

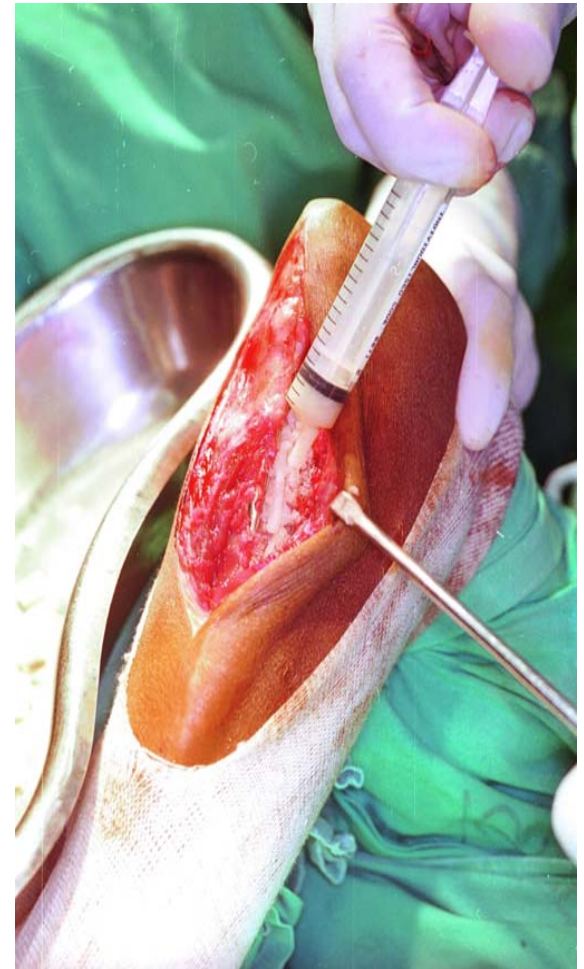
Altis Biologics (Pty) Ltd

TISSUE ENGINEERING OF BONE

FROM CONCEPT TO MARKET

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BioSA
2 April, 2008





ABOUT ALTIS BIOLOGICS

- Start-up biotechnology company (2002)
- 6 employees
 - +7 postgraduate university students
- Innovation Fund Grant (NRF)
 - R 14.8 million over 5 years (2004-2009)
- Annual income from tech licenses-
 - R 220k p.a.



WHAT WE DO

- Research and development of novel tissue engineering biomaterials for bone regeneration
 - Flagship Project:
 - Porcine derived bone morphogenetic protein and collagenous delivery systems

■ Background & Technology Description



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- 12 years research in tissue engineering of bone
 - Formalised co-operations
 - Holland
 - Japan
 - China
 - South Africa



CORE OBJECTIVES

- Commercialisation of products based on Altis' tissue engineering technology platform/s
 - Altis Osteogenic Bone Matrix (OBM) Naturally derived Bone Morphogenetic Protein (BMP) – Proprietary high yield process and novel injectable delivery mechanism

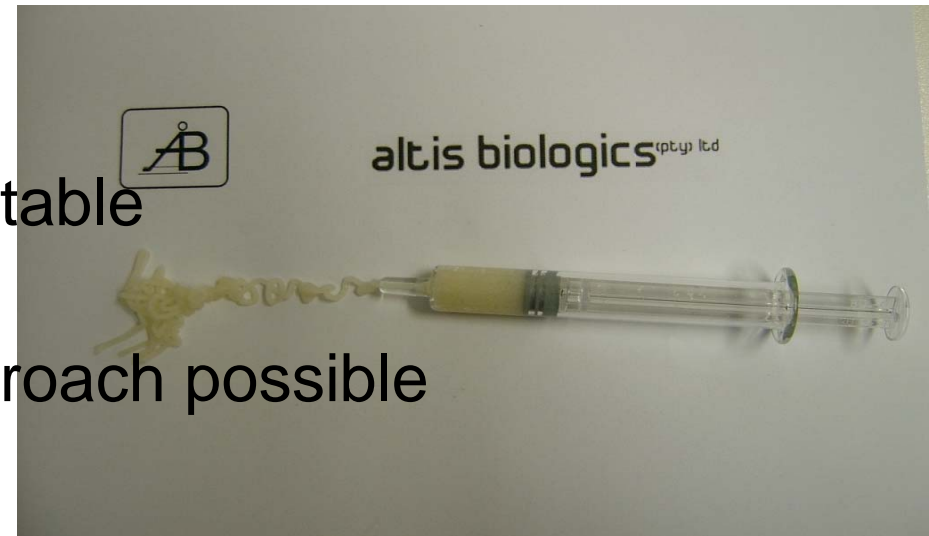
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- 1. Process/Technology review**
 - 2. Preclinical & Human Clinical Studies**
 - 3. IP status**

