Mental and brain health

How can we improve prediction, diagnosis and treatment to fight mental illness and strengthen brain health?

1. BACKGROUND INFORMATION

A healthy brain is what allows us to remember, learn, play, concentrate, navigate, and otherwise thrive in the world around us. With age and disease, however, brain health can deteriorate. Neurological and mental disorders can occur at any stage in life, from early childhood to adulthood, and are increasingly common.

Despite this reality, in many parts of the world treatment is inadequate and sometimes even non-existent. Many people unnecessarily suffer symptoms of cognitive impairment or mental illness, which can lead to long-term motor deficits, confusion, memory loss and depression.

Failure to adequately treat patients has knock-on effects on national healthcare: mood disorders like depression cost EU Member States €113.4 billion a year, dementia-type diseases like Alzheimer's €105.2 billion, and psychotic disorders €93.9 billion.

As populations grow and live longer, and chronic illness becomes more widespread, these problems will become especially pronounced.

2. OPPORTUNITIES

We know that brain health is about keeping the brain in optimal condition and helping to reduce the risks of disease as you age:

- Although the origins of many brain disorders are not yet fully understood, **researchers are increasingly coming to appreciate the impact of contributing factors** like cigarette smoking, midlife high blood pressure, obesity, diabetes, and prior cerebrovascular disease.
- **Preventative factors include active social engagement**, physical exercise, progressing with higher education and activities that require or stimulate the mind.
- **Interventions could be aimed at countering contributing factors** or improving preventative factors that delay brain health issues.
- **Early diagnosis, too, gives individuals a better chance of receiving appropriate care**, and the opportunity to participate in novel clinical trials. Here, emerging technologies like big data may improve diagnosis, treatment and prevention.

3. CURRENT CHALLENGES

Although our understanding of mental and brain health is improving, numerous obstacles stand in the way of effective diagnosis and treatment:

- **Oftentimes the problems are infrastructural**, meaning fewer people get treated. Some healthcare systems have limited access to medicine, insufficient resources to deliver appropriate care, and a reduced number of trained healthcare providers.
- While big data solutions have a clear role to play, **the sheer complexity of the brain, and both the intricacy and volume of brain health research data**, makes analytics difficult.
- As cognitive impairment symptoms present differently in different people, **research and clinical trials can be difficult to organise**. Big data could help to stratify patients with similar symptoms into more specific groups.
- **Many mental health treatments work only on a specific subset of patients**. A significant proportion of treatments have substantial side effects. A precision medicine approach is needed to ensure better outcomes and quality of life.

4. POSSIBLE AREAS OF INTERVENTION

To address these challenges, the Wild Card judges are expecting proposals that focus on either mental or brain health in the following topics:

BRAIN HEALTH

Early diagnosis	• To maximise lifelong brain health, the treatment and management of cognitive impairment must start as early as possible—and that means prompt diagnosis. In cases where there is a pre-existing dementia, early diagnosis and treatment can improve brain function and reduce symptoms. • Using biomarker identification, Wild Card is looking for new ways to introduce faster and more accurate diagnoses for different cognitive impairments.
Proactive engagement	• Reactive approaches to patient engagement are no longer regarded as best practice. A proactive model

	that uses engagement tools and support to improve patient and healthcare provider diagnosis, treatments, and outcomes. • Wild Card is looking for solutions that improve proactive patient engagement, from general awareness of brain disease to assistance with continuous symptom monitoring.

MENTAL HEALTH

Early diagnosis	• Mental health symptoms are often subjective in nature and typically are difficult to map onto a specific part of the brain. Without markers of underlying physiological dysfunction, diagnosis is often based on a self-reported set of cognitive, behavioural, emotional and social symptoms that must then be categorised, diagnosed and treated with a "best fit" strategy. • Wild Card seeks new ways to measure mental health disorders, build new structures for these measurements, and identify critical biomarkers in the early stages of disease.
Proactive engagement	• Proactively managing the psychosocial risk factors that lead to mental health will lead to long-term benefits for patients and societies. However, a high level of stigma towards mental illness still exists in society. • Wild Card seeks new ways to proactively engage patients, increase awareness of symptoms, and ensure affected people seek professional help as early as possible.

5. WHY IS THIS A WILD CARD CHALLENGE?

Brain health is an increasing area of focus for scientists, physicians and entrepreneurs. New technological advancements are helping us understand the most complex organ

of the human body, find answers to difficult, longstanding problems, and improve patient quality of life.

By addressing mental and brain health, this Wild Card challenge is the key to stimulating innovation in all three EIT Health grand challenges: promoting healthy living, supporting active ageing, and improving healthcare.