



*Azienda Sanitaria  
"SS Antonio e Biagio e  
C. Arrigo"  
Alessandria*

**Concentrato Piastrinico per uso  
non Trasfusionale (CPunT).  
Indicazioni nelle patologie  
tendinee**

*Franco Maria Dallavalle*



SidEM  
Società Italiana  
di Emaferesi e  
Manipolazione  
Cellulare

**17<sup>o</sup>** Corso Nazionale  
di Aggiornamento  
**SidEM**




# CPunT nelle patologie tendinee

- Organizzazione del sistema trasfusionale in merito all'utilizzo del CPunT
- Analisi della letteratura esistente
- Nostra casistica
- Novità in letteratura



l'utilizzo degli **emocomponenti ad uso non trasfusionale** è letteralmente "esploso" in pochi anni, soprattutto nelle patologie ortopediche e le strutture trasfusionali si sono spesso trovate "pressate" nella produzione di emocomponenti con **indicazioni basate su esperienze poco consolidate** in letteratura talvolta frammentate in studi con scarsa numerosità di casi se non report dal carattere aneddotico.



L'esplosione ha generato il  
caos

- prodotti eterogenei
- patologie altrettanto eterogenee

- poco comparabili tra loro
- scarsamente confrontabili e standardizzabili
- con dati di *outcome* ottenibili con difficoltà

Legge 2019-2005  
Capo II.  
ORGANIZZAZIONE DEL SISTEMA TRASFUSIONALE  
Art. 5.

*b)* prestazioni di diagnosi e cura in medicina trasfusionale, organizzate in relazione alla complessità della rete ospedaliera pubblica e privata dell'ambito territoriale di competenza e comprendenti:

- verifica dell'appropriatezza della richiesta di sangue ed emocomponenti;
- promozione del buon uso del sangue;
- funzione di osservatorio epidemiologico per il territorio di competenza, ai fini dell'emovigilanza;

Analisi della Letteratura esistente

# Pub Med

*"platelet-rich plasma"*

6124 lavori

*"platelet-rich plasma tendon"*

162 lavori

*Indispensabile adottare criteri  
rigorosi per l'analisi della letteratura*



# Clinical Trial Controllati (CCT)

Studi nei quali sono stati presi in esame due campioni, il primo che esegue il trattamento previsto ed il secondo quale braccio di controllo.

# Clinical Trial Randomizzati

Studi che hanno lo scopo di valutare l'efficacia di un trattamento confrontandolo con un trattamento diverso oppure verso placebo.

Possono essere sia di tipo sperimentale che di tipo controllato

# Metaanalisi

E' un metodo statistico di sintesi delle informazioni raccolte da articoli inerenti uno stesso argomento che consente di avere una singola stima a partire dai risultati ottenuti da studi clinici diversi. E' una tecnica particolarmente utilizzata nella Evidence Based Medicine con la finalità di mettere a punto di linee guida cliniche e profili assistenziali.

# Cochrane Library

Si tratta di una iniziativa internazionale no-profit, nata con lo scopo di raccogliere, valutare criticamente e diffondere le informazioni relative alla efficacia ed alla sicurezza degli interventi sanitari.

Scopo è quello di aiutare i clinici a prendere decisioni bene informate riguardo all'assistenza sanitaria, preparando, mantenendo e garantendo l'accessibilità di aggiornamenti sistematici sugli effetti di svariati interventi di assistenza sanitaria.

