

Research poised to lead to major advances in cataract treatment

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(Medical Xpress)—Research carried out by Professor Barbara Pierscionek and a team of fellow vision experts suggests that the way proteins are distributed in the lens of the eye may cause its gradient to be stepped rather than smooth as previously thought. The finding could give a new insight into the way the eye grows and lead to major improvements in synthetic lenses used in surgery to treat patients who have developed cataracts.

Artificial replacements did not currently match the quality of real ones, Professor Pierscionek said. "However this research could help give patients better vision if manufacturers use it to develop an improved [lens](#) able to change focus," she explained.

Professor Pierscionek, the Associate Dean of Research and Enterprise at Kingston's Faculty of Science, Engineering and Computing, has devoted two decades to researching the eye's lens. Her work has explored its biochemical, optical and [mechanical properties](#). Since the lens is one of the few organs in the body that does not replenish itself, it is a model for ageing. "The lens is the key to a lot of things - we just haven't unlocked its full potential yet. It has the capacity to tell us what has happened to a person throughout their life and their disease state," Professor Pierscionek said.

[Cataracts](#) can occur at any age, but often develop as people get older. In the United Kingdom, an estimated one in three people over the age of 65 is affected. Smoking and [UV radiation](#) are thought to be causes and they can also occur in people with diseases such as diabetes. The condition may gradually make vision more blurred and make it difficult to see in poor light. Treatment usually involves replacing the affected lens with an artificial one.

Professor Pierscionek carried out much of her most recent research at Japan's Spring-8 [synchrotron](#) facility - home of the world's largest third generation synchrotron. It accelerates [electrons](#) close to the [speed of light](#) to generate [X-rays](#) and other beams. The electrons are injected into a storage ring 1.4km in diameter, with the resultant X-rays fed into experimental stations dotted around the site. "These X-rays can penetrate parts of the body and soft tissue better than other forms of radiation," Professor Pierscionek said. "This allows engineers and scientists to look deeply into anything from metal to bacteria." When taking measurements it was important to keep the sample as close as possible to its natural state, Professor Pierscionek said. "The synchrotron is so sophisticated that it allows us to measure the lenses while they are still in the eyeball."

Some of the research has been conducted in collaboration with scientists

from the Spring-8 facility and Cardiff University. It is being funded by eye research charity Fight for Sight as well as grants from Spring-8, which has provided use of the synchrotron.

Further analysis is now being carried out in laboratories at Kingston University. Professor Pierscionek and her team are working with Dr Mehdi Bahram, a researcher funded by Fight for Sight, using ray tracing and mathematical modelling. The work involves projecting lasers of different colours through different parts of the lens to trace their paths. The information will then be used to help develop lenses with improved optical quality.

Provided by Kingston University, London

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