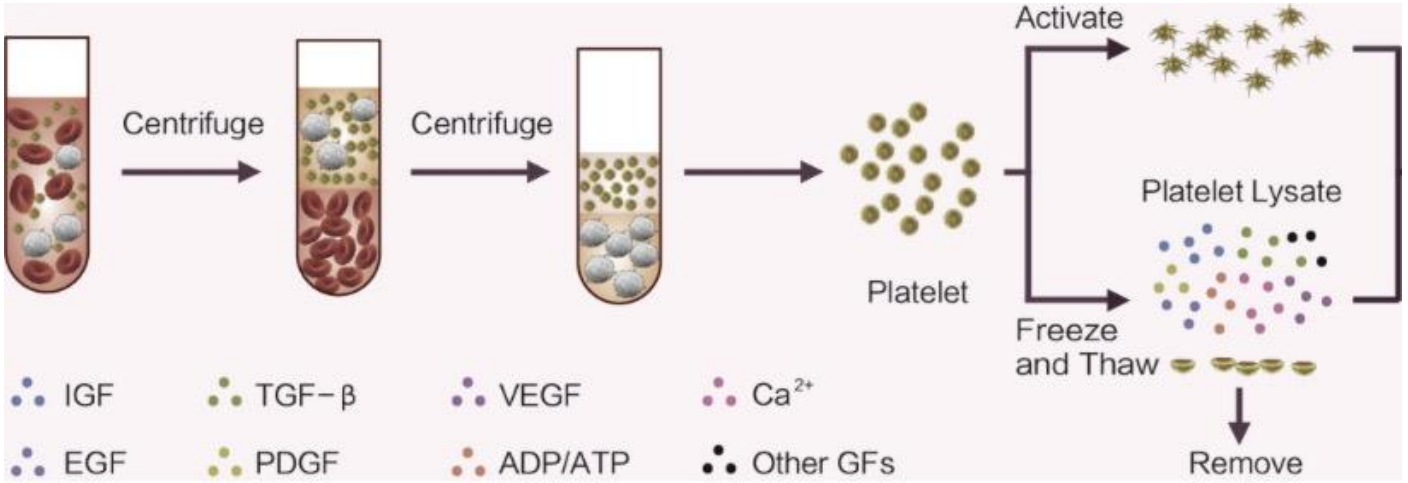
APLICAÇÃO DO PRP EM ESTUDOS *IN VIVO*

APLICAÇÃO INTRA-ARTICULAR DE PRP EM MODELOS ANIMAIS DE OSTEOARTRITE

Kwon et al., 2012	Estimula a proliferação celular
Mifune et al., 2012	Aumenta o conteúdo de colágeno do tipo II
Saito et al., 2012	Suprime a progressão da osteoartrite

O QUE SE CONHECE SOBRE SEU MECANISMO DE AÇÃO NA PROLIFERAÇÃO CELULAR E NA REPARAÇÃO DA CARTILAGEM?

PRP



COMPONENTES DO PRP

ADP

Platelets promote cartilage repair and chondrocyte proliferation via ADP in a rodent model of osteoarthritis

Qi Zhou, Chunhua Xu, Xingyao Cheng, Yangyang Liu, Ming Yue, Mengjiao Hu, Dongjiao Luo, Yuxi Niu, Hongwei Ouyang, Jiansong Ji & Hu Hu

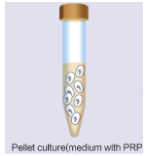
To cite this article: Qi Zhou, Chunhua Xu, Xingyao Cheng, Yangyang Liu, Ming Yue, Mengjiao Hu, Dongjiao Luo, Yuxi Niu, Hongwei Ouyang, Jiansong Ji & Hu Hu (2016) Platelets promote cartilage repair and chondrocyte proliferation via ADP in a rodent model of osteoarthritis, Platelets, 27:3, 212-222, DOI: 10.3109/09537104.2015.1075493

MODELO DE INDUÇÃO DE OSTEOARTRITE EM RATOS PELA ADMINISTRAÇÃO INTRA-ARTICULAR DE MONOSÓDIO IODO ACETATO

Monosodio iodo acetato (MIA)

