BIOENGINEERING SEMINAR

“Molecular Basis of Limb Loss in Snakes”

Friday – September 16, 2016 – 15:00
EPFL – room AI 1 153

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Abstract

The evolution of body shape in vertebrates is tightly coupled to changes within cis-regulatory sequences, yet most examples are associated with relatively subtle morphological alterations. We identified snake-specific sequence changes in an otherwise highly conserved enhancer that are critical for limb development. The in vivo activity pattern of the enhancer is conserved across a wide range of vertebrates from fish to human, but not in snakes. CRISPR/Cas9-mediated replacement of the mouse enhancer with the ortholog from human or fish results in normal limb development. In contrast, replacement with a snake ortholog causes severe limb truncation. Synthetic resurrection of a transcription factor binding site that was specifically lost in the snake lineage restored full enhancer function and rescued limb formation. Our results provide an example of regulatory sequence changes associated with a major body plan transition and demonstrate the conservation of enhancer function over vast evolutionary distances.

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