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Healing parenchyma with mesenchyma: A new therapeutic paradigm

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Nature heals damaged specialized tissues by mending torn tissues, feeding hungry tissues, containing lesive processes and replacing damaged units. These self healing functions are carried out by a developmentally defined group of cells -the stromal cells- comprised by a hetereogeneous population of fibroblasts, endothelial cells, tissue resident mononuclear and progenitor cells. Stromal cells share common essential functions and processes, they also share a common mesenchymal ancestry and early developmental stages, as they remain located within the three-dimensional perivascular structure of different tissues. Indeed, the fact that the above stromal cell functions adapt to resident tissue specificicity unique properties holds true, as it is true the fact that such specificities have been constitutively determined by the surrounding parenchyma and they are not present during earlier differentiation stages. Personal observations and literature review provide ample evidence that stromal mesenchymal cells loose their tissue-specific functions following tissue dissociation when cultured *in-vitro* under non-specific media conditions; they regain their tissue-specific functions in response to their own specific culture media or when returned to their initial tissue source (orthotopic implantation); and express different tissue-specific functions when exposed to other tissue-specific media conditions or after heterotopic implantation. If so, then, a therapeutically useful question is: If such reparative functions were retained by stromal cells after tissue dissociation, cell selection and concentration:

Would these stromal cells express their essential reparative properties when exchanged among different muscle-skeletal tissues? For instance, would the abundant, expendable adipose derived stromal cells exert a quantifiable therapeutic effect when implanted in let's say muscle, or bone, or cartilage? Would they display reparative functions immediately upon engraftment or rather undergo in-vivo reprogramming (dedifferentiation to an earlier stage and redifferentiation) into tissue-specific supporting cells? If instead, these stromal cells did not express their essential reparative functions when delivered heterotopically: Would it be a common, practical, method to then obtain tissue specific stromal cells which could be reliably engrafted and exert a therapeutic effect following orthotopic implantation? Certainly, stromal cells occupy analogous hystological locations across different muscle-skeletal tissues, and remain integrated into tissues by common anchors, matrix structures, and intercellular bounds. This presentation attempts at unveiling answers to the above questions, thus supporting a new therapeutic paradigm: The Biospace of Cell Surgery evolves as a regulatory friendly therapeutic strategy enabled by surgical procurement of autologous cells, both terminally differentiated and progenitor, minimally processed, and immediately delivered to the same patient to exert the mesenchymal cell's therapeutic capacity for muscle-skeletal tissue disorders.

Biography

Ramon Llull obtained his medical degree with honors at University of Navarra, Spain in 1988. His research on immunological aspects of musculo-skeletal tissue transplantation was awarded the Henry Christian Memorial Award for Excellence in Research from the Association of American Physicians, and sponsored by the Plastic Surgery Educational Foundation and the American Association for Hand Surgery. He subsequently entered a plastic surgery clinical training at the University of Pittsburgh residency program. During his training was awarded the 1994 young investigator award of the International Transplantation Society for his continuing studies on musculo-skeletal tissue immunology. He is founder of Stemsource Inc., and holds with Dr. Katz while at the University of Pittsburgh, several US and international patents related to tissue engineering, device biotechnology and stem cells. He is Joint founder, First President and Past-Chairman of the Board of Directors of the International Federation of Adipose Technologies and Science (IFATS). He is member of the Educational Committee of the Tissue Engineering Society, International. In 2009, he enabled the first cell vaccine for brain tumors in Europe as a consultant of Northwest Bio therapeutics (NWBT), a US based Biotechnology Company focused on cancer immunotherapy. Currently, he is founder of The GID Group, Ltd, and holds several patents describing cell surgery methods, devices and sources.

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