Central and Peripheral Nervous System Involvement in Kennedy's Disease

Research

Imagine being relatively healthy and normal, then soon after you reach adult-hood you slowly become weak and progressively not able to walk, talk or swallow properly. These are the problems that are faced by patients with Kennedy's disease (KD). KD, also known as X-linked spinal and bulbar muscular atrophy (SBMA), is a rare, recessive, inherited neurodegenerative disorder which causes slowly progressive weakness and wasting of muscles. Neurodegeneration can occur at the central (brain and the spinal cord) level and at the peripheral (nerve) level of the nervous system, leading to a range of symptoms. KD affects the nerves that control bulbar muscles, which control breathing, swallowing, and talking. It can also lead to androgen (male hormone) insensitivity which causes enlarged breasts in men, decreased fertility, and testicular atrophy. KD is the most common adult-onset SBMA, and disease onset ranges from 18 to 64 ages. However, individuals with KD are often mistakenly thought to have other motor neuron diseases, such as amyotrophic lateral sclerosis (ALS). Therefore the time from onset to confirmation of diagnosis is on average longer than 5 years. Diagnosis of KD is delayed because there are no explicit biomarkers for the disease, and the diagnosis requires a genetic confirmation.

Currently, there is no known cure for KD, and treatment is focused on minimising the symptoms of the disease as well as providing support for patients and their families. There are critical gaps in identifying reliable, sensitive biomarkers across the KD spectrum. There is an urgent need to develop disease-specific, sensitive monitoring biomarkers, to provide clues to the complex underlying pathogenic process in patients with KD. This research aims to investigate the central nervous system (CNS) and the peripheral nervous system (PNS), combining neurophysiological and functional assessments with neuroimaging techniques to offer opportunities for therapeutic intervention in the near future.

Outcome

Preliminary data has been obtained from five symptomatic patients who are genetically confirmed KD diagnosed, and their data was compared to age and gender-matched healthy controls. The results show significant differences in both sensory and motor nerves in KD patients compared to healthy controls, which reflects underlying motor and sensory nerve damage in KD. In the functional assessments, the preliminary results demonstrated that KD patients performed significantly worse in some tasks compared to healthy controls, which suggests sensory and fine motor dysfunction in these patients. Currently we are in the process of collecting the brain imaging data to correlate to the peripheral nerve assessments to provide a comprehensive picture of central and peripheral nervous system involvement in KD.

RESEARCH TEAM:

Chief Investigator:

Professor Cindy Shin-Yi Lin
Central Clinical School, Faculty of Medicine and Health, Brain and Mind Centre, Sydney University

Co-investigators:

Associate Professor Susanna Park, PhD
Brain and Mind Centre, Discipline of Physiology, Faculty of Medicine and Health, University of Sydney, Camperdown

Dr Thanuja Dharmadasa
Central Clinical School, Faculty of Medicine and Health, Brain and Mind Centre, Sydney University