2. Process/Technology

- a. Altis Technology Platforms & Products:
- **Human BMP (hBMP)** Technology Platform
 - Endogen IVT – hBMP based product
 - Bone Morphogenetic Protein based product processed from human donor bone
 - **Porcine BMP (pBMP)** Technology Platform
 - Altis OBM™ - pBMP based product
 - Bone Morphogenetic Protein based product processed from specific pathogen free pigs
 - **Cross-linked Collagen** Technology Platform

■ Altis Proprietary Natural BMP Technology Platform

- High yield purification of previously non-feasible osteogenic complexes
- Injectable
- Lyophilised
- Room temperature stable
- Osteoinductive
- Transcutaneous approach possible
- Precision delivery



■ Operations – Xenogeneic Tissue Engineering

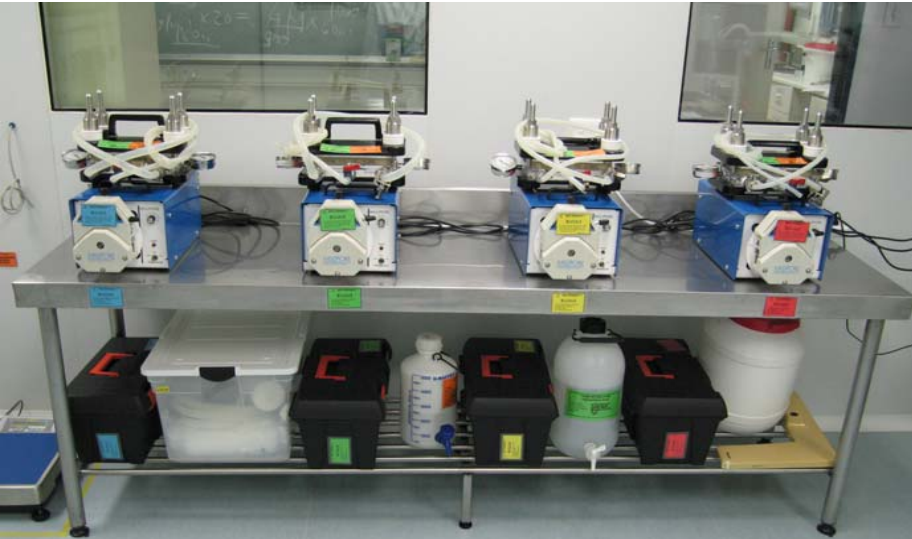
An MCC approved GMP unit dedicated to the development of Altis' xenogeneic biomaterials for tissue engineering, from concept stage up to pilot plant manufacture, clinical testing and premarket approval stages.



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Porcine bone from specified pathogen free herds





■ Animal Studies: Altis OBM BONE INDUCTION PHENOMENON

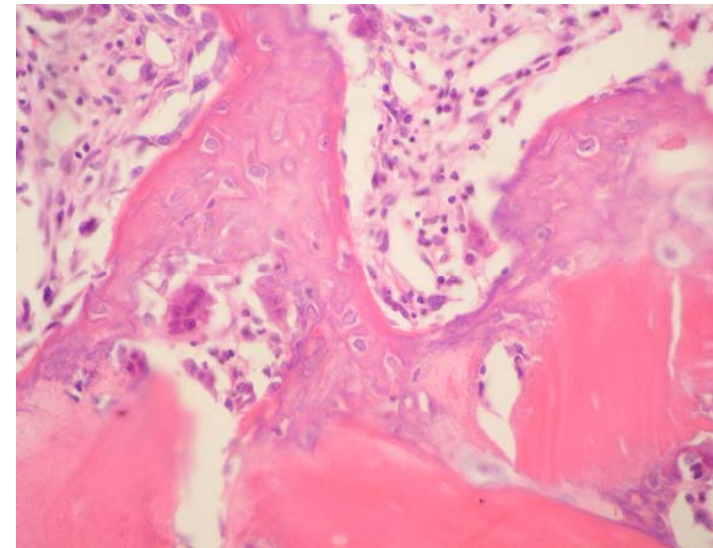
Polyacrylamide
gel
electrophoresis



Implanted into rat
subcutaneously
and explant at 12
days



New bone
formation



Preclinical tests prescribed by the EMEA for bone tissue implant devices and status for testing with Altis OBM, and responsible contracting laboratory and physical address.

Device category: Bone Tissue	<i>In vitro</i> cytotoxicity	Sensitization	<i>In vitro</i> genotoxicity	<i>In vivo</i> implantation effects
ISO CODE	ISO 10993-5	ISO 10993-10	ISO 10993-3	ISO 10993-6
Status with Altis OBM	Successfully completed	Successfully completed	Successfully completed	Successfully completed
Contracting Laboratory	Safeparm Laboratories Limited Shardlow Business Park Shardlow Derbyshire DE72 2GD UK Tel + 44 (0) 1332 792896	LaBio Research cc 175 Nelson Mandela Drive Room3-228 012 318 6267	Safeparm Laboratories Limited Shardlow Business Park Shardlow Derbyshire DE72 2GD UK Tel + 44 (0) 1332 792896	LaBio Research cc 175 Nelson Mandela Drive Room3-228 012 318 6267

Additional preclinical tests not prescribed by EMEA but conducted by the Sponsor for additional safety and proof of concept.

