Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

1475 N. Scottsdale Road, Suite 200
Scottsdale, AZ 85287-3538
Phone: 480 884 1996 Fax: 480 884 1984

Case ID:M15-133L^
Published: 4/19/2023

Inventors

Michael Sierks

Stephanie Williams

Contact

Jovan Heusser
jovan.heusser@skysonginnovations.com

Reagents Targeting Neurodegenerative Diseases and Traumatic Brain Injury

Misfolding and aggregation of proteins, such as beta-amyloid (Aß), alpha-synuclein (a-syn), tau and TAR DNA-binding protein 43 (TDP-43), have been strongly correlated with early onset of neurodegenerative diseases such as Alzheimer's Disease (AD), Parkinson's Disease (PD), Frontotemporal Dementia (FTD), amyotrophic lateral sclerosis (ALS) and other dementias as well as traumatic brain injury (TBI). Detection of specific variants of these proteins, such as the toxic oligomeric protein forms, have great promise as sensitive and dynamic biomarkers for neurodegenerative diseases and TBI.

Researchers at Arizona State University have synthesized recombinant antibody fragments (nanobodies) for the treatment and early diagnosis of neurodegenerative diseases such as AD, PD, ALS, FTD, ALS and traumatic brain injury (TBI)-mediated neurodegeneration. These nanobodies specifically target toxic oligomeric protein variants but do not bind monomeric, fibrillar or non-disease associated forms. These nanobodies can be used for detecting the protein variants present in blood, CSF and other biological samples.

These highly specific and selective nanobodies have great utility in diagnosing, staging, treating and imaging neurodegenerative diseases and TBI. Moreover, their very specific targeting minimizes unwanted side effects, and may provide for a safer long-term therapeutic.

Potential Applications

- Detection, staging and treatment of misfolded toxic oligomeric protein forms present in neurodegenerative diseases:
  - Aß, tau, TDP-43 & a-syn- Alzheimer's Disease, Parkinson's Disease, taupathies, FTD, ALS, TBI & other dementias
- Assessment of neuronal damage & treatment strategies following TBI
  - Assess protein variants of Aß, tau, TDP-43 & a-syn at select times to identify the stage and severity of TBI
  - Creation of an effective personalized treatment plan targeting the proteins as early possible to alter disease progression and future damage

Benefits and Advantages

- Picomolar sensitivity
- Can readily distinguish between AD, PD, FTD, ALS, and cognitively normal samples and the stages of neurodegeneration
- Can detect severity of TBI
- Can be conjugated to an imaging agent
- Can be used in immunoassays for early stage diagnoses
- Specific to only the neurotoxic protein variants to minimize unwanted side effects
- Targets an early cause, rather than treating symptoms
- Well defined specificities and selectivities for selected protein forms to facilitate specific diagnoses
- Early diagnoses - well before onset of disease or mild-cognitive impairment

For more information about the inventor(s) and their research, please see Dr. Sierks' directory webpageDr. Sierks' laboratory webpage