Research opens way to significant improvements for medication

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International research co-authored by the University of Otago, Christchurch has unraveled a century old scientific mystery, opening the way to significant improvements in the way drugs are delivered to the body.

The research into serum albumin, explains why and how this protein is the most abundant in blood, and will enable medication to be better targeted to the needs of individual patients. The study has recently been published in the prestigious international journal *Nature Communications.*

“This is an exciting development we have worked on for some time and which has just been recognised by the international pharmaceutical industry as a major advance in technology,” says Professor Stephen Brennan from the University of Otago, Christchurch.

The research in association with scientists in Norway, the UK and Novozymes Biopharma, has been awarded the premier prize for the most exciting delivery technology of the year at the Drug Delivery Partnerships conference in the USA.

“Essentially what our research reveals is a way to develop different variants of the albumin molecule in the blood, to which many drugs bind, and which is used to transport medications around the body.”

“This means if you want a drug to remain in the body longer for greater

effect, or to avoid a patient having to take so many pills or injections, you can adjust the half-life of the albumin molecule to achieve this."

Brennan says this has major implications for better tailoring of medication to specific needs of patients. In particular albumin could be used as a carrier protein for short-lived therapeutic peptides or hormones.

At present it is difficult to determine the most beneficial dosage regimen because the albumin molecules half-life can't be altered. This research changes all that, providing a new pathway to manipulate albumin molecules and adjust a drug's half-life within the patient, allowing improved therapeutic effects.

Scientifically the study shows that albumin molecules, instead of dying and being absorbed by endothelial cells lining the blood vessel, actually bind to a receptor in these cells and are then recycled back into the blood stream.

"We've established for the first time that when the pH inside the cell vesicles drops, then albumin binds to the Fc receptor in the cell, rather like a magnet. The albumin then gets transported back to the surface of the cell, to be released once more into the blood stream to do its work."

Professor Brennan says the discovery of this unique cellular recycling process that maintains the high volume of serum albumin in blood, carrying vital fatty acids, hormones and amino acids around the body, opens the possibility of adjusting albumin molecules to the requirements of specific medications.

Provided by University of Otago