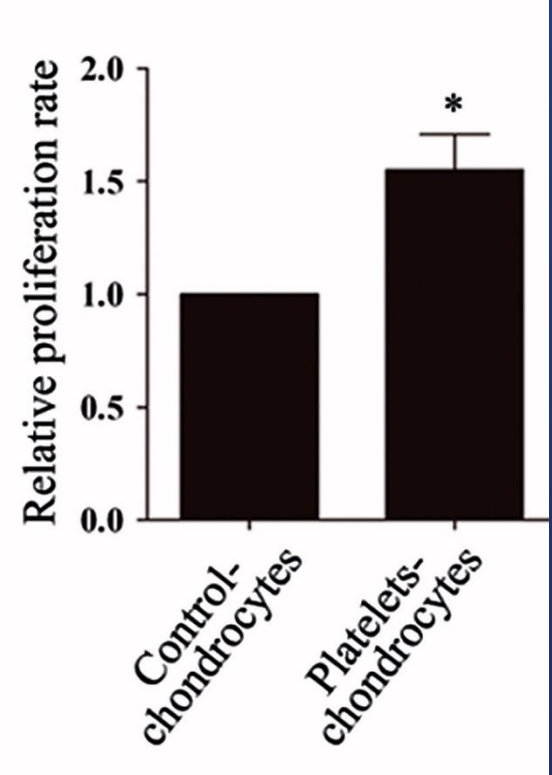
2 semanas

Transplante de condrócitos tratados com plaquetas

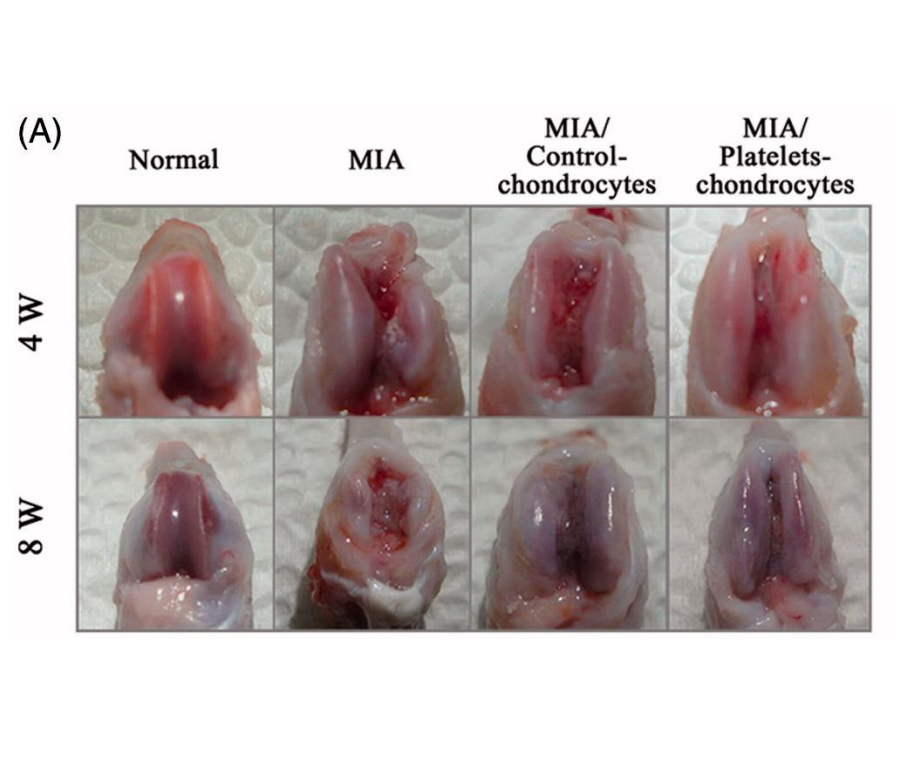


TRANSPLANTE DE CONDRÓCITOS TRATADOS COM PLAQUETAS PROMOVEU O REPARO DA CARTILAGEM EM MODELO DE OSTEOARTRITE EM RATOS

PLAQUETAS AUMENTARAM A PROLIFERAÇÃO DE CONDRÓCITOS

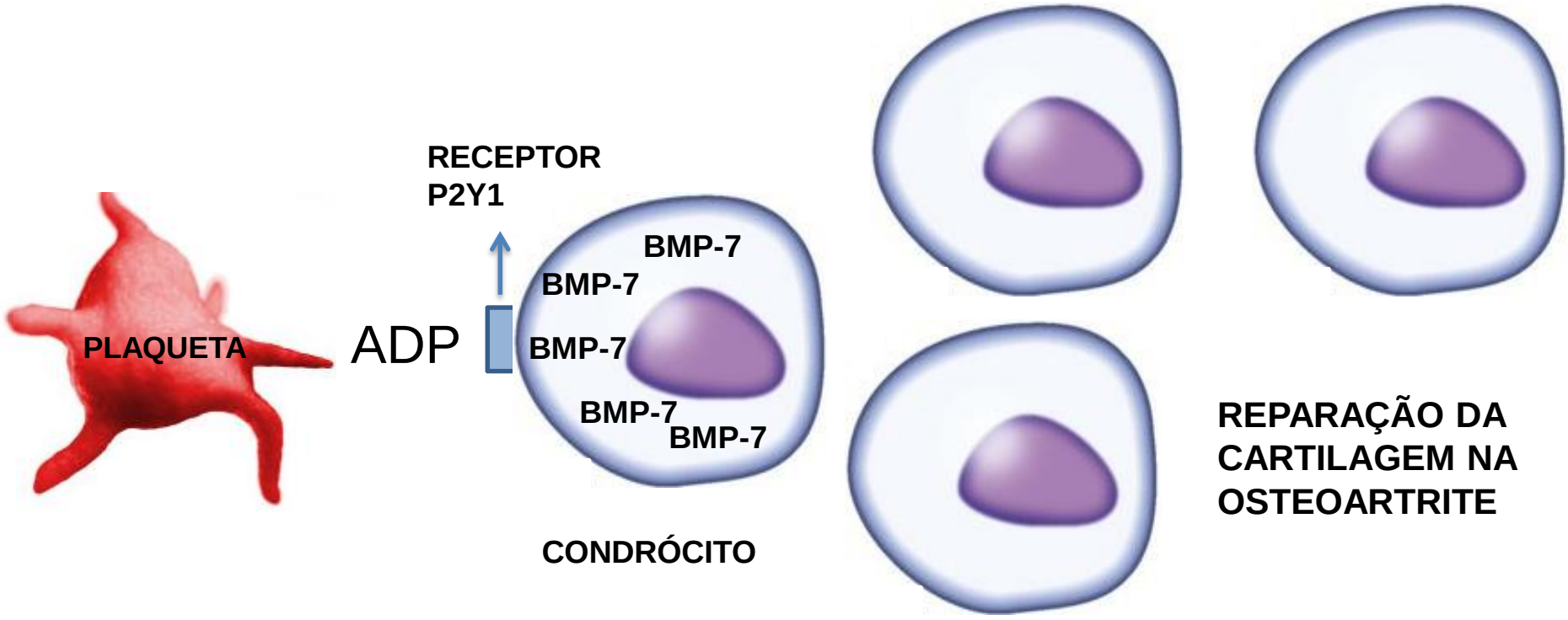


AVALIAÇÃO MACROSCÓPICA DA CARTILAGEM ARTICULAR



CONCLUSÃO

O ADP DERIVADO DAS PLAQUETAS, VIA RECEPTORES P2Y1, PROMOVE A PRODUÇÃO DE BMP7 NOS CONDRÓCITOS RESULTANDO NA PROLIFERAÇÃO DOS MESMOS E NA REPARAÇÃO DA CARILAGEM EM MODELO DE OA EM RATOS



AINDA SOBRE O PAPEL DO PRP NA PROLIFERAÇÃO CELULAR.....

TENÓCITOS

Histochem Cell Biol (2011) 135:453–460
DOI 10.1007/s00418-011-0808-0

ORIGINAL PAPER

Platelet-released growth factors can accelerate tenocyte proliferation and activate the anti-oxidant response element

M. Tohidnezhad · D. Varoga · C. J. Wruck ·
L. O. Brandenburg · A. Seekamp · M. Shakibaei ·
T. T. Sönmez · Thomas Pufe · S. Lippross

OPEN ACCESS Freely available online

2013 PLOS ONE

HGF Mediates the Anti-inflammatory Effects of PRP on Injured Tendons

Jianying Zhang[1], Kellie K. Middleton[1], Freddie H. Fu[1], Hee-Jeong Im[2], James H-C. Wang[1]*

1 MechanoBiology Laboratory, Departments of Orthopaedic Surgery, Bioengineering, and Mechanical Engineering and Materials Science, University of Pittsburgh, Pittsburgh, Pennsylvania, United States of America, **2** Departments of Biochemistry and Internal Medicine Rush University Medical Center, Chicago, Illinois, United States of America