# Ulteriori criteri

- Clinical Trial Controllati (CCT)
  - Clinical Trial Randomizzati (RCT)
  - Metanalisi
  - Revisioni della Cochrane Library
- 
- Pubblicazione dal 2009 in poi
  - Casistica comprendente più di 20 pazienti

# Patologie Tendinee

*"platelet-rich plasma tendon"* 163 lavori

Selezionati 12 lavori

- 8 RCT
- 3 CCT
- 1 Metaanalisi

Autori	Anno	Tipologia dello studio	argomento	F.up	n. paz.	risultati
Randelli P., et al.	2011	RCT	Cuffia dei rotatori	2 anni	53	OK
Gosens T., C., et al	2011	RCT	Epicondiliti	2 anni	100	OK
Hechtman K. S., Uribe J. W., et al.	2011	CCT	Epicondiliti	1 anno	30	OK
Radice F., et al.	2010	CCT	ACL	1 anno	50	OK
Vogrin M., et al.	2010	RCT	ACL	6 sett	ND	OK
Sheth U et al.	2012	Meta-analisi	Lesioni osteo tendinee	NA	NA	NEG
Silva A. Sampaio R.	2009	CCT	ACL	3 mesi	40	NEG
Nin J. R., et al.	2009	RCT	ACL	2 anni	100	NEG
Schepull T., Kvist J., et al	2011	RCT	Rottura del tendine d'Achille	1 anno	30	NEG
de Vos R. J., Weir A., et al.	2011	RCT	Tendinopatie del T. d'Achille	2 anni	54	NEG
de Jonge S., de Vos R. J., et al.	2011	RCT	Tendinopatie del T. di Achille	1 anno	54	NEG
de Vos R. J., Weir A., et al.	2010	RCT	Tendinopatia del T. di Achille	2 anni	54	NEG

Patologia	N° lavori	N° pazienti	Settimane FU
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Cuffia Rotatori	1	53	104
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Epicondiliti	2	130	78
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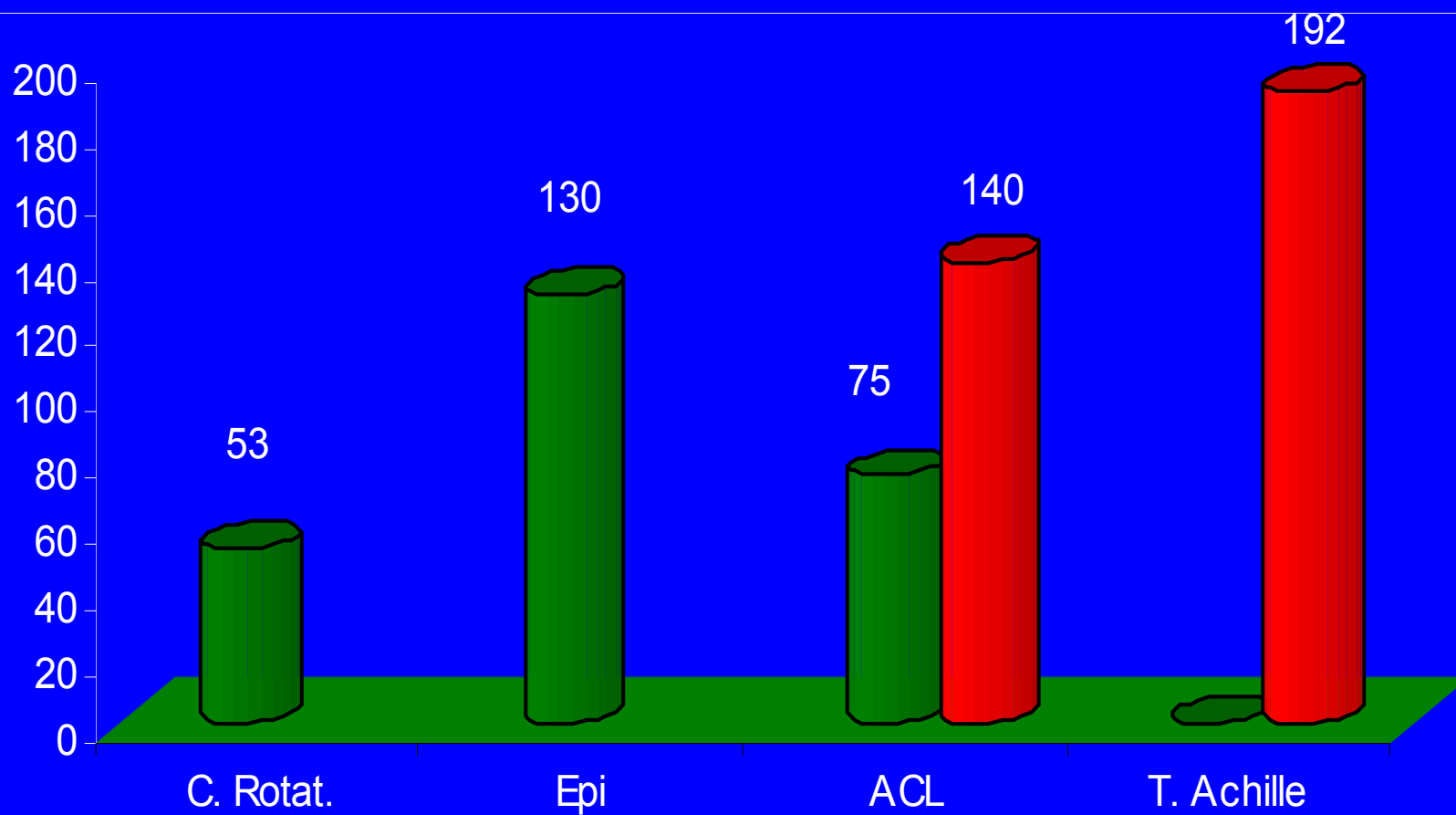
ACL	2	75	29
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ACL	2	140	58
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T. Achille	4	192	78
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## Distribuzione pazienti/lavori



