

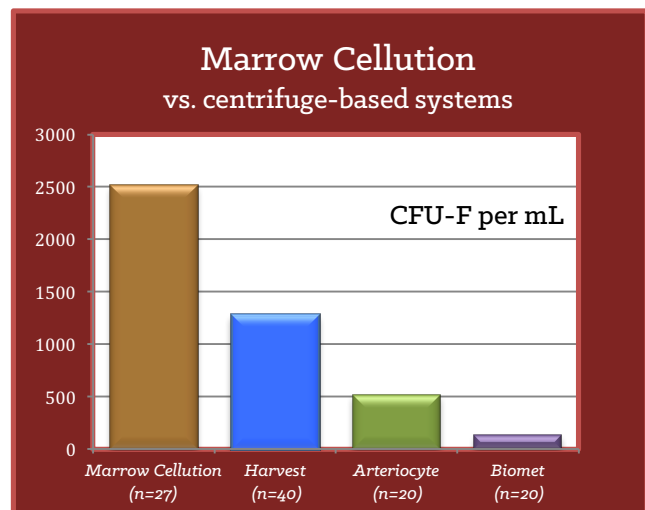
It's NOT a biopsy needle!

Occasionally, the **Marrow Cellution™** Concentrator is mistakenly compared to an inexpensive biopsy needle. Jamshidi developed his needle in the 1970's for diagnostic purposes. Its design was predicated on drawing very small volumes from multiple insertion points. This technique was subsequently modified for grafting by limiting the insertion points and drawing larger volumes (60-240 mL). The aspirate was then reduced through centrifugation due to peripheral blood dilution. This technique delivers low numbers of fibroblastic-like stem cells and is often augmented with expensive allograft alternatives to complete the biologic profile for tissue regeneration.

Unlike a biopsy needle, the **Marrow Cellution™** Concentrator includes the ability to support MIS marrow harvest, cancellous bone dowel harvest and guide wire placement using the same device kit. Trephine and push rods are included to facilitate percutaneous harvesting of cells and cancellous bone for minimally invasive delivery in many Orthopedic surgeries, ranging from spine to sports to trauma. Best of all, utilization of this technology is tied to published outcome studies that require the cell levels routinely delivered by **Marrow Cellutions™**.¹⁻⁴

The Patent Pending **Marrow Cellution™** Concentrator is a unique technology that produces significantly larger numbers of osteoprogenitor cells, very small embryonic-like stem cells (VSELS), and mesenchymal stem cells (MSC's) required for tissue regeneration or fusion.⁵⁻⁶

The accepted research standard for measuring regenerative capability is the Colony Forming Unit - fibroblast (CFU-f). **Marrow Cellution™** delivers up to 20 times as many MSC's than the leading BMAC (bone marrow aspirate concentration) systems.⁵⁻⁶ The **Marrow Cellution™** design outperforms a Jamshidi biopsy needle by 8 to 50 times, based on clinical results.⁷



Why such a big difference?

Leveraging smart engineering and principles of fluid dynamics, the **Marrow Cellution™** Concentrator has been designed to harvest and deliver a large number of MSC's, VSELS, osteoprogenitor cells and the complete array of Growth Factors with a single insertion, without ever leaving the sterile field. Independent clinical tests at multiple centers have demonstrated the effectiveness and reproducibility of the **Marrow Cellution™** design.

The Marrow Cellution™ Concentrator *Concentrate at the Point of Draw*

¹ Hernigou et al. Treatment of Osteonecrosis with Autologous Bone Marrow Grafting. Clinical Orthopaedics and Related Research. Number 405, pp 14-23.
² Hernigou et al. Percutaneous Autologous Bone-Marrow Grafting for Nonunions – Influence of the Number and Concentration of Progenitor Cells. The Journal of Bone and Joint. Volume 87-A No 7. July 2005.
³ Yamada et al. Hybrid Grafting Using Bone Marrow Aspirate Combined with Porous β -tricalcium Phosphate and Trephine Bone for Lumbar Posterolateral Spinal Fusion: a Prospective, Comparative Study versus Local Bone Vrafting. Spine (Phila Pa 1976). 2012 Feb 1;37(3).
⁴ Gan Y et al. The clinical use of enriched bone marrow stem cells combined with porous beta-tricalcium phosphate in posterior spinal fusion. Biomaterials, 2008, 3973-3982
⁵ Purita, J. Harrell D. Novel Technology to Increase Concentrations of Stem and Progenitor Cells in Marrow Aspiration. 2016.
⁶ Scarpone, M, et al. Marrow Cellution™ Bone Marrow Aspiration System and Related Concentrations of Stem and Progenitor Cells. 2015.
⁷ Hegde V, Shonuga O, Ellis S, et al. A prospective comparison of 3 approved systems for autologous bone marrow concentration demonstrated nonequivalency in progenitor cell number and concentration. Journal of Orthopaedic Trauma. 2014;28:591-8.