Experimentos *in vitro* com células de tendão de coelho

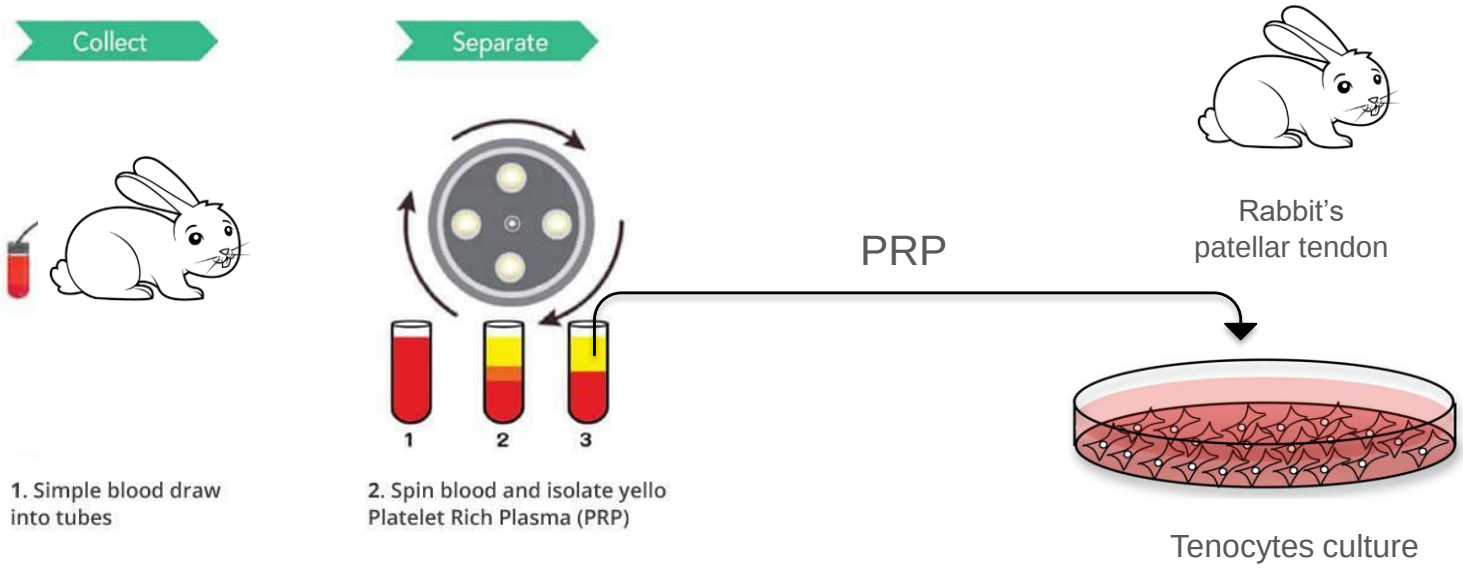
Experimentos *in vivo* em modelo de lesão de tendão de aquiles de camundongo

OPEN ACCESS Freely available online

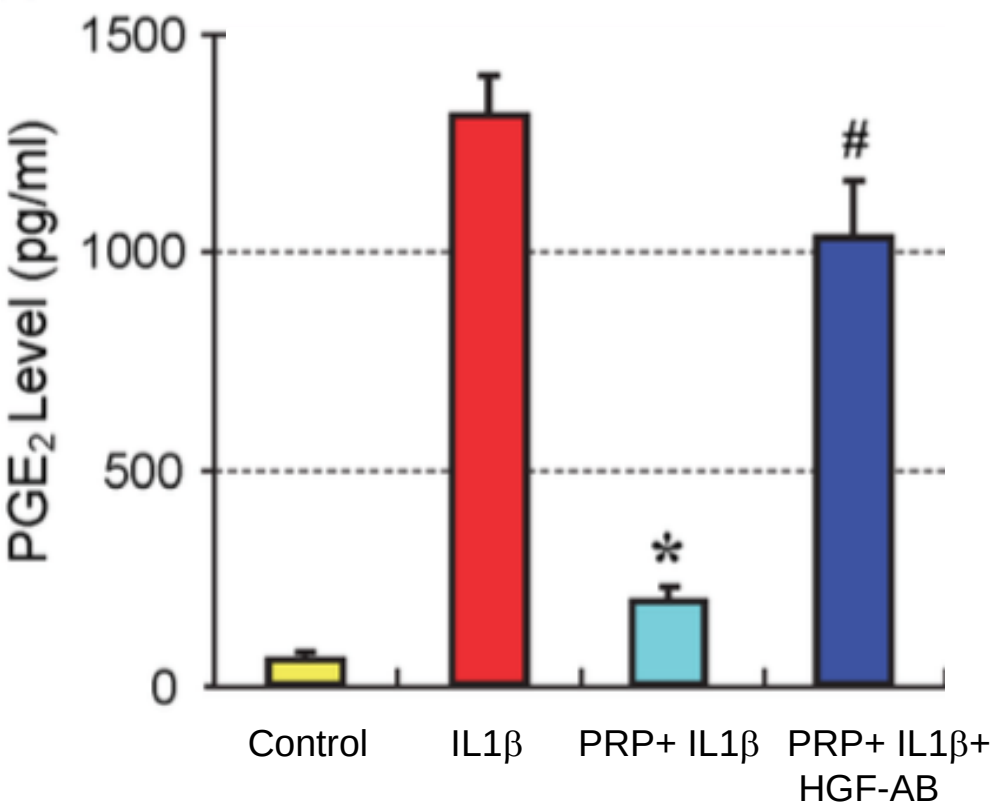
PLOS ONE

HGF Mediates the Anti-inflammatory Effects of PRP on Injured Tendons

EXPERIMENTOS *IN VITRO*



PRP REDUZIU A PRODUÇÃO DE PGE_2 NAS CÉLULAS DA CULTURA DO TENDÃO VIA FATOR DE CRESCIMENTO DOS HEPATÓCITOS



OPEN ACCESS Freely available online

PLOS ONE

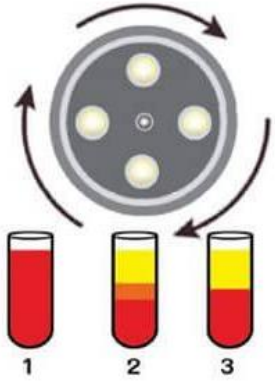
HGF Mediates the Anti-inflammatory Effects of PRP on Injured Tendons

