

## **Bone allografts: FAQs**

### **1. What is the Veterinary Tissue Bank**

The VTB is a new venture which will use donated canine tissues and process them for use by veterinary surgeons to repair injuries in recipient patients. Tissue transplantation is in its infancy in veterinary medicine, but if one looks at human surgery, tissue transplantation is commonplace and became so during the 1980s and 1990s. Our market research suggests that there is now a real need in veterinary surgery and we are looking to meet that need. This is Europe's first veterinary tissue bank.

### **2. Where does the bone come from?**

Just as in humans, tissues are retrieved from donors with full, informed consent from owners. Owners of dogs that die can consider donation of tissues so that other animals might benefit. All donors and their medical history are screened by a veterinary surgeon and selection criteria are applied, for obvious reasons. Tissue donation can have a major impact on quality of life to those dogs that are in need; for example, donation may save another dog's limb. VTB hopes that the owners can take some comfort in their bereavement that other dogs will benefit from their generosity at a difficult time. Tissue donation is a public programme and VTB will be piloting in selected areas. Participation of vets, nurses and those in the veterinary community is encouraged.

### **3. How is the bone processed?**

Tissues are subject to various steps involving cutting, soaking, centrifugation and washing with chemicals such as alcohol, detergent and hydrogen peroxide to remove marrow and lipids. All steps are carried out aseptically. Tissues are subject to freeze drying so that they can be stored at ambient temperature. From cancellous bone, we produce small chips of various sizes which are **osteoconductive**. From cortical bone, we produce demineralised bone matrix (DBM) and for this, calcium is removed by treating the cortical bone with HCl acid so that it can express bone morphogenic protein (BMP) activity. BMP is believed to be somehow shielded by hydroxyapatite. This is a key point, because these BMPs are species-specific and they greatly enhance bone formation, in other words, DBM is **osteoinductive**.

### **4. What are bone allografts used for?**

**Cancellous chips** come in various sizes and are used in procedures such as carpal and tarsal arthrodeses, fracture repairs, void filling, and spinal fusions. They can be used alone, or mixed with DBM, or mixed with autograft as a graft extender.

**DBM** is used where the surgeon requires osteoinduction but does not require structural support. For example:

- small joint arthrodesis such as the carpus and tarsus
- encouraging spinal fusion around a stable fixation
- encouraging fracture healing around a fixated fracture

## **Bone allografts: FAQs (continued)**

**Cortical allografts** are used in limb-sparing surgery for primary bone tumours, during total hip revisions and spinal fusions. The cortical allografts come in struts, cylinders or whole bones.

Cancellous cubes are used to fill voids where some structural integrity is required. The cubes can be shaped with rongeurs to fit the void precisely.

### **5. How is safety of the allografts assured??**

The safety of grafts is achieved by a combination of various steps such as strict donor selection, aseptic harvesting of tissues, processing to reduce bioburden, and sterilisation by gamma irradiation. In addition, Good Manufacturing Practice (GMP) and comprehensive documentation also contribute to safe and quality grafts. In dogs, any risk is considered very low indeed because we have vaccination against the major viruses anyway and all donors must have a full vaccination history.

### **6. What is the difference between allograft and synthetic bone products?**

There are several advantages of allograft over synthetic products:

- a. synthetics lack elastic modulus
- b. allografts are natural materials and host cells have a preference for allografts
- c. DBM contains species-specific growth factors.

### **7. Why should allograft be used when vets have been used to harvesting autograft?**

Allografts offer many of the benefits of autograft but are readily available “off the shelf”. This saves patient preparation time and surgical time. Both will reduce anaesthetic time with benefits to the patient, but also save the surgeon time. The cost of allograft to the client is probably compensated by the saved surgical time. Also, in some of our very small patients, obtaining autograft is very difficult and may be associated with an unacceptable complication rate. Allografts may also be used as graft extenders.

### **8. How long do these products last in storage?**

Shelf life for freeze-dried tissues is **5 years at ambient temperature**, so surgeons can certainly order in these products in advance and have them there, ready to use when needed – an ‘off-the-shelf’ solution. Frozen tissues last for 5 years if stored under  $-40^{\circ}\text{C}$ , or 6 months at  $-20^{\circ}\text{C}$ .