# Beamtime at ID16-NI (N° MD-898)
# Preliminary Project Report

## Team

Lars Dahlin, Department of Clinical Sciences in Malmo, Hand Surgery, Skane University Hospital, MALMO SWEDEN
Martin Bech, Medical Radiation Physics Department, Lund University, LUND SWEDEN

## Project Title

Nerve injury and neuropathy – the relation between axons and blood vessels.

## Aim

The ***general aim*** – as stated in the proposal - is to image the nerve fibers in three-dimensions. This is not possible with any other imaging techniques than X-ray phase nanotomography. We aim to analyze relations between axons and intraneural microvessels with ***focus on 1)*** axonal outgrowth in different experimental biological and artificial conduits after nerve injury in ***experimental models*** and ***2)*** the conditions in nerves and DRGs in ***animals and humans*** affected by ***diabetes***, i.e. unique nerve biopsies.

## Samples measured

We have measured a total of 11 samples, of which 10 gave useful images (one data set was discarded due to bad quality and overwhelming ring artifacts). The 10 samples were all imaged with a voxel size of 130 nm. Further, 3 samples were re-measured with 50 nm voxel size. Of the 10 samples measured, 5 were from patients with type 1 diabetes and 4 were control samples. The type 1 and control samples were paired to match in age and gender. One sample of a diabetes type 2 patient was measured for comparison.

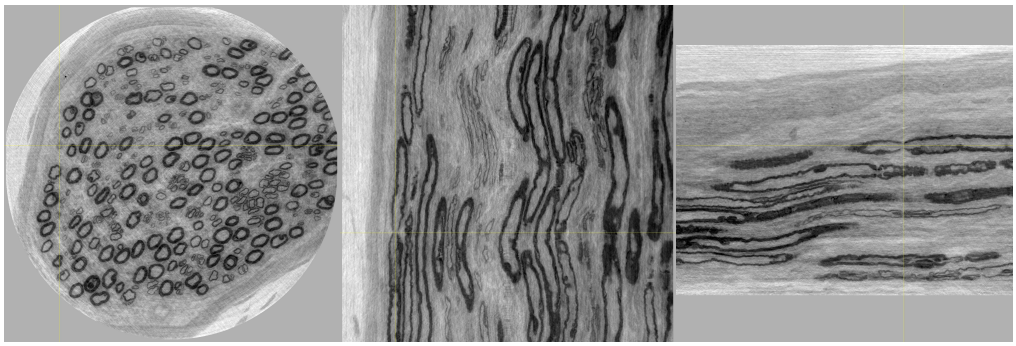

Figure 1. Slices through virtual volume.

## Data analysis

The data from diabetes type 1 and control samples is currently being analysed. Initial visual inspection of the data gives us hope for very promising quantitative results one the data is fully analysed. Unfortunately a full quantitative analysis requires an automated segmentation procedure, which is still not fully developed. A segmentation tool is under development and we expect to publish the result in the next future.

Figure 2. Visualization of one sample revealing details of nerve morphology.

## Impact

Though the data is not fully analysed, the preliminary results have already been used in presentations, both at scientific seminars and as PR material. The images have lead to great inspiration among many colleagues and follow up experiments are in the planning already.