IN VIVO EXPERIMENTS

Collect

1. Simple blood draw into tubes

Separate



2. Spin blood and isolate yello Platelet Rich Plasma (PRP)

OPEN ACCESS Freely available online

PLOS ONE

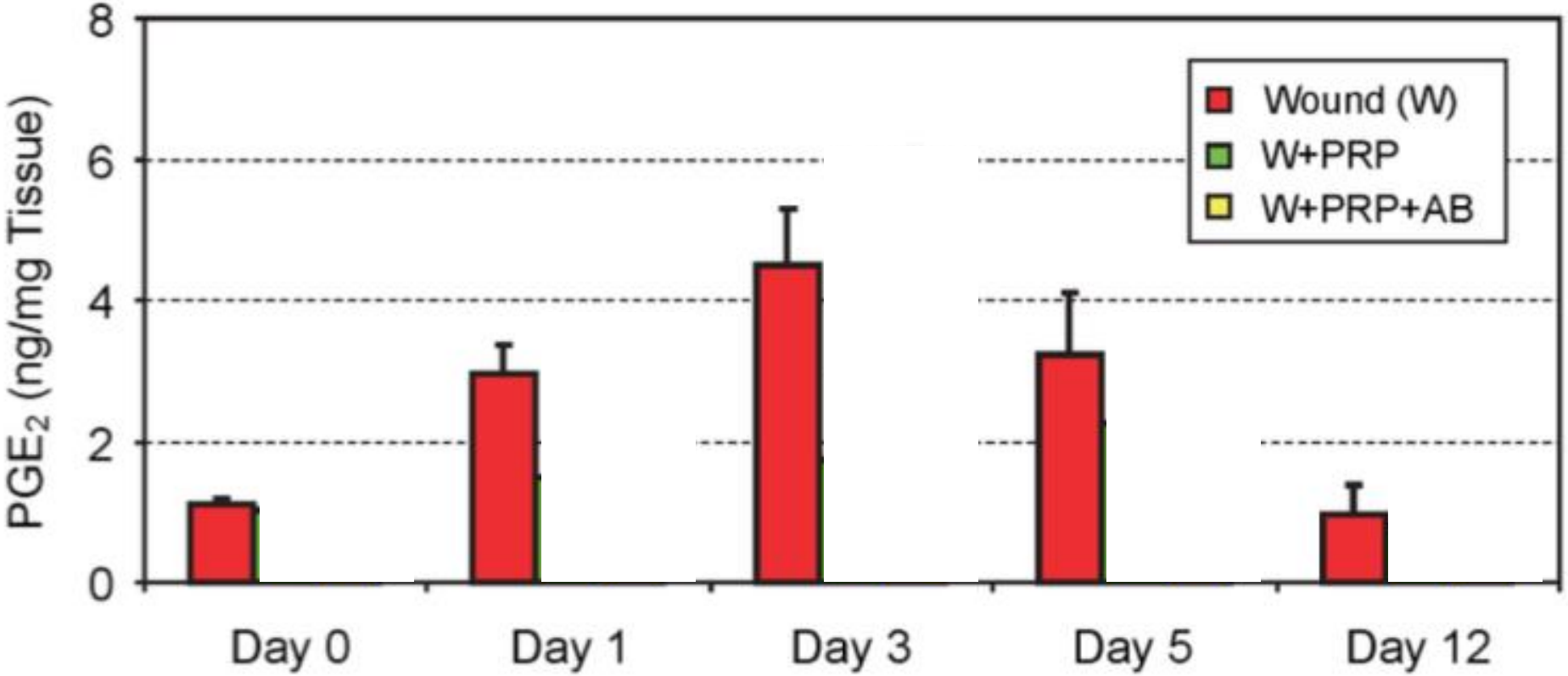
HGF Mediates the Anti-inflammatory Effects of PRP on Injured Tendons

EXPERIMENTOS *IN VIVO*

Indução da lesão no tendão de aquiles (1mm diâmetro) de camundongos

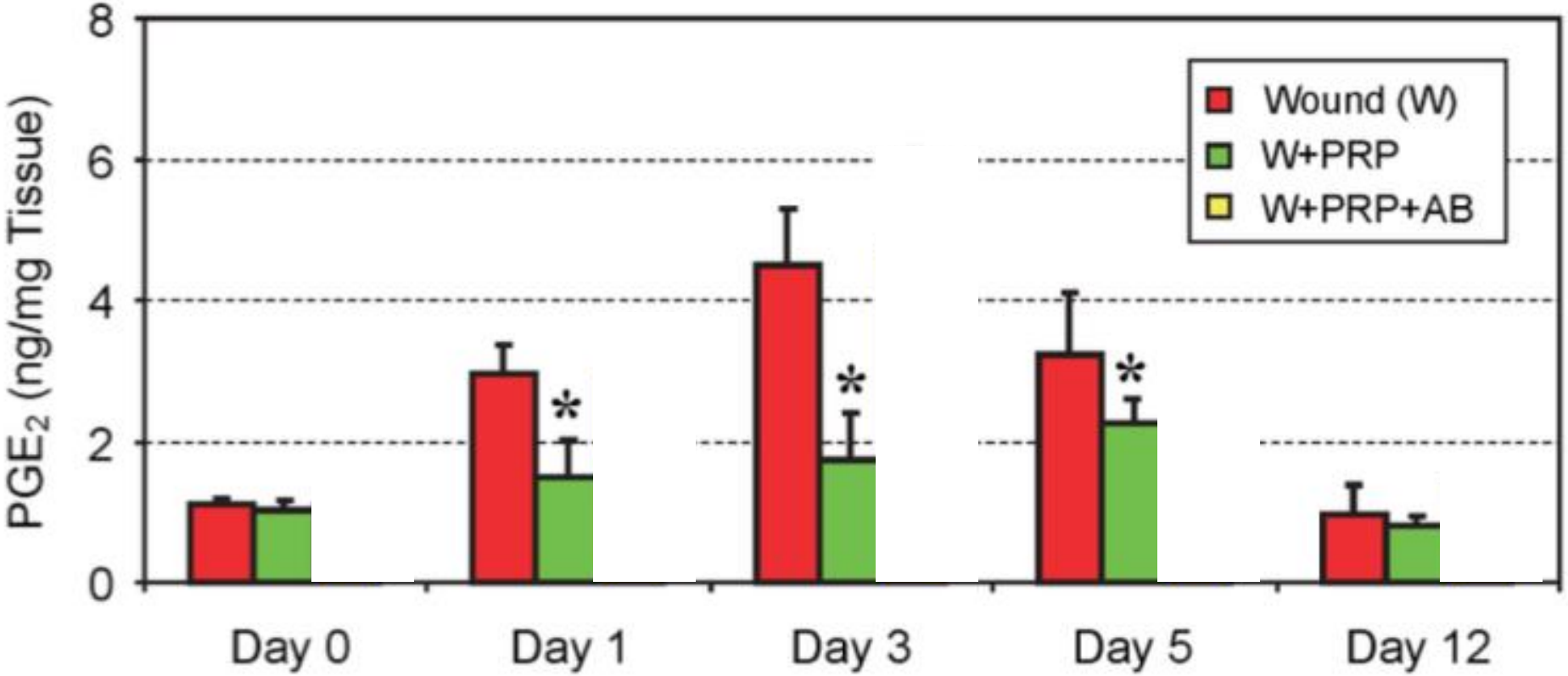
Tratamentos foram realizados imediatamente após