## Comparison of Magnetic Resonance Imaging Findings in Anterior Cruciate Ligament Grafts With and Without Autologous Platelet-Derived Growth Factors

Fernando Radice, M.D., Roberto Yáñez, M.D., Vicente Gutiérrez, M.D., Julio Rosales, M.D., Miguel Pinedo, M.D., and Sebastián Coda, M.D.

CCT

**Purpose:** To determine whether the use of platelet-rich plasma gel (PRPG) affects magnetic resonance imaging (MRI) findings in the anterior cruciate ligament (ACL) graft during the first year after reconstruction. **Methods:** A prospective single-blinded study of 50 ACL reconstructions in 50 patients was performed. In group A (study group) PRPG was added to the graft with a standardized technique, and in group B (control group) no PRPG was added. An MRI study was performed postoperatively between 3 and 9 months in group A and between 3 and 12 months in group B. The imaging analysis was performed in a blind protocol by the same radiologist. **Results:** The mean heterogeneity score value at the time of MRI, assigned by the radiologist, was 1.14 in group A and 3.25 in group B. Both groups were comparable in terms of sex and age ( $P < .05$ ). The mean time to obtain a completely homogeneous intra-articular segment in group A (PRPG added) was 177 days after surgery, and it was 369 days in group B. Using the quadratic predictive model, these findings show that group A (PRPG added) needed only 48% of the time group B required to achieve the same MRI image ( $P < .001$ ). **Conclusions:** ACL reconstruction with the use of PRPG achieves complete homogeneous grafts assessed by MRI, in 179 days compared with 369 days for ACL reconstruction without PRPG. This represents a time shortening of 48% with respect to ACL reconstruction without PRPG. **Level of Evidence:** Level III, case-control study.

