Conclusion: There is expression of most elastolytic and collagenolytic MMPs in both aneurysms and occlusive disease, but expression of stromelysin 1 is greatly increased in aneurysms. Stromelysin 1 may be responsible for collagen breakdown in aneurysm disease and provide a target for pharmacological intervention.

Smoking, cadmium accumulation and aortic aneurysm

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Background: Smoking is an important risk factor for abdominal aortic aneurysm (AAA), a disorder associated with loss of medial smooth muscle cells. Cadmium, one of the toxic components inhaled in cigarette smoke, is known to alter the metabolism of aortic smooth muscle cells. This was an investigation of the hypothesis that excess cadmium accumulation in the abdominal aorta is associated with the development of aneurysms.
Methods: Samples of abdominal aorta were obtained at the time of surgery from 12 patients with AAA (seven men and five women, mean age 72 years) and at autopsy from 17 patients (ten men and seven women, mean age 76 years) with an undilated aorta (diameter 1·6–2·2 cm). The smoking history of all patients was noted. The aorta was dissected into three layers, intima, media and adventitia; each was dried to a constant weight, hydrolysed and cadmium was measured by atomic absorption spectrometry. In separate experiments 5-bromo-2′-deoxyuridine uptake and picogreen assay of DNA were used to investigate the effect of cadmium on the proliferation of cultured aortic smooth muscle cells.
Results: The mean(s.e.) cadmium content of the intima, media and adventitia was 1·14(0·24), 3·25(0·53) and 1·87(0·38) ng per mg dry weight respectively; the medial concentration was significantly higher than the concentration in the other two layers ($P < 0·005$). The medial cadmium content was similar in AAA and normal diameter aortas: 3·65(1·00) and 2·97(0·59) ng per mg dry weight respectively. Only trace amounts of cadmium were present in the aorta of those who had never smoked and there was a strong positive association between medial cadmium content and pack-year history of smoking ($r_S = 0·87$, $P < 0·001$). Cadmium inhibited the proliferation of smooth muscle cells cultured on polymeric collagen, 5-bromo-2′-deoxyuridine uptake (IC_{50} 1·4 nmol l^{-1}) and DNA content (IC_{50} 6·3 nmol l^{-1}). Cadmium was less toxic, by more than tenfold, to smooth muscle cells cultured on fibronectin, monomeric collagen or plastic.
Conclusion: Cadmium accumulates selectively in the medial layer of the abdominal aorta of smokers, where it may inhibit DNA synthesis and proliferation of smooth muscle cells. The toxic effects of cadmium on cultured smooth muscle cells depend on their underlying matrix and this may explain why the accumulation of cadmium in aortic media was not associated with the development of aneurysms.

Decreased endothelin binding and receptor density in varicose veins

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Background: The primary cause of venodilatation and reduced contractility in varicose veins is unclear. Endothelin (ET) 1 acts on smooth muscle cell ET A/ET B receptors to induce contraction and growth, and on endothelial cells to induce production of the vasorelaxant and growth inhibitors nitric oxide and prostacyclin. These factors may be involved in the aetiology of varicose veins. This study investigated ET-1 binding and ET A/ET B receptor density in varicose and non-varicose veins.
Methods: Proximal long sapheous vein (LSV) sections from nine patients undergoing surgery for varicose veins were compared with normal LSV from nine patients undergoing coronary artery bypass surgery. Slide-mounted sections were incubated in [^{125}I]-radiolabelled ET-1 and ET A/ET B binding sites were identified using subtype-selective radioligands. Receptor density and distribution was quantified on autoradiographs by densitometry and binding was localized at the cellular level by nuclear emulsion.
Results:

	ET-1 ($\times 10^{-3}$ d.p.m. mm^{-2})	ET A receptor ($\times 10^{-3}$ d.p.m. mm^{-2})	ET B receptor ($\times 10^{-3}$ d.p.m. mm^{-2})
Varicose veins ($n = 9$)	18·08(2·38)	5·13(0·42)	2·12(0·55)
Controls ($n = 9$)	24·83(1·72)	5·72(0·71)	3·72(0·45)
P*	0·04	0·48	0·03

Values are mean(s.e.m.) radioligand binding. *Unpaired t test

ET-1 binding and ET B receptor density decreased significantly in the varicose group. There was no significant difference in ET A receptor density.
Conclusion: Decreased ET-1 binding may contribute to venodilatation and poor contractility in varicose veins. This may be due to decreased tunica media ET B receptor density.

Methicillin-resistant *Staphylococcus aureus* infection in vascular patients

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Background: The increasing prevalence of methicillin-resistant *Staphylococcus aureus* (MRSA) is a major threat in arterial surgery and poses a considerable therapeutic challenge. The

aim of this study was to assess the prevalence of MRSA infection in patients treated in the vascular unit.