PRP REDUZIU A PRODUÇÃO DE PGE_2 NO TENDÃO DE AQUILES LESIONADO VIA FATOR DE CRESCIMENTO DOS HEPATÓCIOTS



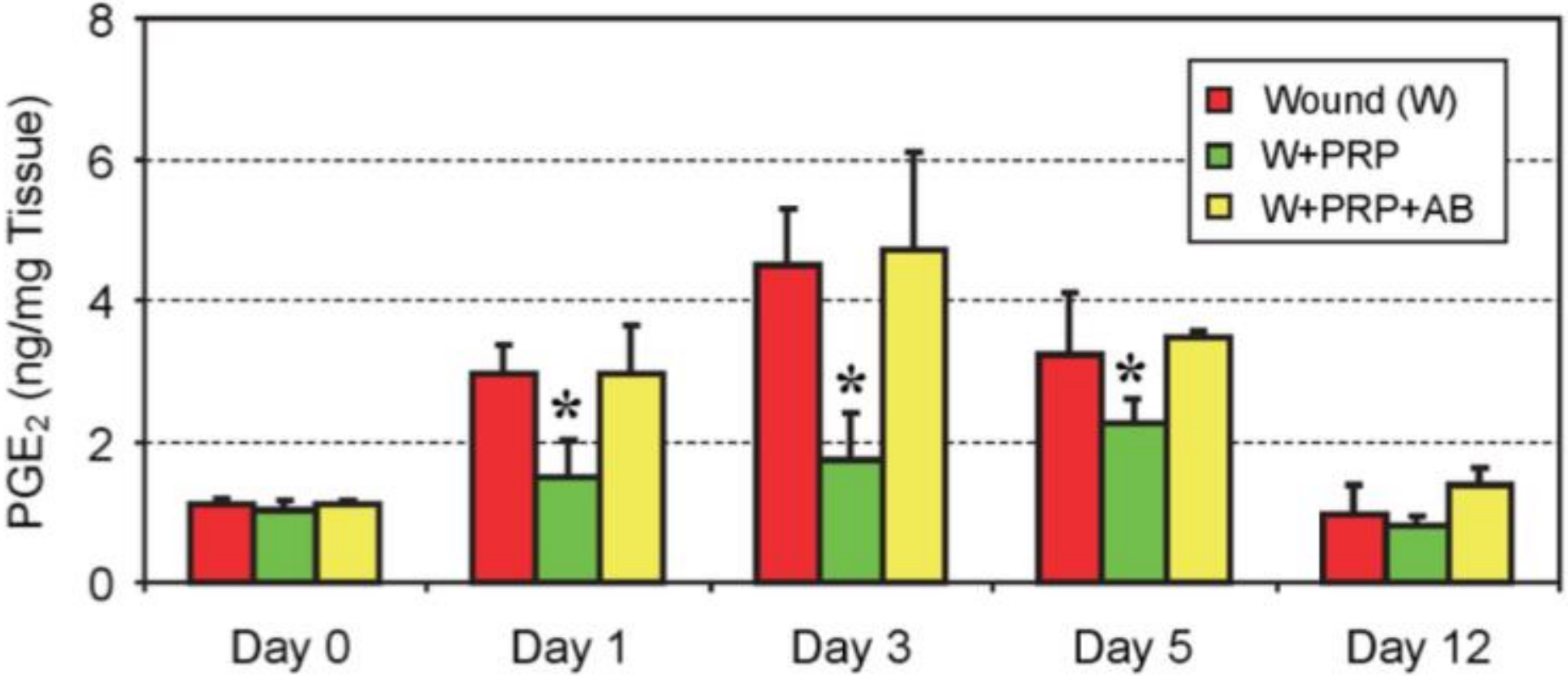
AB = ANTICORPO CONTRA O HGF

PRP REDUZIU A PRODUÇÃO DE PGE_2 NO TENDÃO DE AQUILES LESIONADO VIA FATOR DE CRESCIMENTO DOS HEPATÓCIOTS



AB = ANTICORPO CONTRA O HGF

PRP REDUZIU A PRODUÇÃO DE PGE_2 NO TENDÃO DE AQUILES LESIONADO VIA FATOR DE CRESCIMENTO DOS HEPATÓCITOS



POST TREATMENT

AB = ANTICORPO CONTRA O HGF

UM ASPECTO QUE CHAMA A ATENÇÃO NOS ESTUDOS COM O PRP.....

Publicações

BioResearch Open Access
Volume 2, Number 4, August 2013

DOI: 10.1089/biores.2013.0015

Prediction and Modulation of Platelet Recovery by Discontinuous Centrifugation of Whole Blood for the Preparation of Pure Platelet-Rich Plasma

Amanda G.M. Perez,[1] Rafael Lichy,[1] José Fábio S.D. Lana,[1–3] Ana Amélia Rodrigues,[3] Ângela Cristina M. Luzo,[4] William D. Belangero,[3] and Maria Helena A. Santana[1]

Publicações

Hindawi Publishing Corporation
ISRN Hematology
Volume 2014, Article ID 176060, 8 pages
http://dx.doi.org/10.1155/2014/176060

Hindawi

Research Article

Relevant Aspects of Centrifugation Step in the Preparation of Platelet-Rich Plasma

Amanda G. M. Perez,[1] José Fábio S. D. Lana,[2] Ana Amélia Rodrigues,[3] Angela Cristina M. Luzo,[4] William D. Belangero,[3] and Maria Helena A. Santana[1]

- Aceleração centrífuga (xg), volume do sangue processado, prevenção da agregação e gradiente plaquetário – relevantes para o preparo do PRP
- A observação destes fatores garante a qualidade do PRP (variáveis resultam da natureza autóloga do produto)
- É um ponto de início da padronização do prepare do PRP

Publicações

DISTRIBUTION, RECOVERY AND CONCENTRATION OF PLATELETS AND LEUKOCYTES IN L-PRP PREPARED BY CENTRIFUGATION

Bruna Alice Gomes de Melo[1], Andréa Arruda Martins Shimojo[1], Amanda Gomes Marcelino Perez[1], José Fabio Santos Duarte Lana[2], Maria Helena Andrade Santana[1]*

In press 2018

- A composição do L-PRP pode ser alterada pelas condições de centrifugação
- O perfil de concentração gera um raio de: Plaquetas / leucócitos, Linfócitos / granulócitos – Garantindo a preparação correta do L-PRP com diferentes equilíbrios entre anabólicos / catabólicos

