



VAMAS

## Project 2

**A round-robin to characterise a protein filament material as an internal calibrant for diagnostic electron microscopy**

## Objectives

Validation of a protein filament material as an internal calibrant for electron microscopy (EM) to enable the accurate measurement of biological samples. The study will be performed by (accredited) diagnostic EM laboratories under clinical conditions aiming to proceed with UKAS accreditation of the protein filament material.

## Background

Although morphological data is the primary source of information in diagnostic EM, in many cases this is not sufficient. There are a number of diseases where the measurement of ultrastructural features is clinically relevant. Examples include thin basement membrane disease, amyloidosis, fibrillary glomerular nephritis, infectious agents especially viruses.

However, such measurements are only reliable if the electron microscope and camera are calibrated against a well characterised material with reliably measured dimensions.

## Pre-standardization Needs

No reference standards are available for calibration in EM for biological materials.

# Synthetic Biomaterials

Technical Work Area 40

This is of particular significance for diagnostic EM which relies on the accurate measurement of nanoscale features and periodicities of a biological specimen.

Furthermore, no data exists on relevant biomaterials for use in the EM to provide reference values for interlaboratory reproducibility and repeatability in clinic.

The proposed protein reference material in this study will improve the diagnosis of many diseases and support the follow-up of treatment by monitoring structural differences in amyloid filaments with repeatable 'nm' accuracy.

### Relevant Committees

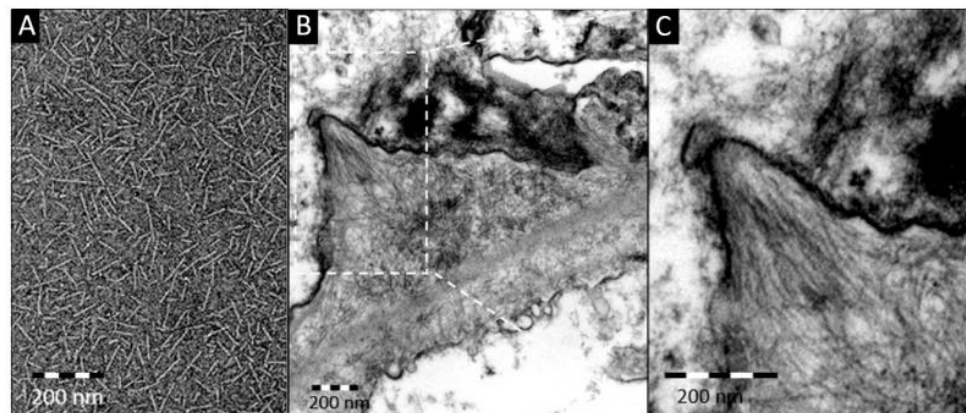
ISO/TC 276 - Biotechnology  
ISO/TC 202 - Microbeam analysis  
ISO/TC 229 - Nanotechnologies

### Relevant Standards

ISO 15189:2012, BS ISO 29301:2010  
ISO 15194:2009

## Work Programme

Comparative characterisation of protein filament material by EM versus clinical samples of protein filaments and evaluation of results including full statistical analysis.



Electron micrographs of protein filament material (PFM) with nanoscale periodicities over a microscopic length scale (A) and typical amyloid formation in kidney disease (B) and (C). PFM is supplied deposited on a EM grid at densities allowing for disperse and dense surface coverage.

## Precision data

- Repeatability or minimum variability in results (constant conditions);
- Reproducibility or maximum variability in results (varying conditions)

## Second stage analysis

The procedures adopted by different participants will be repeated by a smaller group of participants to determine the effect of accurate test control on the repeatability and reproducibility of the materials for a set of clinical samples in two material formats –direct deposits and ultramicrotomy.

## Deliverables and Dissemination

International round-robin tests, good practice guidelines, peer-review publications and presentations as knowledge transfer components of existing projects.

## Status

In progress since October 2017.

## Call for Participation

**Additional volunteers welcome. Participants fund their own study in the project.**

**For more information on participation, please contact:**

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