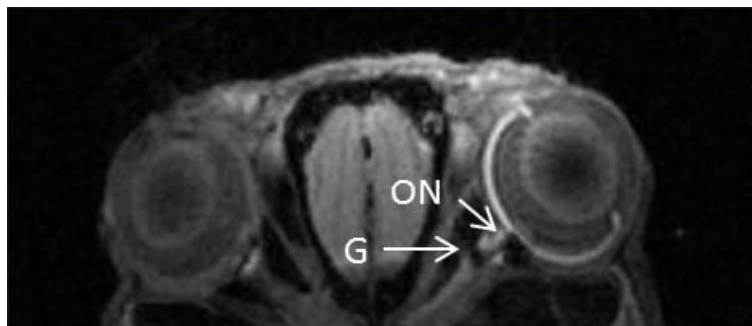
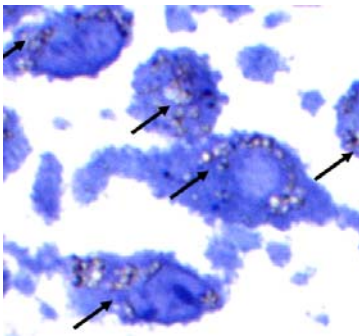


Nanomedicine and image-guided CNS repair

A major impact of nanotechnology in regenerative medicine is the facilitation of the design, application and assessment of multifactorial approaches to therapy with a view to clinical translation. Such approaches include the use of contrast agents for *in vivo* monitoring of cell transplants and neuronal pathways by MRI. We have incorporated T2/T2* contrast agents into cells for visualisation by MRI and combined them with T1 contrast agents for simultaneous assessment of neuronal circuit integrity and axon-regenerative responses to treatment. Having established the utility of this approach, we are currently designing and testing novel nanoparticles for multimodal molecular and cellular imaging as well as gene and drug delivery for repair of experimental CNS lesions. We are also utilising nanotechnology for the development of multifunctional biopolymers for *in situ* tissue engineering. This work represents a collaboration between the Department of Circulation and Medical Imaging, and the Departments of Biotechnology and Chemical Engineering at NTNU.



Left image: Cells after uptake of intracellular contrast agent (arrows). Right image: MRI of cell transplant and regenerating CNS axon tract after injury. ON: Manganese-enhanced optic nerve; G: cell graft at injury site.

"In vivo MRI of olfactory ensheathing cell grafts and regenerating axons in transplant mediated repair of the adult rat optic nerve", I. Sandvig, M. Thuen, L. Hoang, Ø. Olsen, T.C. Sardella, C. Brekken, K.E. Tvedt, S.C. Barnett, O. Haraldseth, M. Berry and A. Sandvig, NMR Biomed. 25 (2012) 620.