Publicações

Simulation and Validation of the Effects of Anticoagulants and Whole Blood Volume on Centrifugation Performance for the Preparation of Platelet –Rich Plasma

Sofia E. M. Galdames[1], Edson R. Onaga[1], Mariana B.e Souza[1], Andrea A.M. Shimojo[1], José Fábio Lana[3], Angela C. M. Luzo[2] and Maria H. A. Santana[1]

In press 2018

- The anticoagulant influences erythrocyte sedimentation, PRP volume and composition

Publicações

Journal of Stem Cells & Regenerative Medicine
ISSN 0973 - 7154

RESEARCH ARTICLE

JSRM Code: 012010300002

In vitro study of the role of thrombin in platelet rich plasma (PRP) preparation: utility for gel formation and impact in growth factors release

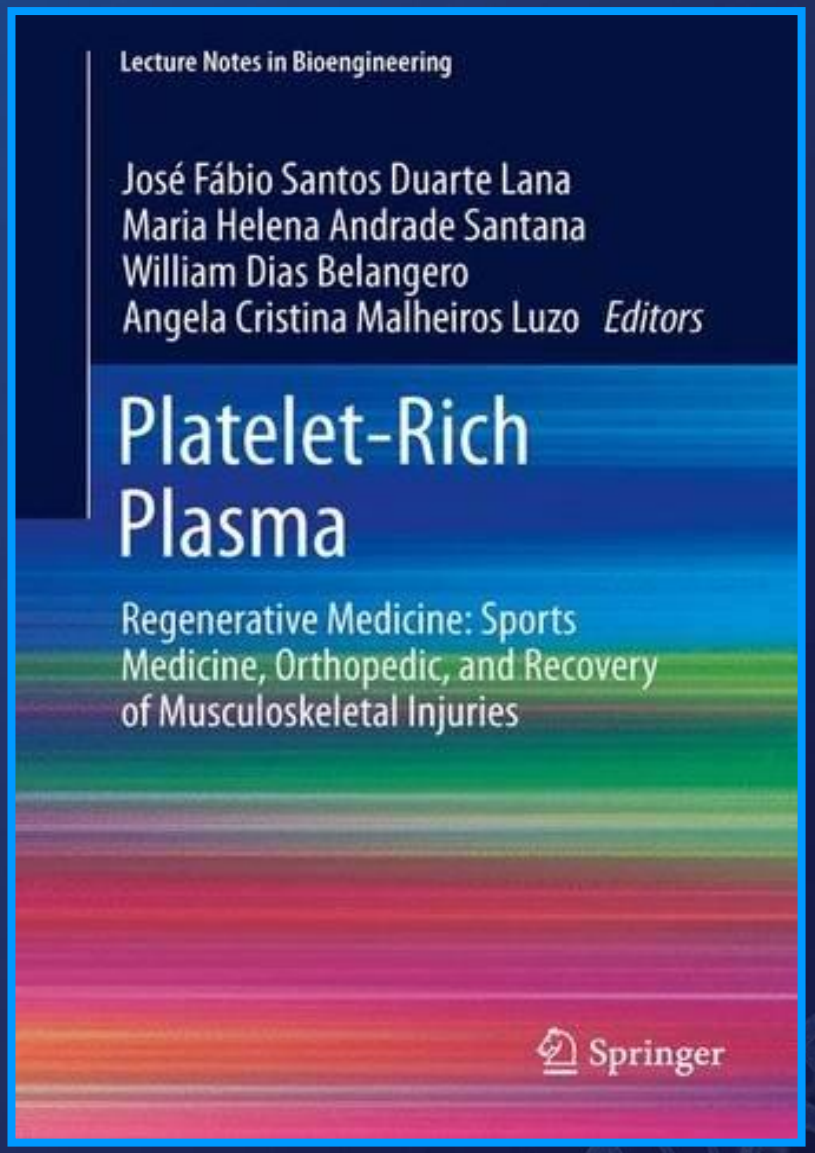
Huber SC[1], Cunha JL[1], Montalvão SAL[1], da Silva LQ[1], Paffaro AU[1], da Silva FAR[1], Rodrigues BL[1], Lana JFSD[1], Annichino-Bizzacchi JM[1]

- A técnica de utilizar soro como fonte de trombina mostrou-se eficiente e reprodutível para promover a formação do gel de PRP, com a vantagem de ser simples e rápido para obtenção
- A ativação do PRP usando diferentes concentrações de trombina não produziu uma maior liberação dos FC, não sendo necessário sua utilização quando o PRP é utilizado como suspensão

OUR SCIENTIFIC CONTRIBUTION

Lana et al

LAS VEGAS 2014



Publicações

- Princípios básicos do metabolismo celular bioquímico que aumenta a eficácia do PRP – Preparing the soil
- Padronização do preparo do PRP para uso clínico – desafio. Nesse contexto, uma estratégia confiável para estudar o preparo do PRP é ilustrada, com o objetivo de garantir a qualidade do PRP para estudos clínicos
- Usos específicos do PRP são descritos com ilustrações detalhadas de experiências pessoais em lesões ortopédicas, ligamentos e tendoes, doenças degenerativas, medicina esportiva, cicatrização crônica de feridas, bem como aspectos de reabilitação em tendinopatias

Chapter 2 – Lana et al

Chapter 2
Platelet-Rich Plasma in Pain Medicine

José Fábio Santos Duarte Lana, Eduardo Fonseca Vicente, Adam Weglein, William Dias Belangero, Fabrício Dias Assis, and André Marques Mansano

Summary

For the past 20 years, autologous Platelet-Rich Plasma (PRP) has been safely employed and its use has been documented in many areas, including orthopedics, sports medicine, dentistry,

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N. Maffulli (ed.), *Platelet Rich Plasma in Musculoskeletal Practice*, DOI 10.1007/978-1-4471-7271-0_2,

