

## Rats and Mice as Models in Cardiovascular Research

### Traditional Models of Myocardial Ischemia

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

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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