2016-99D NELL-1 Regulates Neurogenesis and Nervous System Function

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Technology description

UCLA researchers in the Division of Plastic and Reconstructive Surgery at the Geffen School of Medicine and researchers at the School of Dentistry have identified neural EGFL Like 1 (Nell-1) protein as an essential molecule involved in neurogenic development and nervous system functional regulation.

Neural EGFL Like 1 (Nell-1) is a multimeric secretory protein involved in craniofacial and appendicular skeletogenesis, as well as in osteogenesis facilitated by Runx2, Wnt and MAPK signaling. Nell-1 consists of several structural motifs, including a secretory signal peptide, an N-terminal thrombospondin-1-like (TSPN) module, several von Willebrand factor-like (vWF) repeats with cysteine-rich domains, and six epidermal growth factor (EGF)-like repeats. A combination of all these structural features suggests specific ligand receptor interactions may be necessary for Nell-1 function.

Recent evidence has shown elevated Nell-1 expression in developing and adult neural systems, and Nell-1 potentially plays a critical role in neurodevelopment. Autism spectrum disorder (ASD) includes a range of neurodevelopmental disorders that are often observed as impaired social interaction and communication, as well as repetitive behavior. It is one of the most prevalent neurodevelopmental disorders among children in the U.S. Although anti-depressant drugs are sometimes prescribed for autistic individuals, the current standard treatments are based on intensive educational programs.

Researchers at UCLA have identified a ligand receptor interaction required for Nell-1-mediated osteogenesis, neurogenic development, and nervous system functional regulation. This interaction provides the basis for definitive clinical diagnosis in postnatal individuals, as well as fetal abnormal screening, for neurodevelopmental abnormalities, such as autism spectrum disorder (ASD). Most importantly, Nell-1 may be a potential drug candidate to directly treat patients suffering from neurodevelopmental abnormalities at the molecular level.

Application area

Biomarker for postnatal clinical diagnosis and fetal screening for neurodevelopmental diseases (i.e. ASD)

Therapeutic drug to treat neurological disorders and osteoporosis

Advantages

First therapeutic drug for treating neurodevelopmental diseases
Soluble protein may be more bioavailable

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