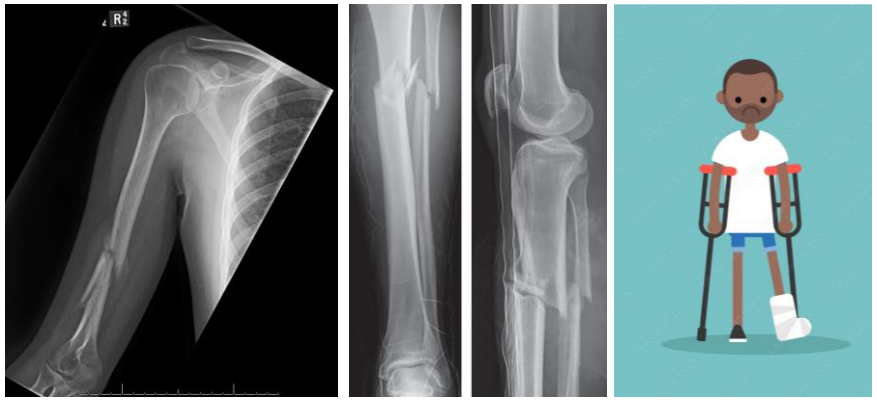
Quick solution
for bone fusion disorders

JAGIELLONIAN
UNIVERSITY
IN KRAKÓW

KNOWLEDGE - COOPERATION - INNOVATION

Problem: Bone fusion disorders



- **Up to 16% cases of atrophic non-unions after bone fractures** – increased risk in obesity, type II diabetes, rheumatoid arthritis, open fractures etc.

  ➔ Autologous transplantation of spongy (cancellous) bone is now common procedure, but it is associated with additional trauma
- **Intra-articular fractures** - predispose the joint to osteoarthrosis
- **Sterile necrosis of the femoral head** – the bone can eventually collapse
- **Loosening of joint endoprostheses** (especially of the hip) - the most frequent complications of joint arthroplasty

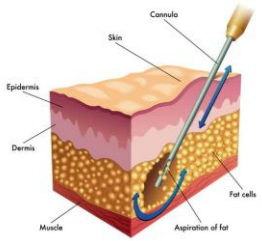
Forearm fractures in miniature breed dogs, up to 75% complication rate due to anatomical conditions

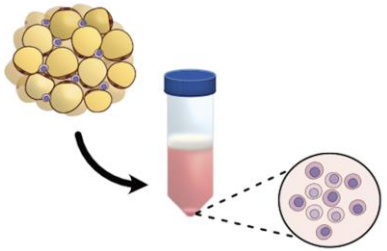
➔ Given the size of the animal, there are currently no effective regenerative methods

Non-unions in dogs

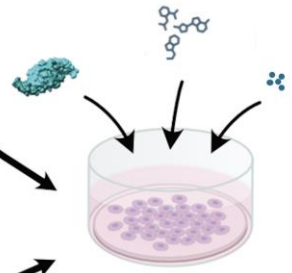
Solution: Osteoblastic cells derived from subcutaneous adipose tissue for bone restoration

Stromal vascular fraction (SVF) cells derived from adipose tissue

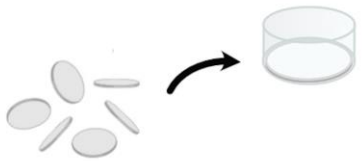




Chemical cocktail

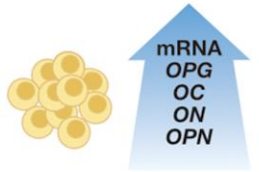


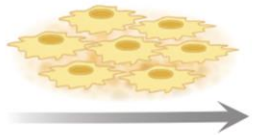
⇆ dynamic culture



Bioactive growth surfaces

Osteoblastic phenotype after **3-7 days** of culture





Mineralizing osteoblasts ~14 days after 7-day preculture on bioactive surfaces

Delivery of osteoblastic cells on the composites used in the Innovation or any other suitable implant material

Current status

The cell culture protocol has been verified in vitro in several human and animal cell types