Lana et al

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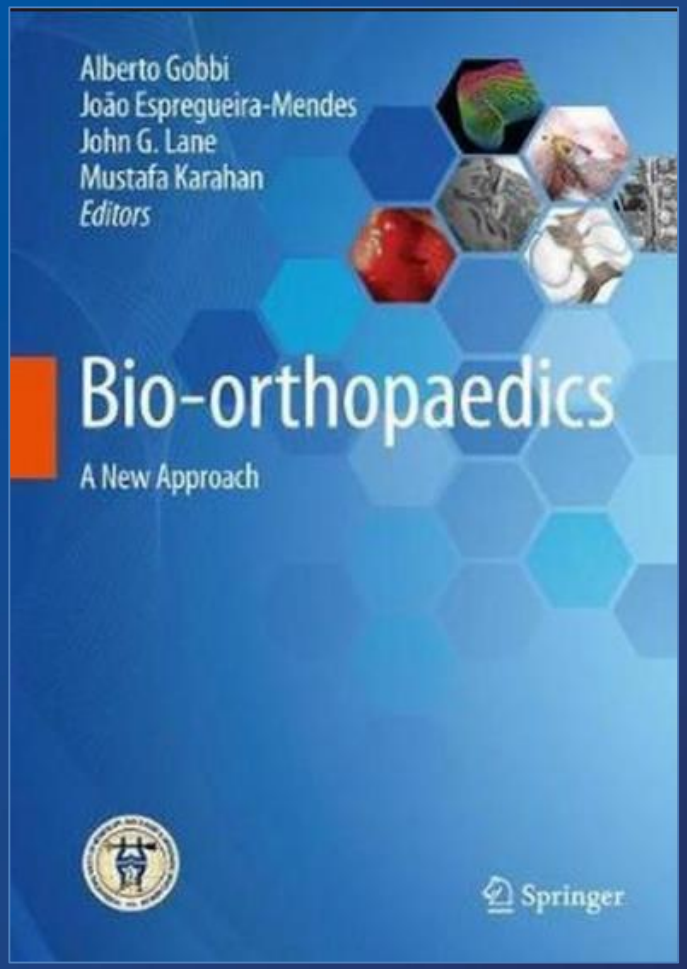

The Role of Biological Treatments in Spine Disorders

48

José Fábio Santos Duarte Lana,
Edilson Silva Machado, Renato Bender Castro,
João Lopo Madureira Junior,
Paulo David Fortis Gusmão,
Nivaldo Evangelista Teles,
Luiz Felipe Chaves Carvalho,
João Paulo Bezerra Leite, Bruno Tavares Rabello,
and Ozório de Almeida Lira Neto

Contents

48.1 Introduction

This chapter addresses several aspects of spine disorders and their implications for pain, functional impairment, and their problems and treatments.

There will be discussions on different causes, such as chronic pain, disc degeneration and discogenic pain, facet syndrome, lumbar spinal stenosis, spinal scapular humeral pain, and spino-pelvic pain. It will be presented the different types of treatments, but with emphasis on the biological approach and its particularities.

48.1.1 Chronic Pain and Spine

Journal of Stem Cells & Regenerative Medicine
ISSN 0973 - 7154

Randomized Controled Trial Hyaluronic Acid + PRP
2016 Publication – Lana et al.

JSRM Code: 012020300011

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

Lana JFSD[1,4], Weglein A[3], Sampson S[2], Vicente EF[1], Huber SC[1,7], Souza CV[4], Ambach MA[5], Vincent H[6], Urban-Paffaro A[7], Onodera CMK[7], Annichino-Bizzacchi JM[7], Santana MHA[8], Belangero WD[8]

Objective: This study aims at evaluating the clinical effects of Platelet Rich Plasma (PRP) and Hyaluronic Acid (HA) as individual treatments for mild to moderate Osteoarthritis (OA) and it also examines the potential synergistic effects of PRP in combination with HA. Research continues to emerge examining the potential therapeutic efficacy of HA and PRP as autologous injectable treatments for joint arthritis. However, there is a paucity of research investigating the effects of combining HA and PRP on pain and functional status in patients with OA.

Design: In this multi-center, randomized, controlled, double blind, prospective trial, 105 patients with mild to moderate knee osteoarthritis, who met the study criteria, were randomly allocated to one of three interventions: HA (n=36), PRP (n=36), or HA+PRP (n=33). Each patient received 3 intra-articular knee injections of their assigned substance, with 2 week intervals between each injection. Clinical outcomes were evaluated using the Western Ontario and McMaster Universities Arthritis Index (WOMAC) and Visual Analogue Scale (VAS) questionnaire at baseline and after 1,3,6 and 12 months.

Results: The study showed that the PRP group have significant reduction in VAS scores at 1 (p= 0.003), 3 (p= 0.0001), 6 (p= 0.0001) and 12 (p= 0.000) months when compared to HA. In addition, the PRP group illustrated greater improvement in WOMAC physical activity scale at 12 months (p= 0.008) when compared to the HA group. Combining HA and PRP resulted in a significant decreases in pain (p=0.0001) and functional limitation (p=0.0001) when compared to HA alone at 1 year post treatment; and significantly increased physical function at 1 (p=0.0004) and 3 (p=.011) months when compared to PRP alone.

Conclusion: The findings of the study support the use of autologous PRP as an effective treatment of mild to moderate knee osteoarthritis. It also shows that the combination of HA and PRP resulted to better outcomes than HA alone up to 1 year and PRP alone up to 3 months. Furthermore, the results suggest that combination of PRP and HA could potentially provide better functional outcomes in the first 30 days after treatment with both PRP and HA alone.

Key Words: Hyaluronic acid, Joint pathology, Knee, Osteoarthritis, Platelet-rich plasma

PRP plays a key role in healing

A Call for Standardization in Platelet-Rich Plasma Preparation Protocols and Composition Reporting

A Systematic Review of the Clinical Orthopaedic Literature

Jorge Chahla, MD, PhD, Mark E. Cinque, MS, Nicolas S. Piuzzi, MD, Sandeep Mannava, MD, PhD, Andrew G. Geeslin, MD, Iain R. Murray, MD, PhD, Grant J. Dornan, MSc, George F. Muschler, MD, and Robert F. LaPrade, MD, PhD

Investigation performed at the Steadman Philippon Research Institute, Vail, Colorado, and The Cleveland Clinic Foundation, Cleveland, Ohio

Standardization is fundamental

FOR PLATELET RICH PLASMA
Quality Control

Regenerative Medicine

Contributions for classification of platelet rich plasma – proposal of a new classification: MARSPILL

Lana et al

PLATELET RICH PLASMA CLASSIFICATION

MARSPILL 2017

Platelet-rich plasma (PRP) has emerged as a significant therapy used in medical conditions with ...tions to try to standardize ...P contents studying celula...assification for PRP. The m...r cells and monocytes. In...pplication incorporated i...lood cells, number of spi... The other focus is the dis... which are interesting due...nocytes (in tissue-macroph...roperty for regenerative m...

