AGINKO Research

Fracture Repair

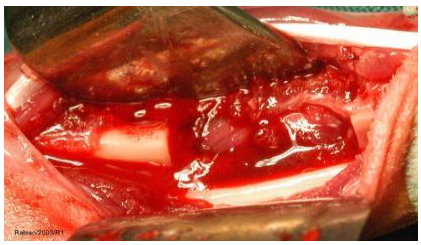
Bone Healing

Fracture healing is a complex physiological process where the bone and its neighboring tissues play important roles. Thus, fracture healing can only be assessed in animal models. However, the choice of the most appropriate animal model for fracture repair remains an unanswered question as no animal model accurately reproduces the human bone physiology, biology, structure and biomechanics. Despite these limitations, small and large animal models have been developed to study the effects of bone substitutes, scaffold, biologics or cell-based products on bone fracture repair.
Fracture bone healing is usually an optimal biological process. However, delayed healing or non-union can occur in patients for multiple reasons. In addition, bone fractures are more frequent and more problematic in osteoporotic patients as the bone structure is compromised. Fracture, segmental and critical-size defect models have been developed in several species.

Animal Models

Critical-size defects:

- Calvaria critical-size defect in rats, rabbits
- Mandibular critical-size defect in mini-pigs, in dogs
- Femur critical-size defects in rats
- Ulna critical-size defects in rabbits
- Tibial critical-size defects in sheeps and mini-pigs



New-Zealand White (NZW) rabbit ulna critical-size defect.

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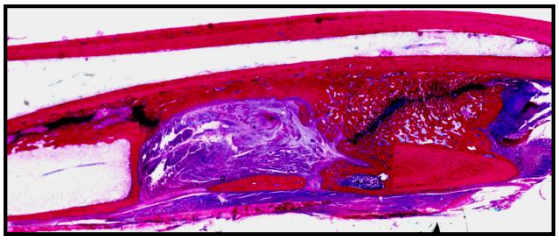
Radiography of New-Zealand White (NZW) rabbit ulna critical-size defect.



Histological staining of (NZW) rabbit ulna critical-size defect.

Osteotomy (fracture and segmental bone defects):

- Tibial osteotomy in mini-pigs, sheeps and goats
- Femoral osteotomy in mini-pigs, sheeps and goats
- Mandibular osteotomy in sheeps

Outcome Measurements

A wide range of measurements can be performed such as:

- *In vivo* and *ex vivo* BMD and BMC measurements of cortical and trabecular bones by DEXA, pQCT and µCT
- Biomechanical testing
- Physiological bone turnover markers (blood, urine)
- Ash chemical analysis
- Histomorphometry, histology