Methods: A retrospective case-note review was undertaken to identify the nature of the infection and the outcome.

Results: During 1993–1998, a total of 115 patients (4 per cent of the total) were positive for MRSA. Of these, 67 were colonized and 48 were infected by MRSA. The number of MRSA infections increased yearly (1 per cent in 1994 to 5 per cent in 1998). Of the 48 patients infected by MRSA, one had wound infection following brachial embolectomy which eventually resolved. Two patients had undergone carotid endarterectomy necessitating removal of an infected Dacron patch, one of whom developed a hemiparesis. Eleven patients had undergone elective abdominal aortic aneurysm (AAA) repair (five developed pneumonia, two septicaemia, two wound infection, one a false aneurysm at the site of insertion of an endovascular stent, and one developed crossover graft infection after endovascular AAA repair and died). Five patients had undergone ruptured AAA repair (two developed pneumonia, one wound infection and two developed graft infection and died). Four patients undergoing reconstruction for aortic occlusive disease developed MRSA infection, two of whom died. Twenty-five patients with MRSA infection had undergone lower limb procedures. Five of these had graft infection leading to amputation in three and death in two. One patient developed primary arterial infection following embolectomy resulting in arterial rupture.

Conclusion: These results suggest that the prevalence of MRSA infection in vascular patients is increasing. Infection of aortic grafts appears to be uniformly fatal and lower limb graft infection is associated with a high rate of limb loss.

Prospective, multicentre audit of complex vascular wound and graft infections: the impact of methicillin-resistant *Staphylococcus aureus*

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Background: A number of studies have looked at the outcome of vascular graft infections, but these often include small numbers of patients collected over a prolonged period of changing practice. Many of these studies do not contain cases of methicillin-resistant *Staphylococcus aureus* (MRSA).

Methods: Between February 1998 and January 1999, a prospective, multicentre audit was performed in order to examine the outcome of complex wound and graft infections in vascular surgery, with particular reference to MRSA.

Results: Some 66 grade II or III Szilagyi wound infections occurred. Overall, 23 per cent of type II infections progressed to graft infection. Of those with type III infections, 83 per cent had an adverse outcome (death, major amputation or ongoing infection). No vein graft became infected, but 12 of 38 prosthetic grafts were affected. MRSA accounted for 42 per cent of infections and was present in 67 per cent of patients with an adverse outcome. Adverse events occurred in 32 per cent of MRSA cases and in 10 per cent of non-MRSA cases ($P = 0{\cdot}04$). Wound infection proceeded to graft infection in 58 per cent of MRSA cases and in 32 per cent of non-MRSA cases ($P = 0{\cdot}08$). Seven of eight patients with MRSA before operation developed postoperative MRSA infection. Median length of stay was 31 days for MRSA *versus* 18 days for non-MRSA infections ($P = 0{\cdot}001$). Forty-three graft infections occurred; 12 were associated with a complex wound infection. Median time to presentation was 39 (range 2–2450) days. There were 16 deaths, nine major limb amputations and three ongoing infections among patients with a graft infection. The median length of stay was 36 days. MRSA was present in 36 per cent of all graft infections. Only one of these infections involved a vein graft ($P = 0{\cdot}001$). MRSA infection occurred more frequently where the primary procedure had been urgent rather than elective ($P = 0{\cdot}03$). MRSA graft infection accounted for seven of the nine major limb amputations. The median length of stay in patients with MRSA graft infection was 25 days longer ($P = 0{\cdot}001$).

Conclusion: Complex wound and graft infections continue to be associated with postoperative deaths and amputations. MRSA infection is now the most common organism involved in complex infections following vascular procedures. It is associated with an increase in the number of adverse outcomes and a significant increase in length of stay.

Use of superficial femoral/popliteal veins for suprainguinal arterial reconstruction in the presence of infection

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Background: Mycotic aneurysms and graft infection in the aortoiliac region provide formidable technical challenges and carry a high morbidity and mortality rate with either of the standard techniques of *in situ* antibiotic-bonded prosthetic reconstruction or extra-anatomical bypass. This study investigated the use of autologous superficial femoral/popliteal vein (SFPV) for arterial reconstruction in ten patients with arterial or graft infections of the aortoiliac region.

Methods: Two patients with mycotic aortic aneurysms and four with aortic graft infections underwent aortoiliac replacement with SFPV after thorough debridement and/or excision of infected graft material. Three infected femorofemoral grafts were replaced *in situ* with reversed SFPV and an infected axillofemoral graft was converted to an iliofemoral reversed SFPV graft. All patients received appropriate antibiotic therapy and were followed by regular postoperative duplex imaging. Preoperative femoral vein duplex imaging was performed in eight of ten patients to confirm suitability as a graft.

Results: Nine of the ten patients survived with a functioning graft and without limb loss or evidence of infection at 3–30 months. One patient died from myocardial infarction after