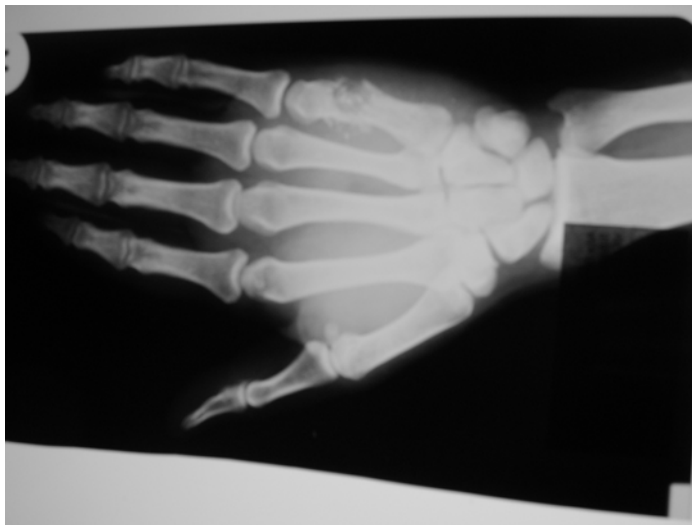
Study	High dose <i>in vivo</i> implantation effects	<i>In vivo</i> subcutaneous heterotopic bone induction	<i>In vivo</i> intramuscular heterotopic bone induction	<i>In vitro</i> mouse myoblast biologic activity determination
ADAPTED ISO CODE	ISO 10993-6	ISO 10993-6	ISO 10993-10	Published method Jortikka <i>et al.</i>
Status with Altis OBM	Successfully completed	Successfully completed	Successfully completed	Successfully completed
Contracting Laboratory	LaBio Research 175 Nelson Mandela Drive Room3-228	LaBio Research Room3-228	LaBio Research 175 Nelson Mandela Drive Room3-228	Centre for Tissue Engineering, Tshwane University of Technology, 175 Nelson Mandela Drive



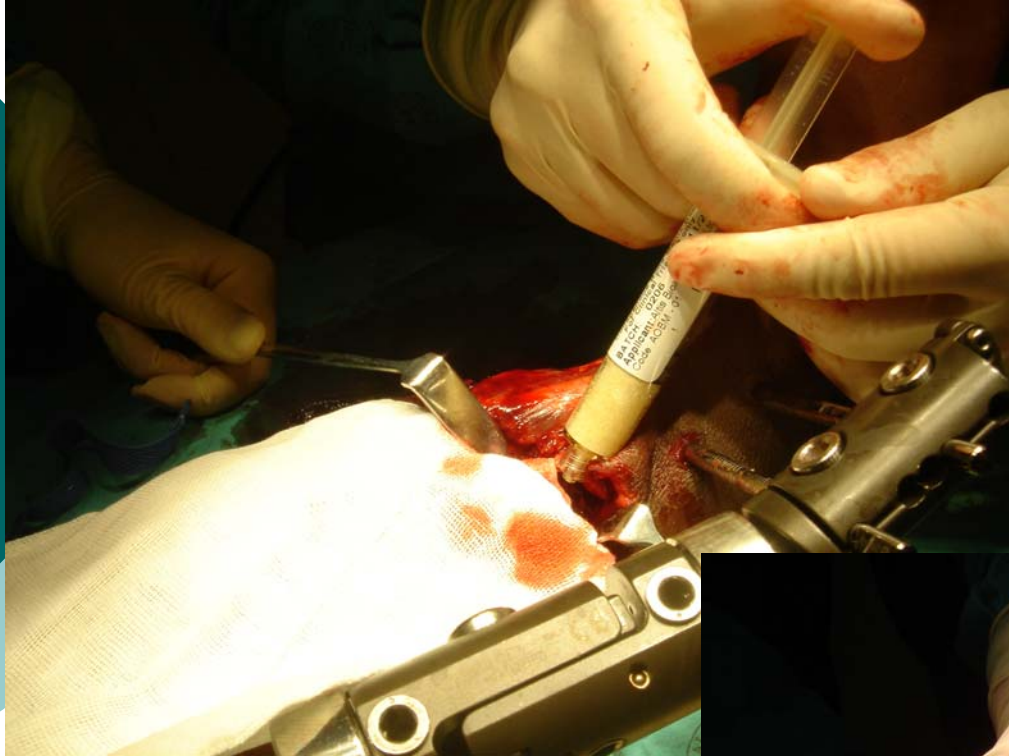
- HUMAN CLINICAL STUDY WITH
ALTIS OBM

Altis™ Osteogenic Bone Matrix in patients with traumatic long bone defects: a phase 1, open label, non-randomized, study over 3 months.

