

# Elements and Isotopes in Neurodegenerative Diseases

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**BEWILLIGT**

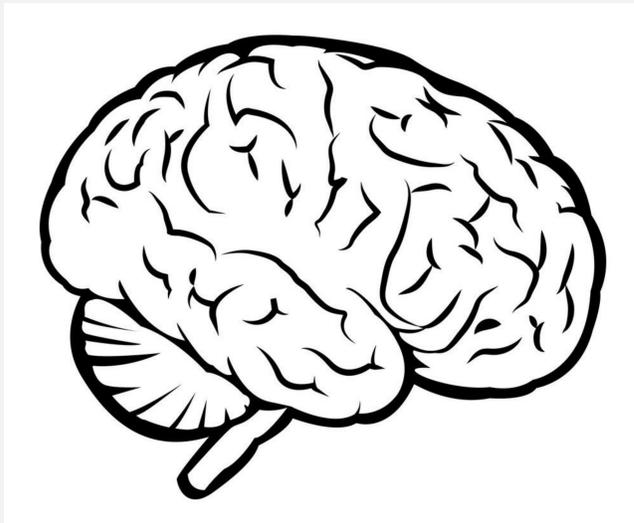
The underlying hypothesis: Element dyshomeostasis in proteins can be used as a diagnostic tool for Neurodegenerative diseases

Disrupted protein degradation



Accumulation of

P Fe  
Cu Ca



Imbalance in  
Cu Zn Fe



Oxidative stress

Imbalance in  
Fe Cu



Mitochondrial dysfunction

Fig .1 Element-protein associations are disrupted in Neurodegenerative diseases.

**The Chronic Health Problem:** Neurodegenerative diseases (NDs) such as **Alzheimer's**, **Parkinson's** and **Amyotrophic lateral sclerosis** result in loss of personal independence and quality of life and lead to increased mortality. Early diagnosis and knowledge of disease progression in NDs is critical since intervention in the early stages can extend independence and improve quality of life via symptomatic care. It is therefore essential that the search for novel biomarkers for diagnostics, disease monitoring and treatment response of NDs is intensified.

**Our Innovation** NDs are diseases of protein dysfunction and this **protein dysfunction involves element dyshomeostasis (Fig. 1)**. We will use an innovative analysis approach to quantify elements, molecularly characterize protein fractions and determine isotopes in specific biomolecular fractions of body fluids (Fig. 2).

Verbundpartner



**GEOMAR**  
Helmholtz-Zentrum für Ozeanforschung Kiel



**UK SH** UNIVERSITÄTSKLINIKUM  
Schleswig-Holstein

**Our partnership**

We will combine the expertise of the Neurogeriatrics team at UKSH with GEOMAR's unique combination of mass spectrometry facilities. We will gain unprecedented knowledge of element dyshomeostasis in NDs. We will study element dyshomeostasis on >1000 biobank samples from ND patients.

**Our Goal**

Over the next three years we will determine element signatures in proteins in cerebral spinal fluid, saliva and blood and develop a tool for diagnosis and progression and for monitoring treatment of NDs. Our long term aim to establish a world-class facility for ND diagnostics in Kiel.

**Acknowledgements:**

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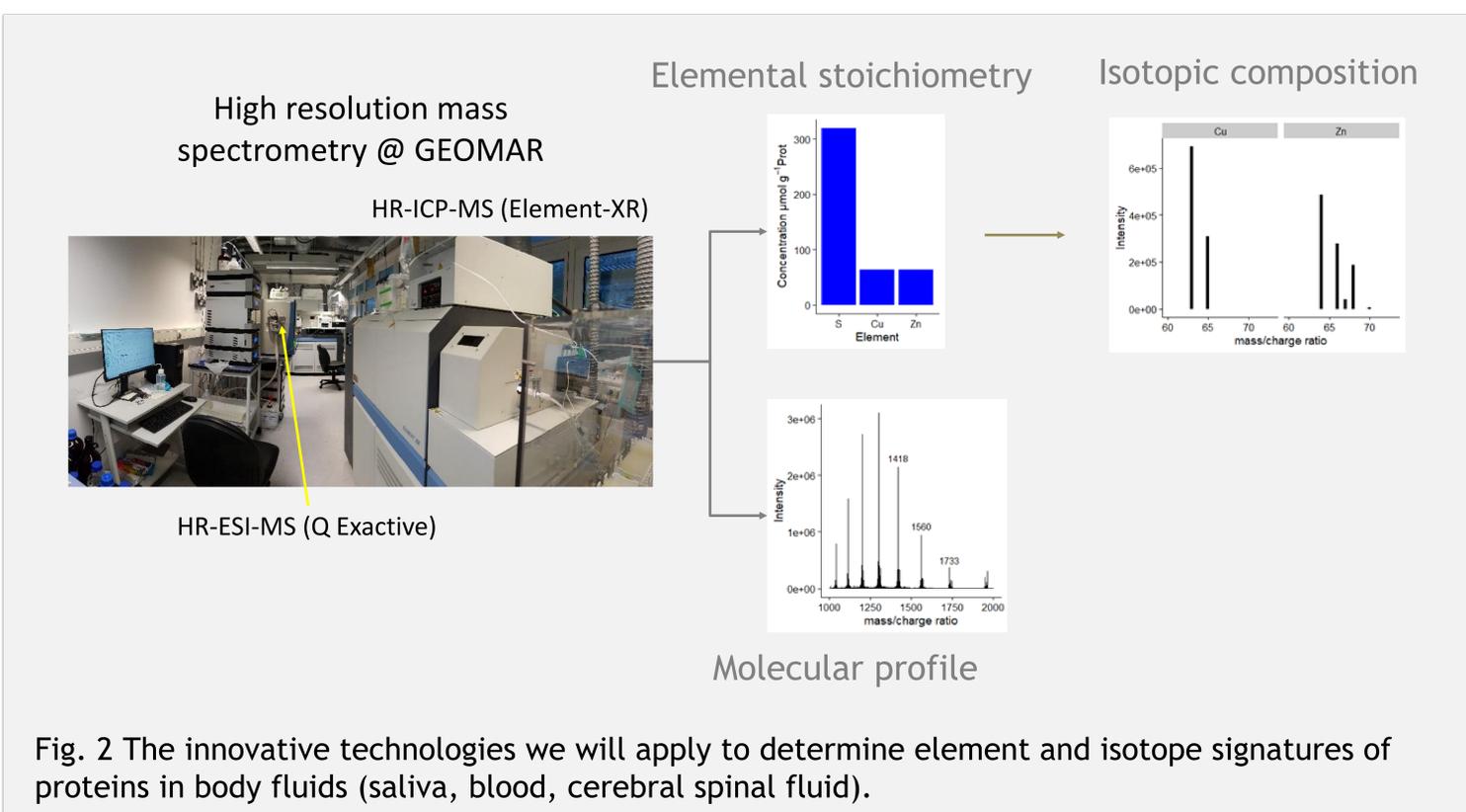


Fig. 2 The innovative technologies we will apply to determine element and isotope signatures of proteins in body fluids (saliva, blood, cerebral spinal fluid).

GEFÖRDERT VOM



**wir!** Wandel durch  
Innovation  
in der Region

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