



Monocyte New Kid on Block

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Abstract

Biologics has come a long way from visco supplementation and microfracture to oral supplements and now Orthobiologics. They are now in clinical reality

Monocytes is the new kid on the block.

The function uses and method to harvest monocytes with charged gravity assisted selected filtration is discussed.

This is in its early stages and more work needs to be done to look into long term outcomes.

Literature is presented to better understand monocytes and process of harvesting.

Keywords: Monocyte; New Kid; Block

Introduction

Joint muscle and tendon pain frequently cause disability and affect life quality [1].

Regenerative medicine is becoming a popular approach to fight osteoarthritis: the use of patients' own cells can slow down cartilage degeneration through trophic effects and immunomodulatory properties [2].

Regenerative medicine can be either a conservative approach to prevent or delay a major surgical intervention, or a surgical support to accelerate tissue regeneration and reduce post-operative pain.

Healing process is helped by Orthobiologics products It minimises the severity of degenerative disease. The procedure can be performed as an office based [3].

This is now a reality and is available to be used in practice [4].

Visco-supplementation was the first biologic and was mechanical in nature. It was effective for weeks only. [5,6].

Microfracture a form of blood stream biologics with glucosamine and peptides as an oral supplement was made available [7,8].

The first autologous product was PRP and a 2nd generation Orthobiologics [9,10].

Bone marrow concentrate (BMC) and stromal vascular fraction are the third-generation biologics.

In some cases, PRP was detrimental to cartilage however when leukocyte poor products were used the results were encouraging [11,12].

Leukocyte poor PRP have better outcomes when repeated doses are used [13].

PRP with a combination of plant origin collagen (Tendo-ACP) have excellent outcome in cuff and muscle tears and tendon pathologies of Patella and Achilles tendon. This is a non surgical procedure and acts as a scaffold with PRP initiating repair [14].

The new kid on the block is monocyte therapy. These were used in management in stroke and burns patient, but a role has been identified in Orthopaedics [15-20].

Monocytes play a role in both the inflammatory and anti-inflammatory processes that take place during an immune response. Monocytes, and their abundance or lack thereof, can provide significant identifying clues for the diagnosis of several hematologic disorders and inflammatory and immune disorders [15-20].

These cells participate in vascular remodelling and structural repair of muscle and bone.

Bone marrow and peripheral blood are well characterized and derivative tissue products are well known in regenerative medicine Bone marrow exploits the regenerative potential of mesenchymal stem cells Peripheral blood is renowned for the PRP (Platelets-rich Plasma) that exploit the release of growth factors from the platelets [15-20].

Monocytes/macrophages and lymphocyte populations exert a crucial role in arterio- arterial collateral growth, promoting vascular growth through paracrine mechanisms, including extracellular matrix remodelling, endothelial progenitor cell recruitment, trophic support for neo-endothelium and finally, the promotion of de novo arteriogenesis.

Moreover, recent findings about new monocytes functions suggest that their role is yet to be fully understood [15-20].

Bone marrow cells are immature progenitors with great plasticity and platelets are full of pre-made growth factors, but PBMCs convey a more important job managing and promoting regeneration instead of merely do it PB-derived cells do not have less potential than BM-derived cells neither more potential than platelets, but we can think them as the missing link between two cell therapies that already proved their efficacy in many clinical settings.

Both PBMCs and PRP are obtained with just a blood draw.

PRP has become fashionable for its supportive role in tissue healing through the release of growth factors, but its biological role is controversial due to the extreme heterogeneity of PRP preparation.

The Clinical Evidence Behind Biologic Therapies Promoted at Annual Orthopaedic Meetings: A Systematic Review Christopher J. Hadley, B.S. Weilong J. Shi, M.D. Hamadi Murphy, M.D. Fotios P. Tjoumakaris, M.D. John P. Salvo, M.D. Kevin B. Freedman, M.D., M.S.C.E.

The monocytes are cell sorted with selective charged membrane filtration, from one's own blood and are showing exceptional results in tendon injuries, focal cartilage defect and bone consolidation delays.



Figure 1: TISS'YOU Srl www.tissyou.com.

After Monocytes processing, the final blood sample is enriched in mononuclear cells and significantly depleted in granulocytes.

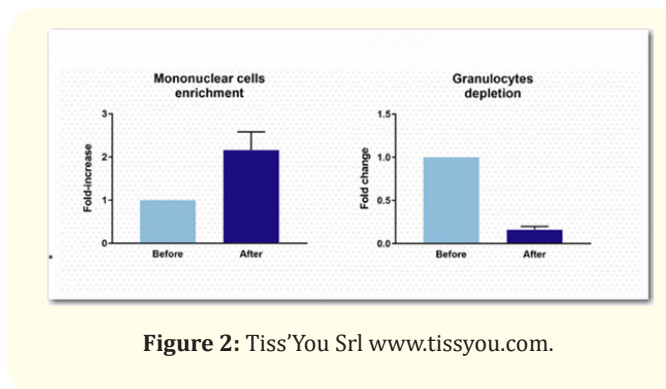


Figure 2: TISS'YOU Srl www.tissyou.com.

The process for acquiring monocytes is selective filtration by gravity, a gentle processing of cells reproducible and not operative dependent with maximal sterility. (Tiss'You Srl www.tissyou.com).

These cells, easily obtainable from a blood withdraw, can ameliorate pain and functional symptoms through immunomodulation and may be more suitable for OA treatment in athletes [21].

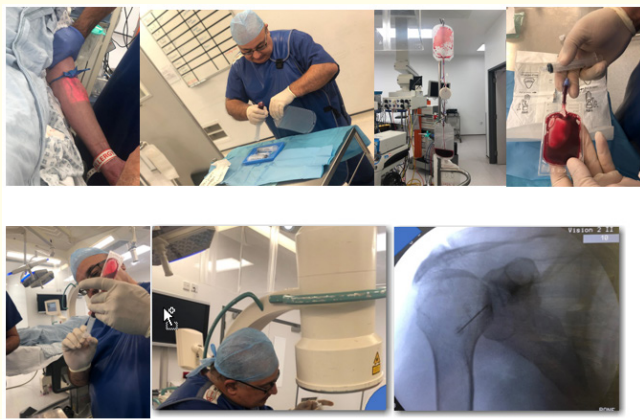


Figure 3: Process of selective filtration and clinical application

The process is quick and has its benefits

Centrifuge-independent procedure that limits cell stress

Closed-loop system with minimization of contamination risks

Fast, reproducible, and versatile procedure in different clinical indications.

Conclusion

Monocytes has regenerative potential Selective recovery of white blood cells from peripheral blood with red blood cell depletion Enrichment of mononuclear cells from peripheral blood with regenerative potential Significant reduction of granulocytes with pro-inflammatory activity [15-20].

The gross pathology does not change but most patients become asymptomatic with less pain or no pain at all.

This process is in its infancy I have had reproducible results in my practice have done 4 cases all shoulder pain and have had symptomatic relief in all patients.

Patient selection is vital.

Areas of application

- BONE VASCULAR PATHOLOGIES
- CONSOLIDATION DELAYS
- TENDON INJURIES
- FOCAL CARTILAGE INJURIES

Source Tiss'You Srl www.tissyou.com.

Regenerative medicine is a key element in the prevention program to ameliorate quality of life and OA symptoms However, a multimodal approach is needed; prevention must also involve physical therapies for neuromuscular control to prevent injuries and rehabilitation protocols after injuries and interventions. Physiotherapy can also exert a role in boosting regenerative medicine [22]. even if little can be found in the scientific literature and further studies are necessary to enlighten this topic.

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