# Effects of a Platelet Gel on Early Graft Revascularization after Anterior Cruciate Ligament Reconstruction: A Prospective, Randomized, Double-Blind, Clinical Trial

M. Vogrin<sup>a</sup> M. Rupreht<sup>a</sup> D. Dinevski<sup>b</sup> M. Hašpl<sup>d</sup> M. Kuhta<sup>a</sup> M. Jevsek<sup>a</sup>  
M. Knežević<sup>c</sup> P. Rožman<sup>c</sup>

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ing (MRI). **Results:** After 4–6 weeks, the PG-treated group demonstrated a significantly higher level of vascularization in the osteoligamentous interface ( $0.33 \pm 0.09$ ) than the control group ( $0.16 \pm 0.09$ ,  $p < 0.001$ ). In the intra-articular

part of the graft, we found no evidence of revascularization in either group. **Conclusion:** Locally applied PG enhanced early revascularization of the graft in the osteoligamentous interface zone after ACL reconstruction.

RCT

## Anatomic ACL reconstruction: does the platelet-rich plasma accelerate tendon healing?

Alcindo Silva · Ricardo Sampaio

**Abstract** Recently, the use of hamstring tendons in anterior cruciate ligament repair has been increasing. However, tendon-to-bone healing occurs slowly, which can be a problem to an early return to sport activities. The use of growth factors from platelets seems to improve tissue healing. We enrolled 40 patients in a prospective study that were submitted to an anatomic reconstruction of the anterior cruciate ligament. Patients were sequentially enrolled into four groups: group A without platelet-rich plasma (PRP); group B with PRP in femoral tunnels at the end of surgery; group C with PRP in femoral tunnels at the end of surgery and intra-articular at 2- and 4 weeks after surgery; group D with PRP activated with thrombin in the femoral tunnels. All patients underwent magnetic resonance imaging of the knee 3 months after surgery to evaluate the signal intensity of the fibrous interzone (FIZ) in the femoral tunnels. We did not find any difference among the groups when comparing the signal intensity of the FIZ on magnetic resonance imaging.

CCT



## Has Platelet-Rich Plasma Any Role in Anterior Cruciate Ligament Allograft Healing?

Juan Ramón Valentí Nin, M.D., Ph.D., Gonzalo Mora Gasque, M.D., Ph.D.,  
Andrés Valentí Azcárate, M.D., Jesús Dámaso Aquerreta Beola, M.D., Ph.D., and  
Milagros Hernandez Gonzalez, M.D., Ph.D.

RCT

**Purpose:** The aim of this study was to evaluate and compare the clinical and inflammatory parameters with the addition of platelet-derived growth factor (PDGF) in primary anterior cruciate ligament (ACL) reconstruction with bone-patellar tendon-bone allograft. **Methods:** We prospectively randomized 100 patients undergoing arthroscopic patellar tendon allograft ACL reconstruction to a group in whom platelet-enriched gel was used ( $n = 50$ ) and a non-gel group ( $n = 50$ ). The platelet concentration was  $837 \times 10^3/\text{mm}^3$ , and the gel was introduced inside the graft and the tibial tunnel. Demographic data were comparable between groups. The mean follow-up was 24 months for both groups and included a history, clinical evaluation with the International Knee Documentation Committee score, radiographs, and magnetic resonance imaging. **Results:** There were no differences in the number of associated injuries. The results did not show any statistically significant differences between the groups for inflammatory parameters (perimeters of the knee and C-reactive protein level), magnetic resonance imaging appearance of the graft, and clinical evaluation scores (visual analog scale, International Knee Documentation Committee, and KT-1000 arthrometer [MEDmetric, San Diego, CA]). **Conclusions:** At this time, the therapeutic role of PDGF in ACL reconstruction remains unclear. The use of PDGF, on the graft and inside the tibial tunnel, in patients treated with bone-patellar tendon-bone allografts has no discernable clinical or biomechanical effect at 2 years' follow-up. More clinical studies will be needed to show the efficacy and use of these factors in daily practice in ACL reconstruction. **Level of Evidence:** Level I, prospective, randomized, double-blind

## SHOULDER

*This paper was awarded the Fukuda Prize for best presented paper at the International Congress of Shoulder & Elbow Surgery in Edinburgh, Scotland held September 5-8, 2010. The Journal of Shoulder and Elbow Surgery is honored to print the full article in this issue.*

