Optical Spectroscopic Method for Neurological Diagnosis and Monitoring

(VA Reference No. 07-150)

Novel device and method that can be used to identify lesions associated with neurodegenerative disease

Technology

Optical spectroscopic device for diagnosis and progression of neurodegenerative disease

Inventor

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Key Features

- Non-invasive device that uses near-infrared light to identify neurodegenerative lesions
- Low cost and portable
- Uses a broad spectrum of wavelengths
- Could be used for evaluating efficacy of experimental therapies in clinical trials

Stage of Development

Reduced to practice with prototype device developed

Keywords

Medical Device/Diagnostic

- Optical Spectroscope
- Alzheimer's
- Neurodegenerative disease
- Brain tissue analysis

Patent Status

Patent application has been filed

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Technology

The Department of Veterans Affairs has developed an optical spectroscopic device and methodology that is widely deployable and an inexpensive aid in the early diagnosis and progression of neurodegenerative disorders, especially Alzheimer's disease. This technology has been reduced to practice and a prototype device has been developed.

Description

The novel technology developed uses near-infrared light, which passes through skin and bone and penetrates into the brain. The detectors measure the intensity of the light that reflects back. The data collected by the device reflect protein aggregates different from healthy neural tissue, and the protocol renders a spectroscopic diagnosis for each patient, indicating presence, for example, of Alzheimer's amyloid plaques and fibrillary tangles.

Both brain trauma and neurodegenerative disease involve loss of, or damage to, nerve cells in the brain. This technology could assist in distinguishing Alzheimer's disease definitively from other dementias in the living patient and allow for a more a definitive diagnosis of Alzheimer's disease and related neurodegenerative disorders. Current use of brain mapping studies has been limited to spectra of oxy- and deoxy-hemoglobin, and other diagnoses have relied on histopathological examination of brain tissue, almost exclusively conducted post mortem.

Competitive Advantage

Early diagnosis and monitoring of progression of Alzheimer's disease and related neurodegenerative disorders could advance understanding of these diseases, advance the development of experimental therapeutics by providing a definitive, quantitative means for evaluating their efficacy in clinical trials, and provide a basis for families' preparation and planning in the event of early diagnosis of Alzheimer's.

This invention:

- Is non-invasive versus neuroimaging methods that require injection of contrast agents and/or radioactive ligands.
- An inexpensive and portable device that does not require a dedicated facility as with the site-specific neuroimaging methods of MRI, CT and PET.
- Uses a broad spectrum of wavelengths for brain tissue analysis, versus its optical imaging competitors who indirectly assay brain integrity by assessing blood flow with limited wavelengths of light.

Status

The Department of Veterans Affairs is looking for a partner for further development and commercialization of this technology through a license, and the VA inventors are available to collaborate with interested companies through a Cooperative Research and Development Agreement (CRADA).