

# Bionic pets

# Engineering new options in pet healthcare

By: Sara Sharpe

Bioengineering is helping to provide an increasing range of treatment options for our pets. In the field of orthopaedics, applications such as biocompatible prostheses and other devices are presenting promising new tools for veterinary practice. Thanks to the work of pioneering veterinary surgeons, like Noel Fitzpatrick – one of the world’s leading ‘bionic’ veterinary experts – cutting-edge technology and expertise in orthopaedics and neurosurgery are combined to find new solutions for complex, often life-threatening problems. PETS International talked to Noel about this ground breaking field that holds considerable potential in contributing towards advancing healthcare for pets, as well as humans.

A veterinary surgeon with expertise in orthopaedics and neurosurgery, Noel works together with a large team of vets and nurses at his state-of-the-art practice, Fitzpatrick Referrals, in Surrey, the United Kingdom. He develops new methods and techniques to help pets with serious clinical problems, many of which would otherwise face being put to sleep. His most well-known cases include Oscar, ‘the bionic cat’ – the world’s first cat to receive two prosthetic feet - after both his hind paws were severed in an accident and Roly, an American Bulldog, who became the first dog in the world to be fitted with an artificial hip

specially designed to ‘sandwich’ muscle with metal and fabric mesh to restore full mobility following excision of a large bone tumour.

**PETS International (PI): What inspired you to specialize in this field?**

**Noel Fitzpatrick (NF):** I was driven to explore this field by its underdevelopment. My specialism grew from curiosity and from sheer frustration at the paucity of existing resources and the lack of mental and physical investment devoted to this field. I have since dedicated the vast majority of my professional career to neuro-orthopaedics and am passionate about advancing it. I believe wholeheartedly in leveraging technology, wherever possible, to provide pain free, functional quality of life – taking each patient as an individual case, of course. I am also convinced of the immense value of the ‘one medicine’ concept – that medical developments for animals and humans can, and should be, advanced hand-in-hand.

**PI: What are the most common problems that you encounter in your practice?**

**NF:** 90% of the cases seen at the practice are routine. They include elbow, knee, hip and spinal problems, such as cruciate ligament injury and dysplasias. The other 10% consists of more unusual cases, such as

total joint or partial limb replacement due to injury or cancer.

**PI: So you use advanced technology in every aspect of your work?**

**NF:** Yes. Advanced diagnostic imaging is particularly important. We have equipped the practice with state-of-the-art imaging systems, such as the latest MRI and CT machines from Siemens that provide images of very high quality, but short scan times, often allowing us to use sedation rather than general anaesthesia, which can be very important for trauma cases. The scanners also provide greater options in vascular imaging and intervention. We also have Storz and Sony arthroscopy systems that allow us to view joints with superb magnification and clarity for diagnostic and surgical intervention. Software advances, such as Computer Aided Design (CAD) are essential in the design process of, for example, new devices and implants. And we are pioneering material applications in developing devices, such as developing new metal surfaces or coating metal implants

