Metals in Medicine – The Use of Stents

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What is the connection between American fighter jets and the Christie Centre in Manchester? Answer: they both make use of memory shape alloys.

NiTiNOL is a remarkable material: it is super-elastic (you can stretch it, and stretch it….) and it then always returns to its previous shape (a shape that you can set by heating it to 500 degrees Centigrade while holding it in the desired configuration). Combine these properties with corrosion resistance and bio-compatibility and you have a highly desirable material for use in medical stents. The memory-shape ability and elasticity means that a stent designed to hold open a body passage (such as the Oesophagus or the bile duct) can be compressed inside a small tube that can be fed down to the target location. When the stent is pushed out of the insertion device it expands back to its original dimensions (preferably somewhat gently) and, for example, now provides a route for food to patients who previously had difficulty swallowing.

The Christie, supported by Derek Edwards, make use of stents to provide palliative care for sufferers from Oesophageal cancer, but to some extent they have been victims of their own success in extending life. Patients are surviving sufficiently long for them to discover that NiTiNol is not quite as corrosion resistant to stomach acids as they at first thought, and they have now had to develop sophisticated methods of removing stents that after many months are starting to break up. This looked like a decidedly non-trivial process, because spreading cancers can grow around the stent wires. The search is on for more resistant materials that can also retain the highly desirable properties of NiTiNOL (e.g. by coating the wire in platinum).

Derek Edwards was clearly a man overflowing with enthusiasm for his work (for which, being formally in retirement, he no longer gets paid - as a matter of choice), but it is clearly an all consuming activity that he will never be able to leave alone, and for which we should all be highly grateful.