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A long-term interest of the Vascular Surgical Research Group has been skeletal muscle ischaemia-reperfusion injury. The problem arises clinically when the arteries to the legs are blocked by clots from the heart, by atherosclerotic arteries, by arterial injuries or during major vascular surgical procedures. As well as damaging the ischaemic leg itself, reperfusion injury can also have remote effects, causing multisystem organ failure and even death. Current therapies are relatively ineffective, being supportive rather than curative. Research projects in the group address a number of aspects of the pathophysiology of vascular inflammation and reperfusion injury, potential therapies and their clinical implications. Both clinical and animal-based approaches are used.

Pathophysiology of small bowel damage following major vascular surgery A model of hind limb reperfusion injury has been established in the rat and previous studies have shown that administration of statins can reduce the severity of damage. Current studies are examining the molecular mechanisms by which the small bowel is damaged during reperfusion injury, including the roles of neutrophil activation, matrix metalloproteinase activity and nitric oxide in mediating tissue damage. Techniques include small animal procedures, enzyme assays, gel electrophoresis, real-time RT-PCR and immunohistochemistry.

Therapeutic approaches to limit peripheral reperfusion injury (in collaboration with the Cardiology Unit, The Queen Elizabeth Hospital) Using the rat model of skeletal muscle reperfusion injury, this project will aim to compare the protective effects of agents which potentially limit reactive oxygen species (ROS) release. A number of therapies will be tested, including direct scavenging of ROS using n-acetyl cysteine and ascorbic acid. The effect of limitation of neutrophil and intravascular NAD(P)H oxidase activation using ramipril, statins, perhexiline will also be tested. Techniques include small animal procedures, enzyme assays, gel electrophoresis, real-time RTPCR and immunohistochemistry.