

# 3<sup>rd</sup> International Conference and Exhibition on Cell & Gene Therapy

October 27-29, 2014 Embassy Suites Las Vegas, USA

## Human development as a template for defining tissue-specific stem and progenitor cells

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Tissue-specific stem cells (TSSCs) are specified during human development in carefully orchestrated processes that balance active proliferation with conservation of long-term potential for self-renewal and differentiation. Deconstruction of these processes, as well as delineating possible methods of mimicking them, represents critical landmarks in our progress toward generating and manipulating TSSCs *in vitro*. However, in many human tissues both the regulatory mechanisms and the phenotypic identity of stem and progenitor cells remain elusive. Novogenix Laboratories was founded in 2009 to help facilitate identification and molecular definition of TSSCs during human development. Recently, in collaboration with Dr. Denis Evseenko at UCLA, this paradigm is applied to identify and characterize the earliest cartilage-committed progenitor cells during human development. By coupling gene expression analysis with laser capture microdissection, a putative cell surface phenotype for cartilage progenitor cells was defined; this phenotype was confirmed with cell sorting, immunohistochemistry and functional assays. Moreover, in depth analysis of the gene expression data identified the Leukemia Inhibitory Factor (LIF) and Transforming Growth Factor (TGF)- $\beta$  pathways as specifically enriched in undifferentiated cartilage cells. Application of LIF and TGF- $\beta$  to mesodermal progenitor cells derived from human pluripotent stem cells allowed the efficient isolation of cartilage progenitor cells that differentiated into cartilage-like tissue. Currently, the joint reparative capacity of these cells *in vivo* in both small and large animal models is being tested. Overall, we strongly believe that identification and characterization of TSSCs as they are specified during human development will enable more rapid progress of cell-based therapies and regenerative medicine.

### Biography

Ben Van Handel received his PhD from UCLA in 2011. He is currently the Executive Director of Novogenix Laboratories, a scientific services company he co-founded in 2009. He has published 20 papers in reputed journals including *Cell*, *Cell Stem Cell*, *Stem Cell Reports*, *Developmental Cell* and *Blood*. He is passionate about supporting the progress of stem cell research and regenerative medicine to the clinic.

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