

Case study  
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## Building on Rosalind Franklin's foundations

The foundations of the Rosalind Franklin Institute are not only being laid at the site of the main hub building in Harwell, but also 60 miles away at King's College London. Rather than bricks and mortar, however, researchers at King's are doing some of the groundwork needed to set The Franklin on its course towards pioneering discoveries.

"While we wait for the building to be finished and for the high end microscopes to come on stream, we are putting the basics in place to make sure everything is ready," says Professor Roland Fleck, director of the Centre for Ultrastructural Imaging (CUI) at King's and the College's lead at The Franklin. "Our aim is to be able to feed them with samples on day one."

Professor Fleck, together with Professor Juan Burrone, from the Centre for Developmental Neurobiology at Kings, and Professor Mark Green, from the Department of Physics, are working in the Correlated Imaging theme. They are particularly focused on neurons and brain tissue.

"We have questions that involve very advanced neuroscience around the development of the brain, how it organises memories and how this relates to disease in later life," says Professor Fleck. To do this the King's team will be combining X-ray tomography images and detailed three-dimensional electron microscope images of the connections between neurons.

One of the problems they are tackling currently, however, is how to ensure biological samples can be used in both X-ray imaging instruments and time resolved transmission electron microscopes.

"We need to ensure the blue sky thinking of the physics on which these microscopes will be based is well matched to the biological questions we're trying to answer," says Professor Fleck. "We have been working with the physicists so they know the limitations of what the biological samples can endure in terms of the environment within these instruments."

Professor Green has also been working on nanoparticle bio-labels to help enhance the contrast of structures and molecules within cells so they can be imaged better with both X-ray and electron microscopes.

"There's a very advanced engineering, physical science and design program going on to create these instruments which will take a number of years," says Professor Fleck. He predicts that while the aims of The Franklin are relatively high risk compared to traditional research funded at universities, it could bring massive rewards.

"It could take 15-20 years to deliver an outcome," says Professor Fleck. "But that outcome could cascade all the way through global science. Linking patient data to the underlying cell responses at an elemental level would be transformative. It is something we can only do with an organisation like The Franklin in partnership over many years."

King's involvement with The Franklin will build on the legacy of Rosalind Franklin herself during her academic career at the College, according to Chris Mottershead, Senior Vice President (Quality, Strategy & Innovation) at King's and its member representative at The Franklin.

"The techniques she used during her spectacular academic career at King's transformed our understanding of life sciences, by fusing the cutting-edge technology of the day with well-established scientific knowledge," he says. "The Rosalind Franklin Institute will follow in the spirit of enquiry that drove Rosalind herself, developing new techniques and tools and applying them for the first time to biological problems."



Chris Mottershead, Senior Vice President (Quality, Strategy & Innovation)

