

Transcription factors, traveling across the surface... and beyond

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Homeoproteins represent a family of a few hundred transcription factors first identified through their developmental functions. However, they are also expressed in the adult where they serve several physiological processes.

Most homeoproteins contain two conserved regions allowing intercellular transfer, a rather unexpected finding that led to the proposal that homeoproteins are not only cell autonomous transcription factors but also non-cell autonomous signaling entities.

Several examples of this novel signaling mechanism will be presented from the formation of compartments in the developing nervous system to the regulation of physiological plasticity in the post-natal and adult cerebral cortex.

The fact that homeoproteins are internalized by live cells suggests that blocking or, alternatively, enhancing their capture through pharmacological or genetic manipulations could be of therapeutic interest. This will be illustrated with animal models of neurological and psychiatric diseases.

Finally, it will be shown that these novel signaling proteins, at least for the few that have been studied, display several non-cell autonomous modes of action that include the regulation of protein translation and gene transcription, plus the control of the chromatin epigenetic status.

One recent review

Alain Prochiantz & Ariel A. Di Nardo. Homeoprotein Signaling in the Developing and Adult Nervous System. *Neuron* **85**: 911-925, 2015