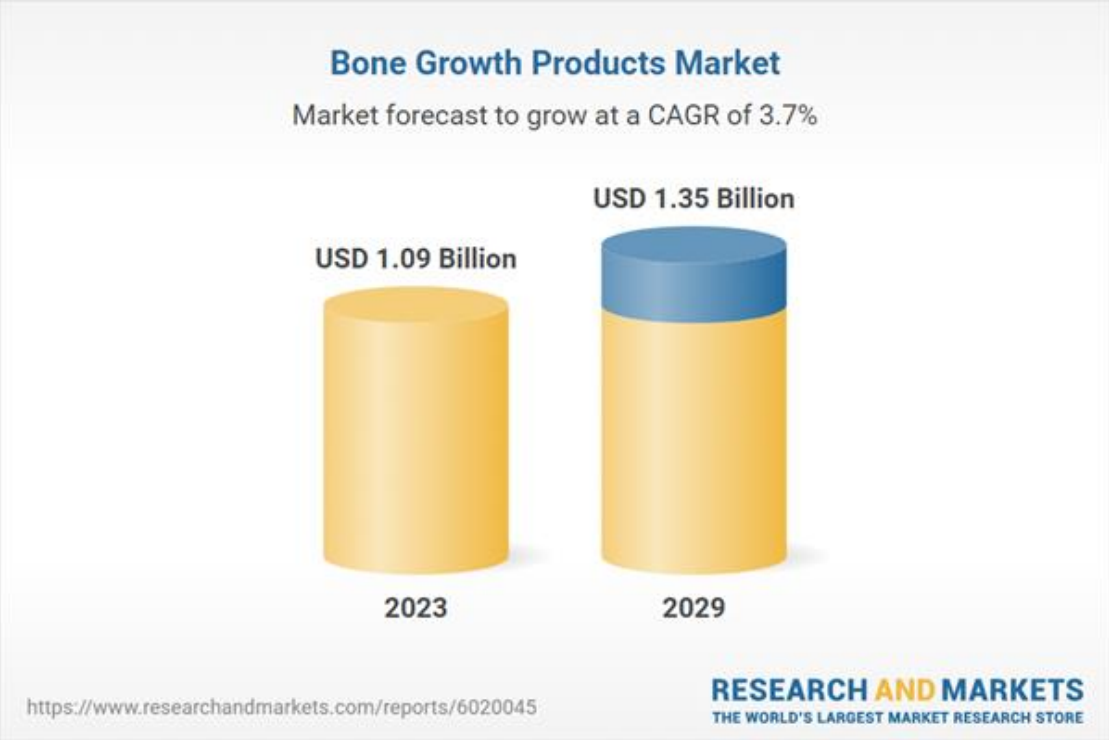
3D cultures on a scaffold or scaffold-free enhance the osteogenic effect of the protocol

Animal model studies are now planned, preferably in mammals other than rodents

TRL IV technology readiness level

Patent-pending regarding the culture protocol

Market and competition



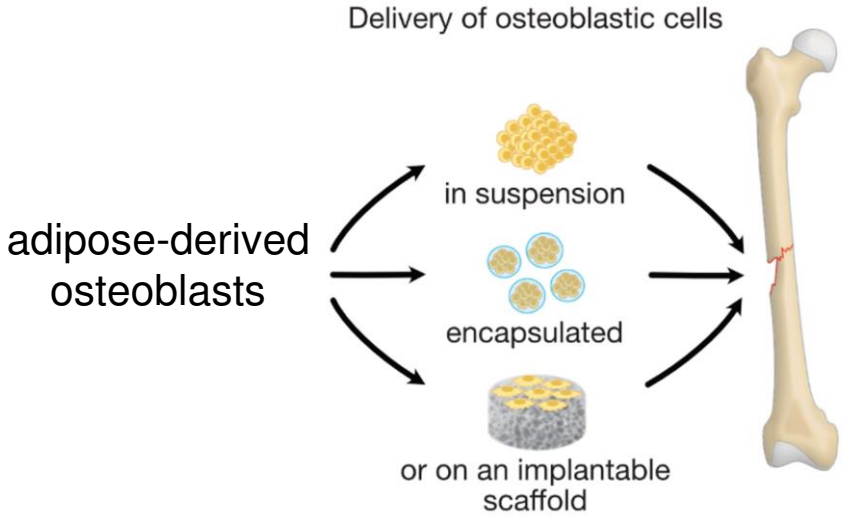
Biological methods commercially available:

- Bone marrow-derived cells – additional trauma
- Demineralized bone matrix – various properties depending on a batch
- Platelet-rich plasma (PRP) and undifferentiated adipose tissue-derived stem cells – not very efficient

FDA has not approved yet any products using adipose-derived cells directed to bone cells

Ultimate goal





- **Treatment of non-unions in miniature „toy" dog breeds**

  So far any study on stimulating the bone fusion process in small dogs has not entered clinical practice on a massive scale

- **Clinical trials in orthopedics and traumatology following implementation of the protocol in animals**

  Boosting bone formation in atrophic non-unions and restoration of bone defects in sterile necrosis of the femoral head, intra-articular fractures, loosening of joint endoprostheses and after benign tumor resections

Team

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