

Peripheral protein biomarkers for Parkinson's disease and synucleinopathies

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Citation: Shu G Chen, Peripheral protein biomarkers for Parkinson's disease and synucleinopathies. J. Alz. Demetia Vol. 4 No. 5: 66

Abstract

Synucleinopathies such as Parkinson's disease (PD), dementia with Lewy bodies (DLB) are characterized by the deposition of misfolded protein aggregates consisted of alpha-synuclein in the central nervous system (CNS). Previous efforts have focused on the development of CNS-proximal clinical biomarkers, including cerebrospinal fluid measures of alpha-synuclein, and tau. However, these diagnostic techniques are often used in clinical studies on patients with advanced disease state, and are invasive. Therefore, there remains an urgent need for reliable, inexpensive and minimally invasive peripheral biomarkers. Recent studies have revealed widespread peripheral involvement of Lewy bodylike pathology, often prior to clinical manifestations of the diseases. Indeed, alpha-synuclein deposits have been observed in peripheral tissues in PD and DLB. A formidable challenge is that the levels of the amyloidogenic protein aggregates in peripheral tissues are extremely low and thus only variably detectable using immunological methods.

Keywords: Neck fractures; Hemiarthroplasty; Orthopedics

Received: November 10, 2021, **Accepted:** November 20, 2021, **Published:** December 28, 2021

Introduction

Therefore, highly sensitive analytical platforms are required as the new generation of biomarker assays specific for protein aggregates and amyloid fibrils. The real-time quaking induced conversion (RT-QuIC) has emerged as a robust, rapid and ultrasensitive technology for template-assisted amplification of misfolded protein aggregates in neurodegenerative diseases. Using the RT-QuIC technique, our recent studies have shown that disease-associated protein aggregates are readily detectable in peripheral tissues of patients affected by PD, and dementia with Lewy bodies. Validation of peripheral protein biomarkers will enable sensitive premortem diagnostic tests for PD, DLB, and other related disorders, and accelerate clinical trials for disease-modifying therapies. Caring for someone with Alzheimer's disease or another type of dementia can be a long, stressful, and intensely emotional journey. But you're not alone. In the United States, there are more than 16 million people caring for someone with dementia, and many millions more around the world. As there is currently no cure for Alzheimer's or dementia, it is often your caregiving and support that makes the biggest difference to your loved one's quality of life. That is a remarkable gift.

However, caregiving can also become all-consuming. As your loved one's cognitive, physical, and functional abilities gradually diminish over time, it's easy to become overwhelmed, disheartened, and neglect your own health and well-being. The burden of caregiving can put you at increased risk for significant health problems and many dementia caregivers experience depression, high levels of stress, or even burnout. And nearly all Alzheimer's or dementia caregivers at some time experience sadness, anxiety, loneliness, and exhaustion. Seeking help and support along the way is not a luxury; it's a necessity.

Just as each individual with Alzheimer's disease or dementia progresses differently, so too can the caregiving experience vary widely from person to person. However, there are strategies that can aid you as a caregiver and help make your caregiving journey as rewarding as it is challenging. Caring for a person with Alzheimer's disease or dementia can often seem to be a series of grief experiences as you watch your loved one's memories disappear and skills erode. The person with dementia will change and behave in different, sometimes disturbing or upsetting ways. For both caregivers and their patients, these changes can produce an emotional wallop of confusion, frustration, and sadness.

As the disease advances through the different stages, your loved one's needs increase, your caregiving and financial responsibilities become more challenging, and the fatigue, stress, and isolation can become overwhelming. At the same time, the ability of your loved one to show appreciation for all your hard work only diminishes. Caregiving can literally seem like a thankless task.

As life expectancies increase, medical treatments advance, and increasing numbers of people live with chronic illness and disabilities, more and more of us find ourselves caring for a loved one at home. Whether you're taking care of an aging parent, a handicapped spouse, or looking after a child with a physical or mental illness, providing care for a family member in

need is an act of kindness, love, and loyalty. Day after day, you gift your loved one your care and attention, improving their quality of life, even if they're unable to express their gratitude. Regardless of your particular circumstances, being a family caregiver is a challenging role and likely one that you haven't been trained to undertake. And like many family caregivers, you probably never anticipated this situation.

However, you don't have to be a nursing expert, a superhero, or a saint in order to be a good family caregiver. With the right help and support, you can provide loving, effective care without having to sacrifice yourself in the process. And that can make family caregiving a more rewarding experience—for both you and your loved one.

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