Why does physical and mental activity provide a certain degree of protection against dementia and neurodegeneration? Physical activity especially is one of the few scientifically proven methods available to the individual to reduce the risk of neurodegenerative disease and influence its progression positively. Where is the link between neurodegeneration and brain development? How does the brain combat degenerative processes? Are there any simple ways to boost this potential in preventing, compensating for and treating such disease?
Throughout a person’s life, the brain is in a constant state of change and its structure is directly related to its function. This interrelationship is known as plasticity. In Dresden research work focuses on plasticity processes in the adult and ageing brain, and investigates how plasticity determines the brain’s ability to compensate for degeneration. The aim of the research performed in Dresden is to make the findings of stem cell and plasticity research operable in preventing and treating neurodegenerative disease. Biologically founded approaches are to be developed to activate the body’s compensational and regenerational potential.

Stem cells from the brain play an important (but not the only) role in this plasticity. Adult neurogenesis, the generation of new nerve cells in the adult brain, has its origins in stem cell populations that remain in the brain throughout life and are thus elementary to its structural plasticity. Adult neurogenesis is a key factor in explaining the adult brain’s ability to compensate for neurodegeneration. In the opposite direction, targeted promotion of adult neurogenesis could generate reserves which would protect the brain from the effects of neurodegeneration (especially where learning and memory processes are concerned). Broadening this knowledge and making it available for use in work with patients is the aim of the research conducted in Dresden. Hence, the specific research themes take in stem cell models of neurodegeneration, mechanisms of activity-dependent plasticity in animal models and
translational plasticity research on clinical trial subjects and patients. Basic science researchers and clinicians work together in implementing this concept. Hence, the clinical focus lies in identifying early stages of neurodegenerative disease and finding references and strategies for early intervention.

Dresden is part of the local Centre for Regenerative Therapies Dresden (CRTD) network and builds on local-level research conducted into development biology, stem cell research and plasticity research.