# Platelet rich plasma in arthroscopic rotator cuff repair: a prospective RCT study, 2-year follow-up

Pietro Randelli, MD<sup>a,\*</sup>, Paolo Arrigoni, MD<sup>a</sup>, Vincenza Ragone, MEng<sup>a</sup>,  
Alberto Aliprandi, MD<sup>b</sup>, Paolo Cabitza, MD<sup>a</sup>

<sup>a</sup>Department of Scienze Medico Chirurgiche, University of Milano, IRCCS Policlinico San Donato, Milano, Italy

<sup>b</sup>Radiology Unit, University of Milano, IRCCS Policlinico San Donato, Milano, Italy

**Conclusion:** The results of our study showed autologous PRP reduced pain in the first postoperative months. The long-term results of subgroups of grade 1 and 2 tears suggest that PRP positively affected cuff rotator healing.

# Ongoing Positive Effect of Platelet-Rich Plasma Versus Corticosteroid Injection in Lateral Epicondylitis

## A Double-Blind Randomized Controlled Trial With 2-year Follow-up

Taco Gosens,<sup>\*,†</sup> MD, PhD, Joost C. Peerbooms,<sup>‡</sup> MD, Wilbert van Laar,<sup>‡</sup> and Brenda L. den Oudsten,<sup>†</sup> PhD

*Investigation performed at St Elisabeth Hospital, Tilburg, the Netherlands, and Haga Hospital, The Hague, the Netherlands*

**Conclusion:** Treatment of patients with chronic lateral epicondylitis with PRP reduces pain and increases function significantly, exceeding the effect of corticosteroid injection even after a follow-up of 2 years. Future decisions for application of PRP for lateral epicondylitis should be confirmed by further follow-up from this trial and should take into account possible costs and harms as well as benefits.



# The American Journal of Sports Medicine

## Autologous Platelets Have No Effect on the Healing of Human Achilles Tendon Ruptures

### A Randomized Single-Blind Study

Thorsten Schepull,\* MD, Joanna Kvist,<sup>†</sup> PhD, RPT, Hanna Norrman,<sup>†</sup> RPT, Marie Trinks,<sup>‡</sup> BS, Gösta Berlin,<sup>‡</sup> MD, PhD, and Per Aspenberg,\*<sup>§</sup> MD, PhD  
*Investigation performed at Linköping University, Linköping, Sweden*

**Background:** Animal studies have shown that local application of platelet-rich plasma (PRP) stimulates tendon repair. Preliminary results from a retrospective case series have shown faster return to sports.

**Hypothesis:** Autologous PRP stimulates healing of acute Achilles tendon ruptures.

**Study Design:** Randomized controlled trial; Level of evidence, 2.

**Methods:** Thirty patients were recruited consecutively. During surgery, tantalum beads were implanted in the Achilles tendon proximal and distal to the rupture. Before skin suture, randomization was performed, and 16 patients were injected with 10 mL PRP (10 times higher platelet concentration than peripheral blood) whereas 14 were not. With 3-dimensional radiographs (roentgen stereophotogrammetric analysis; RSA), the distance between the beads was measured at 7, 19, and 52 weeks while the patient resisted different dorsal flexion moments over the ankle joint, thereby estimating tendon strain per load. An estimate of elasticity modulus was calculated using callus dimensions from computed tomography. At 1 year, functional outcome was evaluated, including the heel raise index and Achilles Tendon Total Rupture Score. The primary effect variables were elasticity modulus at 7 weeks and heel raise index at 1 year.

**Results:** The mechanical variables showed a large degree of variation between patients that could not be explained by measuring error. No significant group differences in elasticity modulus could be shown. There was no significant difference in heel raise index. The Achilles Tendon Total Rupture Score was lower in the PRP group, suggesting a detrimental effect. There was a correlation between the elasticity modulus at 7 and 19 weeks and the heel raise index at 52 weeks.

