The pre-clinical drug development process frequently uses *in vitro* and *in vivo* animal models to try and predict the safety and efficacy of drugs in humans. The selection of animal species can have a pronounced influence on the outcome and potential fate of the test drug. When penicillin was discovered, researchers firstly chose to test it in mice and the encouraging results led to its use in humans. Had the researchers chosen hamsters or guinea pigs instead as their research model, penicillin would likely have been discarded, as it is lethal to both species\(^1\). Conversely, many drugs have been extensively scrutinised in preclinical animal tests only to be withdrawn after causing unpredictable and unacceptable side effects in human trials.

Biopta’s ability to perform comparative *in vitro* studies in multiple preclinical species, including human tissue, highlights potential species differences early in the drug development process. This has become especially important for translation of preclinical safety studies to patients and to improve the prediction of efficacy by using phenotypically-relevant fresh diseased human tissue.

For example, the 5-hydroxytryptamine (5-HT, serotonin) pathway is more prominent in the coronary artery function of human than in dogs, a standard preclinical safety species and pig, a favoured cardiac model species.

![Figure 1](image1.png)

*Figure 1 shows that in coronary arteries there are significant differences in the potency of 5-HT (5-hydroxytryptamine, serotonin) in human, dog and pig coronary arteries.*

In subcutaneous resistance arteries, human and non-human primate species differ significantly (10-fold) to rodent in their sensitivity to the vasorelaxant acetylcholine (Ach), which reflects species differences in the expression of nitric oxide synthase enzymes (NOS enzymes).

![Figure 1](image2.png)

*Figure 2. In this test of eNOS activity, we elicited vasodilatation of isolated small arteries by adding ACh, which released NO from the endothelium and caused roughly 80% relaxation in human arteries and the response was found to be similar in arteries from non-human primates. Arteries isolated from rats however showed a less sensitive response to Ach.*

Although animal models have a vital part to play in the testing of potential new drug therapies, early cross-species comparisons with fresh functional human tissues would increase confidence that the selected animal models are a relevant model and display similar responses to that observed in humans.

Biopta has been providing contract research services to the pharmaceutical industry since 2002 and has established itself as the world leader in the use of fresh isolated tissues including human to better predict drug activity prior to clinical trials. The clear commercial benefits of reducing risk by generating early human data on safety, efficacy and absorption are making human tissue research a routine part of drug development. Biopta’s expertise in all areas of human tissues research including sourcing, handling and experimenting on human tissue allows us to act as your “Human Tissue Research Department”.

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