Brain Shrinkage (brain volume loss) and Relapsing Multiple Sclerosis
Media Fact Sheet

What is brain shrinkage in neurological diseases?
Brain shrinkage (brain volume loss) refers to the permanent loss of brain tissue (both myelin and axons) and changes in the water containing spaces in and around the brain. Everyone experiences brain shrinkage in their lifetime however this process is accelerated in those with neurological diseases. It can affect the whole brain or be limited to specific regions, and is associated with the loss of physical (e.g. walking) or cognitive (e.g. memory) function. For example, if some elements of the cerebral hemispheres (the two lobes of the brain that form the cerebrum) are affected, conscious thought and voluntary processes may be impaired. Brain shrinkage can predict a patient’s future disability.

How is brain shrinkage measured?
Brain shrinkage is measured by Magnetic Resonance Imaging (MRI). MRI uses a strong magnetic field to create detailed images of pathological changes in the brain including areas of inflammation, damage or scarring in nerve tissue.

How is brain shrinkage linked to relapsing multiple sclerosis (RMS)?
Brain shrinkage occurs three to five times faster in people with RMS compared to those without RMS. This acceleration starts early in people with relapsing MS, before patients even notice their symptoms. Based on growing evidence, damage from lesions and brain shrinkage leads to worsening of the symptoms for RMS.

MRI images of the brain demonstrate the extent of brain shrinkage in people with RMS compared to a person without RMS. The images show that as the disease progresses the brain itself becomes smaller due to nerve tissue loss, whilst the water containing spaces (in black) within and around the brain increase in size.

Assessing brain shrinkage is increasingly becoming an important consideration in monitoring RMS treatment effects. Several studies have shown that brain shrinkage is a predictor of long-term disability in RMS, therefore it is also being measured as an additional endpoint in clinical trials.

There are now disease-modifying therapies (DMTs) that aim to alter the natural course of relapsing MS by modifying the immune response. There are DMTs available that can reduce the frequency of relapses and MRI lesions, delay the accumulation of physical disability and minimize brain shrinkage. The differences between the efficacy profiles of DMTs in relation to brain shrinkage may be explained by their mode of action, their overall efficacy and their ability to enter the central nervous system (CNS).

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