**Conclusion:** The results suggest that PRP is not useful for treatment of Achilles tendon ruptures. The variation in elasticity modulus provides biologically relevant information, although it is unclear how early biomechanics is connected to late clinical results.

**Keywords:** Achilles tendon; platelet; platelet-rich plasma; tendon healing; biomechanics; roentgen stereophotogrammetric analysis



## Efficacy of Autologous Platelet-Rich Plasma Use for Orthopaedic Indications: A Meta-Analysis

Ujash Sheth, BHSc, Nicole Simunovic, MSc, Guy Klein, DO, Freddie Fu, MD, Thomas A. Einhorn, MD, Emil Schemitsch, MD, Olufemi R. Ayeni, MD, and Mohit Bhandari, MD, PhD

*Investigation performed at the Center for Evidence-Based Orthopaedics, Division of Orthopaedic Surgery, McMaster University, Hamilton, Ontario, Canada*

895 relevant citations.

**Conclusions:** The current literature is complicated by a lack of standardization of study protocols, platelet-separation techniques, and outcome measures. As a result, there is uncertainty about the evidence to support the increasing clinical use of platelet-rich plasma and autologous blood concentrates as a treatment modality for orthopaedic bone and soft-tissue injuries.

In conclusion, current evidence is insufficient to discern whether autologous blood concentrates provide a clinical benefit



Dove andare?

## Raccomandazioni classificate per **gradi**

espressi in

in funzione

**Num. Arabi (1,2,3)**

**forza**

**Lettere (A,B,C)**

**evidenza**

Il livello della prova o livello della evidenza è strettamente legato alla tipologia dello studio. La forza della raccomandazione che scaturisce dal livello della evidenza, si riferisce alla probabilità che la riproduzione nella pratica clinica della procedura documentata dallo studio determini un miglioramento dello stato di salute: tale probabilità sarà tanto maggiore quanto "migliore" è lo studio

Evidenza	Livello della prova	Grado della raccomandazione	
Metaanalisi di RCTs	1a	A	forte
Almeno 1 RCT	1b		
Almeno 1 studio clinico ben condotto senza randomizzazione	2a	B	discreta
Almeno un altro tipo di studio clinico ben disegnato quasi sperimentale	2b		
Almeno uno studio clinico ben disegnato non sperimentale	3		
Opinioni di comitati di esperti o esperienze di autorità riconosciute	4	C	debole