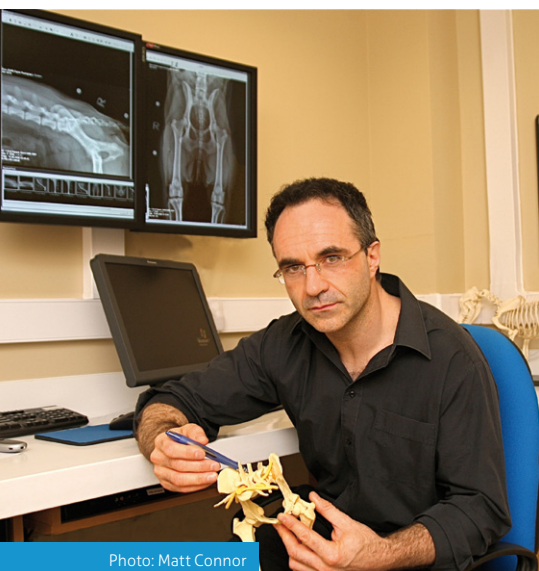


Photo: Matt Connor

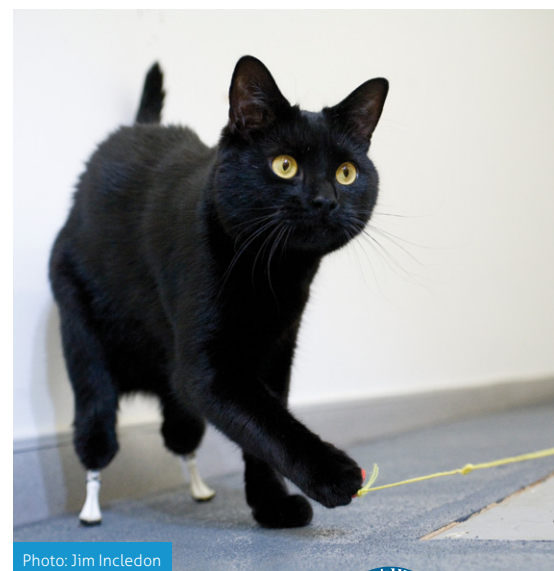


Photo: Jim Inledon



### What is bioengineering?

Bio(medical)engineering is the application of engineering principles and design concepts to medicine and biology. It combines the design and problem solving skills of engineering with medical and biological sciences to improve healthcare diagnosis, monitoring and therapy. Bionics is the application of biological methods and systems found in nature to the study and design of engineering systems and modern technology.

### Oscar

One of Noel's most well-known success stories includes Oscar 'the bionic cat' – a young, male cat that had both his hind paws accidentally severed between the ankle and foot, by a corn-harvester active in a field nearby his Jersey home, in 2009. Oscar was referred to Noel, who undertook ground breaking surgery to successfully attach two prosthetic hind feet. Although the operation he carried out was a world first, it mimics a natural process, being similar to the way deer grow antler bones, in the manner that the implants adhere to bone and skin. The implants were both custom-made to fit into holes drilled into Oscar's ankle bones. The procedure was so unique that Oscar's story appeared in news across the world in June 2010 and featured in a BBC documentary about Noel's remarkable work – The Bionic Vet – which was screened across the UK last year. It has since been considered for application in humans.

### Roly

Stricken with cancer, Roly, the American Bulldog had his hip joint and most of his femur replaced with a device that allows tendons and musculature to grow into it, similar to Oscar the cat's special prosthetics. Roly's successful procedure shows promise in paving the way forward for successful tendon reattachments to human knee and shoulder prostheses following accidents.

with hydroxyapatite – a bone 'building' mineral – to stimulate natural growth of bone or skin around the device. Extensive aftercare and rehabilitation is an equally vital aspect of our work. The practice has a dedicated rehabilitation centre with a large, purpose-built, hydrotherapy pool and dedicated physiotherapy team and facilities. Of course, most important is the skill of our exceptional team of vets, technicians and nurses – currently 92 staff – in applying all this technology appropriately. We are fully committed to providing a surgical and medical service for our patients that is second to none in the world.

### PI: Are manufacturers meeting your needs as a specialist?

**NF:** Absolutely not! While diagnostic imaging has advanced considerably driven by needs in human medicine, other bioengineering applications for veterinary use are very much overlooked by manufacturers. I

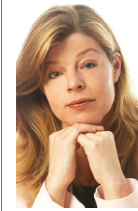
currently work closely together with many individual bioengineers from manufacturers and research institutes, but in general there is a wider lack of investment, research, coherence and vision in this field.

### PI: Alongside your pioneering work, you have also established your own manufacturing base to address some of the missing needs.

**NF:** Yes. OrthoFitz Implants Ltd. is a specialist manufacturing company that has been established together with several respected bioengineers and researchers. Our aim is to develop and patent medical devices with practical application for animal patients and translational potential for human patients.

### PI: What would you like to see manufacturers focus on in the coming years?

**NF:** As mentioned, the field currently requires far more investment in research and education. This is key to oil the wheels of



Sara Sharpe

sara@thecreativepractice.com

www.thecreativepractice.com

manufacture. Manufacturers could contribute to this by supporting R&D in this field more. I would also like to see more crossover and collaboration between human and animal medicine. To make our own contribution to this, we have established The Fitzpatrick Education Foundation, with a future aim to support key research projects. We don't have any money to do so yet, however. We have also launched a global veterinary learning platform – The Fitzpatrick Learning Academy – an online learning facility for veterinary professionals, introduced in July this year.

### PI: Are manufacturers working closely enough with other organizations in this field?

**NF:** Not enough at the moment. By collaborating more with others, sharing knowledge and supporting R&D, development of this field for animal and human use would accelerate. Another limiting factor is that there are few national or international bodies with a proactive desire in this field.

### PI: What factors should new manufacturers entering this field consider?

**NF:** Well, this is definitely not a field in which manufacturers should expect a large return immediately. Serious organizations, which can bring new solutions to the table, will be welcomed, but interested manufacturers need to think in terms of a five to ten year game plan, as an absolute minimum. However, it is an exciting field to work in. With such broad implications across animal and human medicine, the long term prospects could be significant. ■

For further information:

www.fitzpatrickreferrals.co.uk

