graft to respond tit-for-tat: any T cells that attempt to reject the graft would themselves be eliminated.

That's the theory, but there are plenty of questions that must be answered before we will know if such an approach will work in humans. Bellgrau *et al.* show that the expression of CD95 ligand is necessary to ensure the immune privilege of the testis, but will it be sufficient? It could be that other, yet to be identified, factors expressed by this tissue are required for the ligand to exert its action. Moreover, it is not known to what extent organs can become immune-privileged before they succumb to invading pathogens. The answers to such doubts await the generation of mice transgenic for CD95 ligand and the transplantation of their organs into mismatched recipients.

Even if those results are encouraging, grafting organs from pigs to humans will not happen overnight. Thus far the bottleneck in the routine use of animals as a source of donor organs has not been the aggression of the host's T cells towards the graft: long before the T cells become activated, the graft has been rejected. Natural antibodies circulating in the blood of the recipient recognize endothelial antigens on the graft, and initiate the complement and clotting cascade of the host, resulting in hyperacute rejection within an hour. Although the graft carries its own complement regulatory proteins, the porcine complement inhibitors are not able to keep the human complement in check.

Earlier this year, McCurry *et al.*[10] described the development of pigs transgenic for human complement inhibitors to circumvent this problem; the results look promising, and it seems that the prevention of hyperacute rejection during the critical first 24 hours is well within reach. It remains to be seen whether a genetically engineered porcine graft expressing both complement inhibitors and CD95 ligand will be equipped to fight off the human immune system, or whether it will reveal new obstacles to xenografting. The scientists involved, and maybe ethicists too, are in for a busy time. □

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OBITUARY

Rudolf Peierls (1907–95)

PROFESSOR Sir Rudolf Peierls died on 19 September at the age of 88. He was, I believe, the last of that extraordinarily gifted generation of central European physicists who, having escaped from Hitler's Germany and seeking a career in Britain, took part in the projects for the construction of the atomic bomb.

As his autobiography (*Bird of Passage*, Princeton University Press, 1985) records, it was common knowledge among physicists in the early days of the Second World War that a uranium bomb might be possible. Peierls in 1941 had already achieved the status of professor of theoretical physics in the University of Birmingham, but as an 'ex-enemy alien' he was not involved in military research. He and his compatriot Robert Frisch, also in Birmingham, had the idea of working out from known data what would be the critical mass for an explosion if the pure ^{235}U isotope could be prepared. Finding — to their surprise — that the answer was only about a pound, they realized that the bomb was possible, and, fearing that Germany might get it first, had no doubt that this information should be communicated to the British government.

This was done and the news was thence passed across the Atlantic, where it was a big factor in convincing the United States to launch a major project. Peierls, in spite of his nationality, was brought into the project, and worked at Los Alamos, as did his assistant Klaus Fuchs, who was later found to have told Russian agents everything he knew. The news was a terrible shock to Peierls and his Russian wife, Genia.

Theoretical physicists, in the post-war period, have tended to specialize either in nuclear physics and the science of fundamental particles, or in the theory of solids. Peierls, back in Birmingham after the war, refused to do this. He

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wanted to be a generalist, publishing papers on applications of quantum mechanics to solids and to nuclei — and to accept research students in both fields. It is extraordinary how many of the senior theorists in Britain and elsewhere have passed through his hands, in Birmingham and later Oxford, including for instance Sir Sam Edwards and Sir Brian Flowers. He and his wife were indefatigable travellers, going to Seattle most summers, and attending many Pugwash meetings and summer schools.

At home they showed an outstanding hospitality. If someone turned up in Birmingham and could not find a lodging, they could always stay at the Peierls, and if a colleague got married, the reception would always be at the Peierls house.

Peierls is survived by his four children; Lady Peierls died some years ago, and is remembered by the helping hand she gave to everyone. I remember a Pugwash meeting in Cambridge, at which the Russian ladies expected the women in England to be cold and reserved. They had not met Genia yet.

If I say that Peierls is best known for his work on electrons in metals, that is because he wrote a book about this part of his work, and I am a solid-state physicist myself. A paper of his in *Physical Review Letters* last year on vanadium dioxide is entitled "Mott or Peierls?" His achievements include the understanding of a form of metal–insulator transition in one-dimensional systems, diamagnetism in metals and the force resisting the motion of a dislocation. Rudolf Peierls would like to be remembered, justly, as a physicist who turned his hand to any problem. Nevill Mott

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