Nowadays, more and more people around the world are suffering from some form of dementia, with Alzheimer's Disease (AD) being the most common neurodegenerative disease. Currently, there is no known cure for AD, but there are several therapies available, that can slow down the course of the disease and by doing that – improve the prognosis. To be most effective, those therapies have to be applied as soon as possible. That is why early diagnosis of AD, or the cognitive decline predeceasing AD (known as Mild Cognitive Impairment, MCI) is crucial. Several screening tools are available for that, but they were not designed to reflect the actual changes occurring in the brains of the patients. Instead, they only give us a very general overview of a person's cognitive ability. This gap in screening tools inspired us to take a novel approach, based on recent findings regarding the AD-related changes in the visual system. We want to understand better, how parts of the brain that process our vision can reflect the changes in the brain happening in Alzheimer's and other neurodegenerative illnesses.

In an effort to develop a better screening tool for early MCI, we will conduct three different studies. During the first study, we will test 146 healthy participants aged 18-80 to check if the way we see things across the visual field reflects how well we do in classical cognitive screening tools. To do that, we will prepare a dedicated behavioral task, that all the participants will perform on a computer. In the second study, we will use an online database to access the brain scans of patients with Alzheimer's disease and Mild Cognitive Impairment, and of healthy elderly participants to learn more about how different parts of the brain responsible for processing vision are affected by neurodegeneration. Our third study will combine the findings from the previous two. We will test 66 healthy participants (33 aged 18-30 and 33 aged 65-80). All of them will be asked to perform our behavioral test and will have their brains scanned in the MRI. This will allow us to check if the way we see things across the visual field changes with age and explore how is it reflected in the organization of the brain. Additionally, we will examine a group of stroke patients with Mild Cognitive Impairment. We will ask them to perform our task and check their brain structure on their medical MRI scans. This will allow us to check if indeed our visual task allows for the detection of early MCI.

Our research aims to explore a lesser-known aspect of neurodegenerative disorders. It can be useful both in basic research, providing new information about how our brains work and how they age, but also in clinical practice, leading towards new, easy, quick, and reliable methods of early diagnosis of neurodegenerative disorders.