# Gradi di raccomandazione CPunT in patologie tendinee (raccomandazioni SIMTI)

*Trattamento infiltrativo delle epicondiliti*

**Grado di raccomandazione: 1B**

*Trattamento delle lesioni della cuffia dei rotatori*

**Grado di raccomandazione: 2B**

*Trattamento delle lesioni del legamento crociato anteriore*

**Grado di raccomandazione: 2B**

*Trattamento delle lesioni del tendine di Achille*

**Grado di raccomandazione: 3**

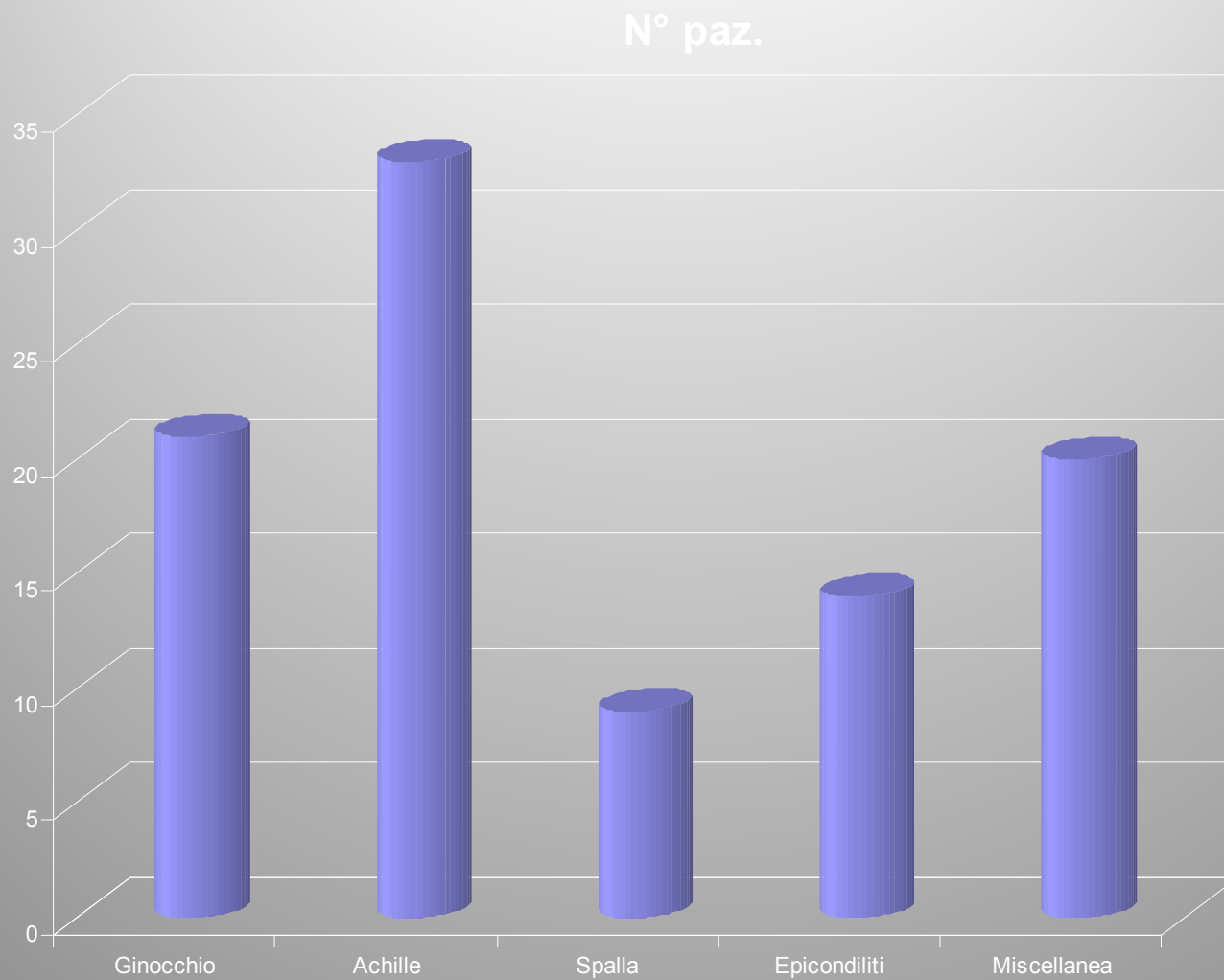
*Altre patologie osteo-muscolari ligamentose*

**Grado di raccomandazione: 3**

## Casistica SIT Alessandria (2011- 30/08/2012)

		età		Dosi CPunT	
	N° paz.	media	ds	Media	ds
Patologie Tendinee Ginocchio	21	45.88	20.87	2.56	1.63
Patologia Tendine Achille	33	52.14	13.15	2.83	1.26
Patolologia Tendinea Spalla	9	56.11	11.88	2.56	0.53
Epicondiliti	14	50.93	7.31	2.14	0.94
Miscellanea	20	54.23	19.08	2.46	0.75
Media generale	97	51.86		2.51	
$\chi^2$ per medie e ds		0.318		1.00	

## Casistica Alessandria 01/01/2011 - 30/08/2012







Siamo ai blocchi di partenza!



