# Development, Evaluation and Validation of Blood Circulating Biomarker Assay to Subtype Schizophrenia (BASS ASSAY)

## Development status

**Clinical trials**

## IP protection status

The NIMH Neuroimaging-based subsidization model is subject to UK patent pending (UK patent GB2000634.2). There might be a substantially high benefit-sharing potential of predictive BASS ASSAY based on the future patenting of subtype-specific configuration of peripheral blood markers.

## Partnering strategy

*Collaboration, investment, licensing*

## Institution

NÁRODNÍ ÚSTAV DUŠEVNÍHO ZDRAVÍ
**National Institute of Mental Health**

## Challenge

Schizophrenia (SZ) represents one of the leading causes of disability worldwide, primarily due to its chronic outcomes and young age of onset. It is considered a heterogeneous disorder since the establishment of its diagnostic entity. A broad spectrum of neurobiological features unveiled in the last decades suggests different pathophysiology of brain structures and functions in the disease. Diversity in disease aetiology extends to heterogeneity in treatment responses. To this end, heterogeneity in SZ represents a very promising framework to progress towards precision medicine in SZ. The approach could also help to initiate clinical research into the use of key-lock treatments adjusted to distinct neurobiological and neurochemical subtypes, including neuroprotective or anti-inflammatory compounds.

## Description

Previous research at the National Institute of Mental Health into the major reorganization in the gray matter layers in early-stage SZ patients has identified four distinct subtypes of progressive changes in gray matter cortical thickness. Results of subtypization model based on morphometry changes in first-episode schizophrenic subjects may represent a breakthrough in the field of schizophrenia research and clinical management. The past decade has seen impressive efforts in search for biomarkers of brain disease. Recently, it has been recognized that some common molecular mechanisms, including specific protein production, are shared between almost all CNS-related disorders and brain damage that had been previously considered unrelated and biologically distinct. It has also been shown that glymphatic CSF-blood exchange plays a critical role in the clearance of such endogenously produced proteins (in our case, the biomarkers of brain damage) from the CNS to the peripheral blood. Our approach therefore allows for very early detection of even subtle brain

abnormalities. These abnormalities are independent of blood-brain barrier disruption, which otherwise occurs in the later stages of brain damage The identification of a robust blood biomarker—one that is reliably elevated during the acute phase of the brain insult—could improve screening, diagnosis, and follow-up of patients with brain damage of different severities and pathologies. Recent research has identified several promising biomarker candidates detectable in peripheral blood that reflect impairment in different brain compartments (neuronal or glial injury, disruption in white matter integrity, CNS inflammation). Consequently, BASS ASSAY will specifically focus on (i) S100 calcium-binding protein B (S100B); (ii) glial fibrillary acidic protein (GFAP); (iii) neurofilament-light (NF-L); (iv) Neuron-Specific Enolase (NSE); (v) Ubiquitin C-terminal hydrolase-L1 (UCH-L1) and; (vi) interleukin 6 (IL-6) as the marker of inflammation (4-7).

## Commercial opportunity

The development and commercialization of BASS ECL PROTEIN ASSAY (= BASS ASSAY) will enable personalized healthcare for schizophrenia patients right after the onset of illness. Known biological information about the schizophrenia subtypization would increase the homogeneity of patient populations and thus allow for development of targeted treatment. Consequently, the results obtained from BASS ASSAY will enable conduction of next-generation, biomarker-driven clinical trial designs in SZ. Patients will benefit from improved treatment outcomes and earlier access to novel therapies. Pharmaceutical industries will benefit from a reduced time-to-market of new drugs through improved success rate of clinical trials by enrichment of particular schizophrenia subtypes, reduced number of patients per trial and reduced treatment time by eliminating the trial-and-error phase. Complementation with the anonymized circulating protein database, whilst combining and validating the data using computational MRI models for schizophrenia, will enable NIMH to initiate and sustain a healthy R&D pipeline attractive to public and private funders, especially the pharmaceutical industry. This game-changing technology, validated against cutting-edge MRI neuroimaging research, will result into a unique bedside test using peripheral blood, capable to identify heterogeneous nosologic subtype of schizophrenia even without the use of MRI imaging.