Trans-Neuronal Tag for Mapping and Modulating Neural Circuits

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Technology description

Market Opportunity

The U.S. Federal government committed $4.5 billion dollars to the BRAIN initiative, because deciphering complex neural circuits underlying mental disorders such as schizophrenia and depression is key to developing targeted therapies. Available treatments for these disorders lack specificity and therefore cause severe side effects in patients. Retrograde transcellular viral tracers are powerful tools for mapping the inputs to specific neuronal populations in brain circuits. However, anterograde viral tracers for identifying target neurons downstream of synaptic outputs remain under-developed.

USC Solution

USC scientists have demonstrated that anterograde transport of adeno-associative virus (AAV) from pre-synaptic neurons can effectively and specifically drive transgene expression in postsynaptic neurons. This technique allows identification and manipulation of second-order neuronal projections in the brain.

Application area

Research tool for identifying specific components of neural circuits involved in behavior and disease
Tool for targeted delivery of viral-based gene therapy

Advantages

First technique demonstrating anterograde transneuronal propagation of AAV virus
Non-toxic tool conclusively maps neural circuits to reveal brain structure
Long term, robust expression of viral transgenes

Institution

University of Southern California

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com