First draft submitted: 22 March 2017; Accepted for publication: 31 May 2017; Published online: 31 July 2017

Keywords: growth factors • leukocytes • mononuclear cells • platelet-rich plasma • regenerative medicine

Jose Fabio Santos Duarte Lana*[,1], Joseph Purita[2], Christian Paulus[2], Stephany Cares Huber[3], Bruno Lima Rodrigues[3], Ana Amélia Rodrigues[4], Maria Helena Santana[5], João Lopo Madureira Jr[5], Ângela Cristina Malheiros Luzo[7], William Dias Belangero[4] & Joyce Maria Annichino-Bizzacchi[3]

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MARSPILL Classification

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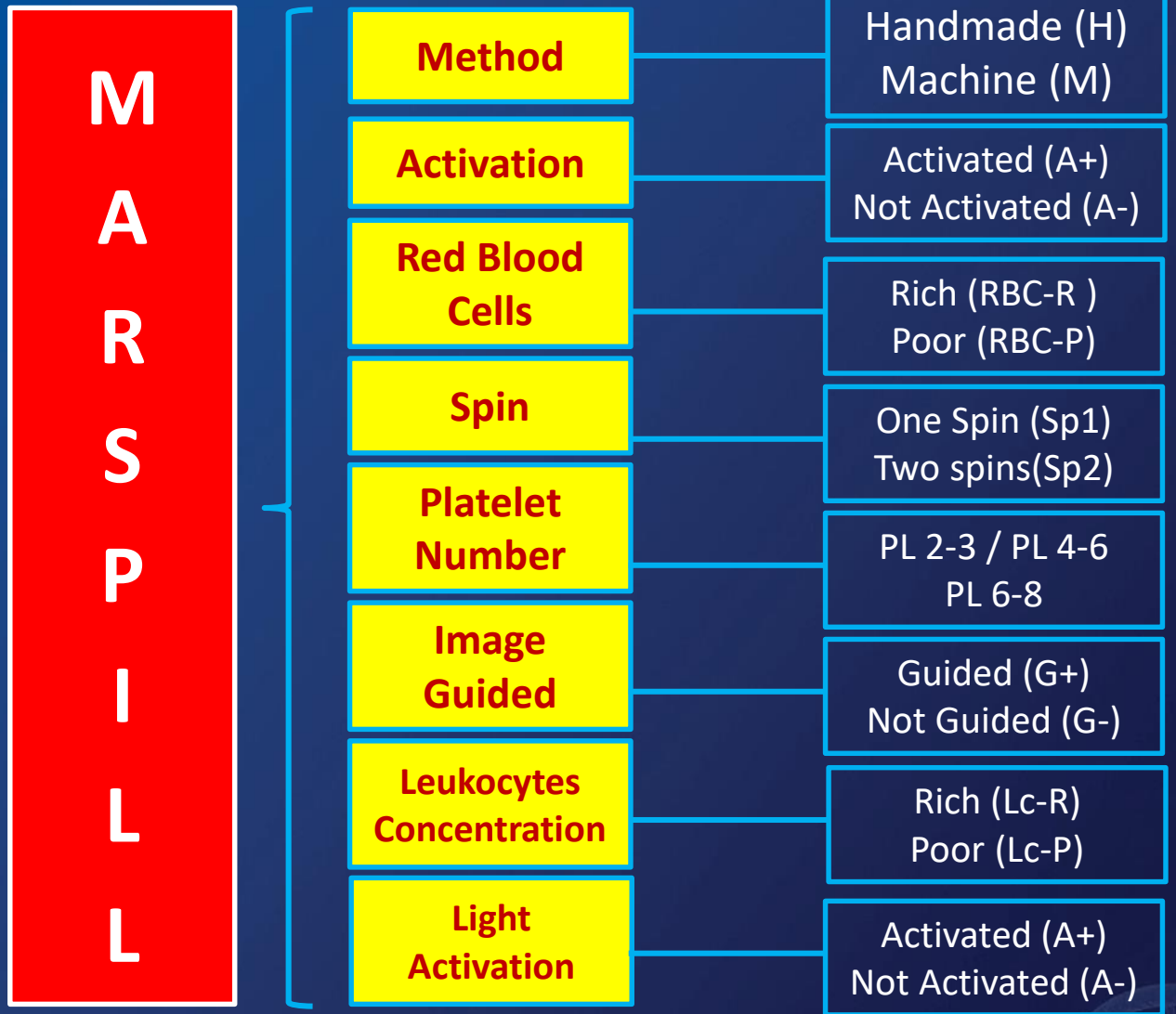

MARSPILL Classification

- The biological focus on **Buffy Coat (WHITE BLOOD CELLS LAYER)** collection as carrier of **Mononuclear Cells (Lymphocytes and Monocytes)** for tissue regeneration.

- There are three types of granulocyte named according to their staining characteristics in blood films. They are neutrophils,eosinophils and basophils.
- Mononuclear cells are divided into lymphocytes and monocytes.

Platelet Rich Plasma RICH in Mononuclear Cells (PRP- RMC)

Platelet Rich Plasma POOR in Mononuclear Cells (PRP- PMC)

MARSPILL Classification

- Example of a PRP production of clinical study through MARSPILL classification:

Standardized PRP according the New Classification

PRP-RMC (Platelet Rich Plasma, Rich in Mononuclear Cells)

M (H), **A** (A-), **R** (RBC-P), **S** (Sp^2), **P** (PL[4-6]), **I** (G+), **L** (Lc-R[2-3]), **L** (L-)

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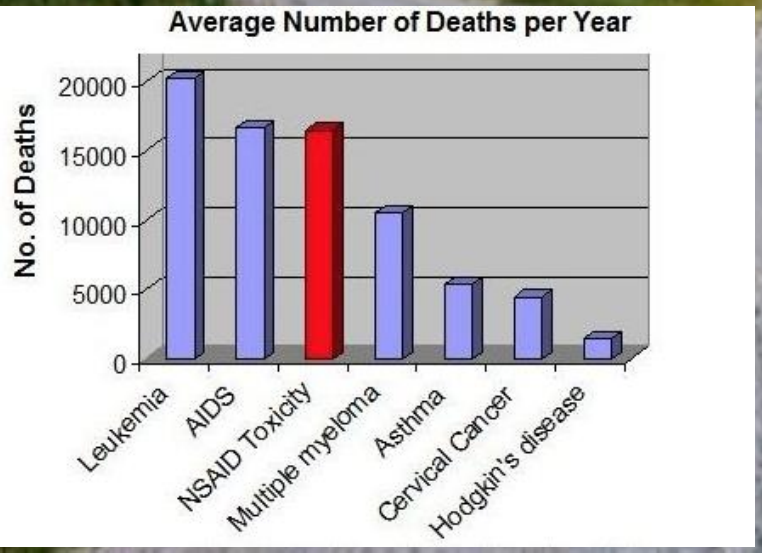
PLASMA RICO EM PLAQUETAS

CIRURGIAS




Obrigado!