Research to focus effective use of artemisinin stocks for malaria

The frontline malaria treatment artemisinin could soon be treating more people for less cost, thanks to research collaboration between Bradford and Shanghai.

Artemisinin is the leading treatment on the market able to combat drug-resistant strains of malaria, but a more efficient form of the drug is urgently needed. The active ingredient is just 1% of the plant and when taken in tablet form, poor solubility means that the amount of the drug absorbed into the bloodstream can l as low as 20%.

An extract of a grass grown mainly in China and Vietnam, artemisinin is also vulnerable to poor harvests, changing agricultural practices and natural disasters. Stocks were devastated in 2008 by the Sichuan Earthquake.

About 3.3 billion people - half of the world's population - are at risk of malaria, with around 250 million new cases each year and nearly one million deaths, mostly in the developing world.

Experts in drug design and delivery from the University of Bradford are working with scientists from Jilin University and the Shanghai Institute of Materia Medica - where artemisinin was first extracted in the 1960s to create a version of the drug that retains more of the active ingredient during manufacture and can be tak up more easily by the body.

Because of the low absorption of current marketed products, doses of the drug currently have to be up to five times the amount that should be needed. Not only does this overload the patient with unnecessary medication, waste valuable stocks of the drug and raise the chance of side effects, it also increases the c of the treatment - a crucial factor in developing countries where malaria poses the greatest risk.

Making more of it

"Our research is focusing on making the best and most effective use of the stocks of artemisinin that are available to us," explains Professor Peter York, who is leading the project at Bradford.

"We've worked in the past with other challenging drugs, so we believe we're well placed to make an impac While other research groups are looking at modifying the plant or synthesising the drug to overcome the problems of supply, we want to ensure we are able to create a medicine that works efficiently at minimum dosage, wherever the supply comes from."

Because artemisinin is very sensitive to oxidisation and heat, a proportion of the valuable active ingredient lost with traditional solvent-based extraction methods. The team will use a drug manufacturing process developed at Bradford, called the Super Critical Fluid (SCF) process, which is carried out at relatively low temperatures and is more benign than conventional extraction methods. The researchers believe that larg amounts of high quality artemisinin will be retained by using this method of manufacture. The SCF studies will be carried out by a spin-out company from the University of Bradford's Institute of Pharmaceutical Innovation - CrystecPharma, and its subsidiary based in Tianjin, China.

Looking to improve performance

The research will also look at ways to improve the rate of solution and absorption of artemisinin through the SCF process, by modifying the size and form of the drug particles and possibly incorporating hydrophilic polymer into the drug particles. Absorption studies and chemical analysis will be carried out by the Chinese project partners.

The project has been jointly funded by RCUK through its Science Bridges programme and by the Chinese Ministry of Science and Technology. The University of Bradford secured a £1.27M grant through the programme to forge partnerships and develop collaborative research into new drugs and healthcare products with top universities and healthcare companies across China. The artemisinin collaboration is one of 11 projects currently funded under Bradford's Science Bridges programme.

"This project is a great example of what Bradford's Science Bridges can do, bringing together the best of the UK and the best of China to carry out innovative research and deliver a new product with a potentially huge health benefit to millions of people," says Professor York. "Neither the researchers in the UK, nor those in China, could do this alone, but together we believe we have an excellent chance of success."

Source: University of Bradford