27th Stem Cell Club and Singapore Stem Cell Consortium Meeting

(Organised by the Stem Cells Research Singapore Website Committee http://www.stemcell.edu.sg)

Date: September, 21st, 2007 (**Friday!**)
Time: 5:00 pm
Venue: Aspiration, Level 2M, Matrix

Host: Sohail Ahmed

Time	Title	
5:00-6:00	**Stem cell properties in skeletal muscles: emergence in the embryo and regeneration in the adult**	**Shahragim Tajbakhsh** *Pasteur Institute*
6:00 -	**Wine and Cheese (at Invitrogen facilities, 4th floor Chromos)**	

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Stem cell properties in skeletal muscle: emergence in the embryo and regeneration in the adult

Shahragim Tajbakhsh
Stem Cells & Development, Dept. of Developmental Biology, CNRS URA 2578, Pasteur Institute, 25 rue du Dr Roux, Paris 75015, France.

During embryonic development and post-natal growth of vertebrates, skeletal muscle is formed in multiple waves. Stem/progenitor cells originating in the somites participate in these multiple waves of myogenesis. *Pax3* as well as *Pax7* expression marks these stem/progenitors throughout development. Expression of Pax genes is followed by that of the muscle regulatory factors (MRFs) *Myf5*, *MyoD* and *Mrf4*. These MRFs commit the progenitor cells to myogenic pathway.

Above studies also indicate that satellite cells, presumed stem cells that contribute to post-natal myogenesis, derive from the *Pax3/7* expressing stem cell pool in the embryo. The lineage relationship between the skeletal muscle stem/progenitor cell population that assures multiple waves of myogenesis in the embryo and their relationship to satellite cells are not clear. Moreover, Pax7 is necessary for the survival or maintenance of satellite cells, since in *Pax7* null mice the number of satellite cells diminish after birth.

Emerging evidence suggests that the satellite cell population constitutes a heterogenous pool of stem and progenitors. The stem cell properties of satellite cells were investigated by examining asymmetric cell divisions. We observe asymmetric segregation of the cell fate determinant Numb, transcription factors Pax7, MyoD and Myogenin, as well as the co-segregation of template DNA strands to one daughter cell during cell division. These studies are complemented by functional studies involving the engraftment of satellite cells *in vivo* to examine the ability of satellite cells to contribute to regenerating skeletal muscles.

References:

Kassar-Duchossoy, L., Gayraud-Morel, B., Gomès, D., Rocancourt, D., Buckingham, M., Shinin, V., Tajbakhsh, S. (2004). *Mrf4* determines skeletal muscle identity in *Myf5 :MyoD* double mutant mice. Nature 431: 466-471.

Kassar-Duchossoy, L., Giacone, E., Gayraud-Morel, B., Jory, A., Gomès, D., Tajbakhsh, S. (2005). Pax3/Pax7 mark a novel population of primitive myogenic cells during development. Genes & Dev. 3:1426-1431.

Tajbakhsh, S. (2005). Skeletal muscle stem and progenitor cells: Reconciling genetics and lineage. Exp Cell Res 306: 364-72.

Shinin, V., Gayraud-Morel, B., Gomes, D., and Tajbakhsh, S. (2006). Asymmetric division and cosegregation of template DNA strands in adult muscle satellite cells. *Nat Cell Biol* 8, 677-82.