Docket #: S08-242

Biomarkers of Aging and Cognitive Function

A team of Stanford researchers have identified a panel of intercellular signaling protein biomarkers that form an aging signature in healthy individuals. One marker, the chemokine CCL11, is specifically correlated with reduced neurogenesis and impaired learning and memory. The panel of proteins could be used to determine an individual's physiological or biological age (rather than the chronological age) by a simple blood draw. In addition, this approach could enable early detection and monitoring of age-related disorders, such as Alzheimer's disease, stroke, cardiovascular disease, and cancer. Finally, the functional study of age-related markers that are changed due to a disease may be helpful in the development of new drug targets and treatments.

Stage of Research
The inventors have:
--> identified a panel of 10 human proteins that are robust predictors for modeling age;
--> demonstrated that the “old” systemic environment decreases synaptic plasticity and impairs contextual fear condition and spatial learning and memory in young mice; and
--> performed mouse studies to show CCL11's effects on neurogenesis, learning and memory

Applications

- **Diagnostic** - determining levels of aging biomarkers may help with early detection and monitoring of age-related diseases, such as Alzheimer's disease, stroke, cardiovascular disease, and cancer
- **Drug development:**
    - identifying new secreted protein targets for age-related diseases

    - monitoring effects of therapy

Advantages

- **Unique diagnostic tool** - there are currently no biomarkers for healthy aging available
- **Blood-based markers** - relevant markers are panel of signaling proteins that can be easily measured in a blood sample

Publications

- S. A. Villeda et al. (2011). "The ageing systemic milieu negatively regulates neurogenesis and cognitive function" *Nature*. 2011 Sep 01; 477(7362):90-4.
- "The Brain's Fountain of Youth" *ScienceNOW*. 2001 Aug. 31.
- Biomarkers of Aging for Detection and Treatment of Disorders (International Patent Application WO2011094535)

Patents

- Published Application: WO2011094535
- Published Application: 20130040844
- Published Application: 20140255424
- Published Application: 20160208011
- Published Application: WO2017120461
- Published Application: 20190024091
- Published Application: 20200399644
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- Published Application: 20240191238
- Issued: 10,626,399 (USA)
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