Drug Discovery

CASE STUDY

Tropoelastin: nature's perfect nanoscale spring

Elastin allows tissues in humans and other mammals to stretch and return to original shape e.g. during respiration or heart beats.

The schematic (first image on page 2) shows how many tropoelastin monomers (blue) can self assemble and cross-link (red) to form elastin but the structure of the soluble precursor of elastin, tropoelastin, is not well understood.

MANCHESTER 1824
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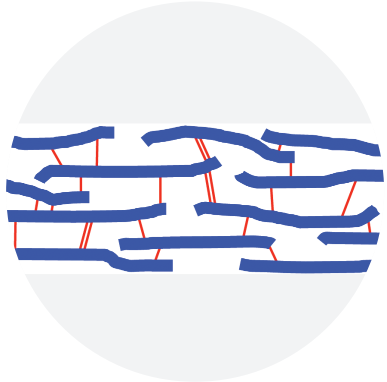
The Challenge



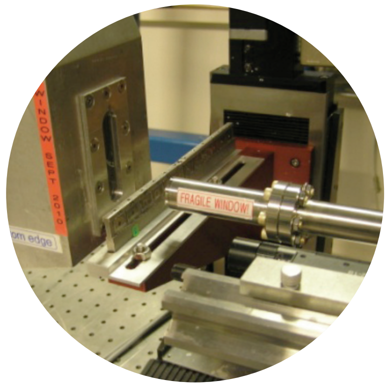
Due to its flexible nature and strong tendency to self-associate, tropoelastin is not a good candidate for crystallographic studies. The team needed an alternative method of investigating the structure of a flexible protein in solution.

The Solution

An international team from UK, Australia, USA and Europe used beamline I22 at Diamond (along with ESRF and APS) to investigate the 3D solution structure of tropoelastin using small angle X-ray scattering.

Complementary small angle X-ray (left) and neutron scattering (centre) measurements allowed identification of discrete regions of the molecule. The combined data provided details of the full length tropoelastin structure (right).

The Benefits



The small angle scattering measurements allowed the researchers to gain high quality structural information from a flexible protein. They gained an understanding of the subunit structure that governs the ability of elastin to stretch and how it attaches to cells. The team were able use this information to propose a mechanism for the self-assembly of tropoelastin to form elastin; nature's ideal nanoscale spring.

"We discovered that tropoelastin is a curved, spring-like molecule with a 'foot' region to facilitate attachment to cells" **Dr Clair Baldock, Wellcome Trust Centre for Cell Matrix Research, The University of Manchester**

For further information

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