Novità emergenti

**Administrations of peripheral blood CD34-positive cells contribute to medial collateral ligament healing via vasculogenesis**

[Tei K.](#), [Matsumoto T.](#), [Mifune Y.](#), [Ishida K.](#), [Sasaki K.](#), [Shoji T.](#), [Kubo S.](#),  
[Kawamoto A.](#), [Asahara T.](#), [Kurosaka M.](#) and [Kuroda R.](#)

Stem Cells 2008 26:3 (819-830)

Conclusions

*Our data strongly suggest that local transplantation of circulating human CD34+ cells may augment the ligament healing process by promoting a favorable environment through neovascularization.*

## **Enhancement of tendon-bone osteointegration of anterior cruciate ligament graft using granulocyte colony-stimulating factor.**

Am J Sports Med. 2008 Aug;36(8):1519-27. Epub 2008 Apr 15.  
[Sasaki K](#), [Kuroda R](#), [Ishida K](#), [Kubo S](#), [Matsumoto T](#), [Mifune Y](#),  
[Kinoshita K](#), [Tei K](#), [Akisue T](#), [Tabata Y](#), [Kurosaka M](#).

### **CONCLUSION:**

*This study demonstrated that a local application of granulocyte colony-stimulating factor-incorporated gelatin significantly accelerates bone-tendon interface strength via enhanced angiogenesis and osteogenesis.*

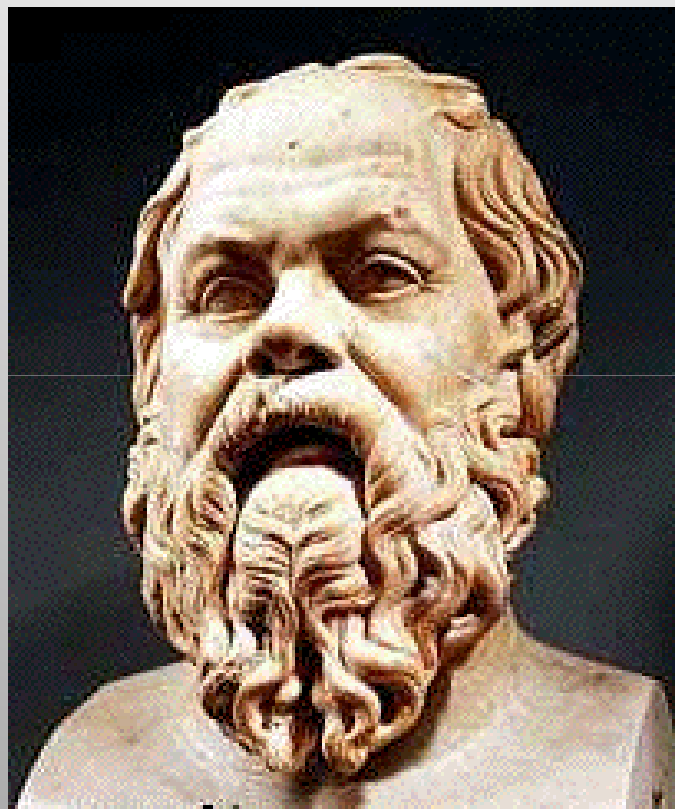
## Bone marrow-derived cell mobilization by G-CSF to enhance osseointegration of bone substitute in high tibial osteotomy

A. Marmotti · F. Castoldi · R. Rossi ·  
S. Marengo · A. Risso · M. Ruella · A. Tron ·  
A. Borrelli · D. Blonna · C. Tarella

*Conclusions* Although the limited number of patients does not allow firm conclusions, the study suggests that G-CSF can be safely administered preoperatively in subjects undergoing opening-wedge high tibial valgus osteotomy; in addition, the clinical, radiographic and CT monitoring indicate that G-CSF and/or mobilized BMCs may hasten bone graft substitute osseointegration.

*Level of evidence* I.

# Sappiamo di non sapere?



Roberto Guaschino



Laura Mazzucco  
Valeria Balbo