

Rats and Mice as Models in Cardiovascular Research

Traditional Models of Myocardial Ischemia

ANIMAL MODEL	ADVANTAGES	DISADVANTAGES
Canine	<ul style="list-style-type: none"> •Extensive use - acute myocardial ischemia and infarction •Large vessels •Closed chest manipulation of coronary arteries 	<ul style="list-style-type: none"> •Extensive and variable collateral system •Cost •Social pressure against use
Swine	<ul style="list-style-type: none"> –Anatomy closely parallels human heart –Lack of significant collaterals –Large animal, more socially acceptable 	<ul style="list-style-type: none"> –Generally young immature pigs used –Often need multiple anesthetic agents –Vessel size relatively small –More prone to arrhythmias
Rabbit	<ul style="list-style-type: none"> –Established model for infarct size studies –Arteriosclerosis with cholesterol feeding –Utilized for mechanisms of pre-conditioning 	<ul style="list-style-type: none"> –Blood sampling limitations –Instrumentation limitations
Guinea Pig	Used to study cellular electrophysiology	Large collateral blood flow effectively preventing study of regional ischemia
Rat	<ul style="list-style-type: none"> –Standardization of regional ischemia –Homogeneous study population –Reproducible infarct size and arrhythmias –Cost 	<ul style="list-style-type: none"> –Size –Limitation of blood sampling and instrumentation
Mouse	Transgenic models available	<ul style="list-style-type: none"> •Instrumentation •Blood sampling
Langendorff Perfused Heart	<ul style="list-style-type: none"> –Stable preparation acutely –Standardize ischemia & reperfusion conditions –Isolates heart from neuro-humoral interaction 	<ul style="list-style-type: none"> –Deteriorates over time (5-10%/ hr) –Acellular perfusate –Heart isolated from neuro-humoral interaction

In general, the further one moves away from the study of human tissues, the greater becomes the quantity, quality and reproducibility of the data and the lower becomes the

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cost and time-to-result, but unfortunately this is usually offset by the model becoming increasingly less relevant to the human condition-especially when the disease process such as ischemia is the focus of study.

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