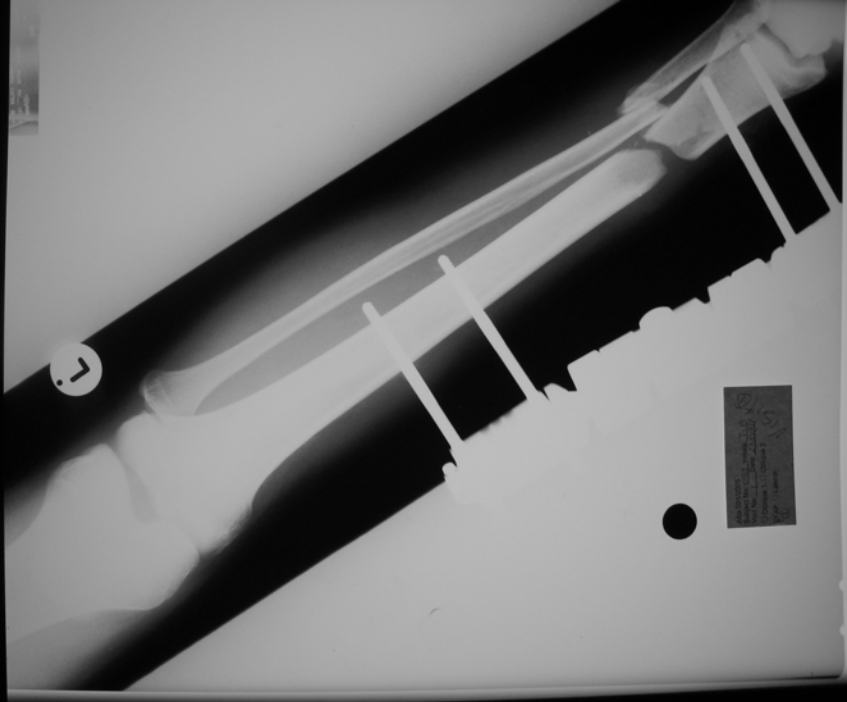
MCC Reference Number: N2/19/8/2 (2147), MCC Ethics Reference Number: 20050425



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FIGURE 3a. Non-union in a patient after attempts to treat defect conventionally had failed.

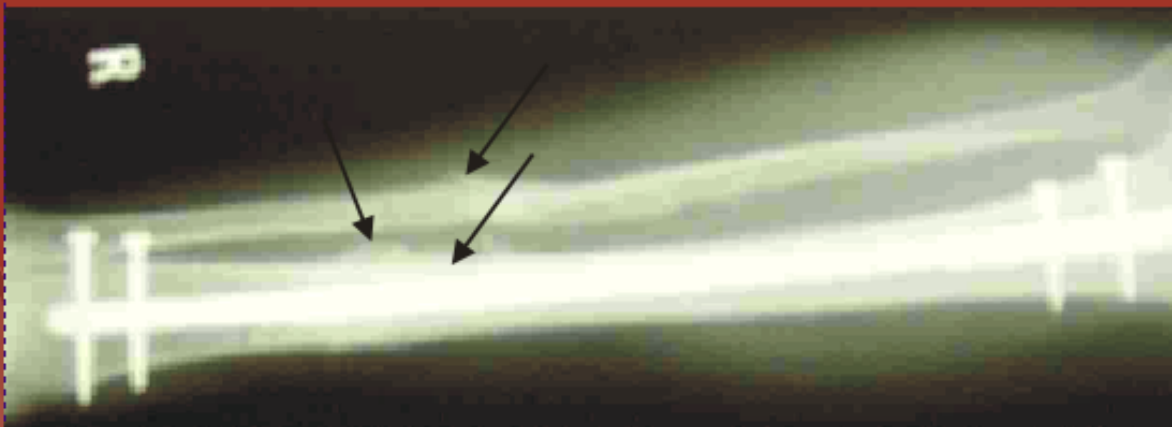
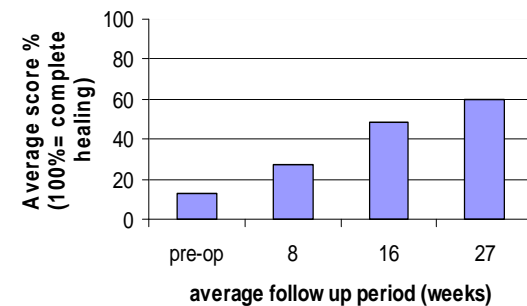
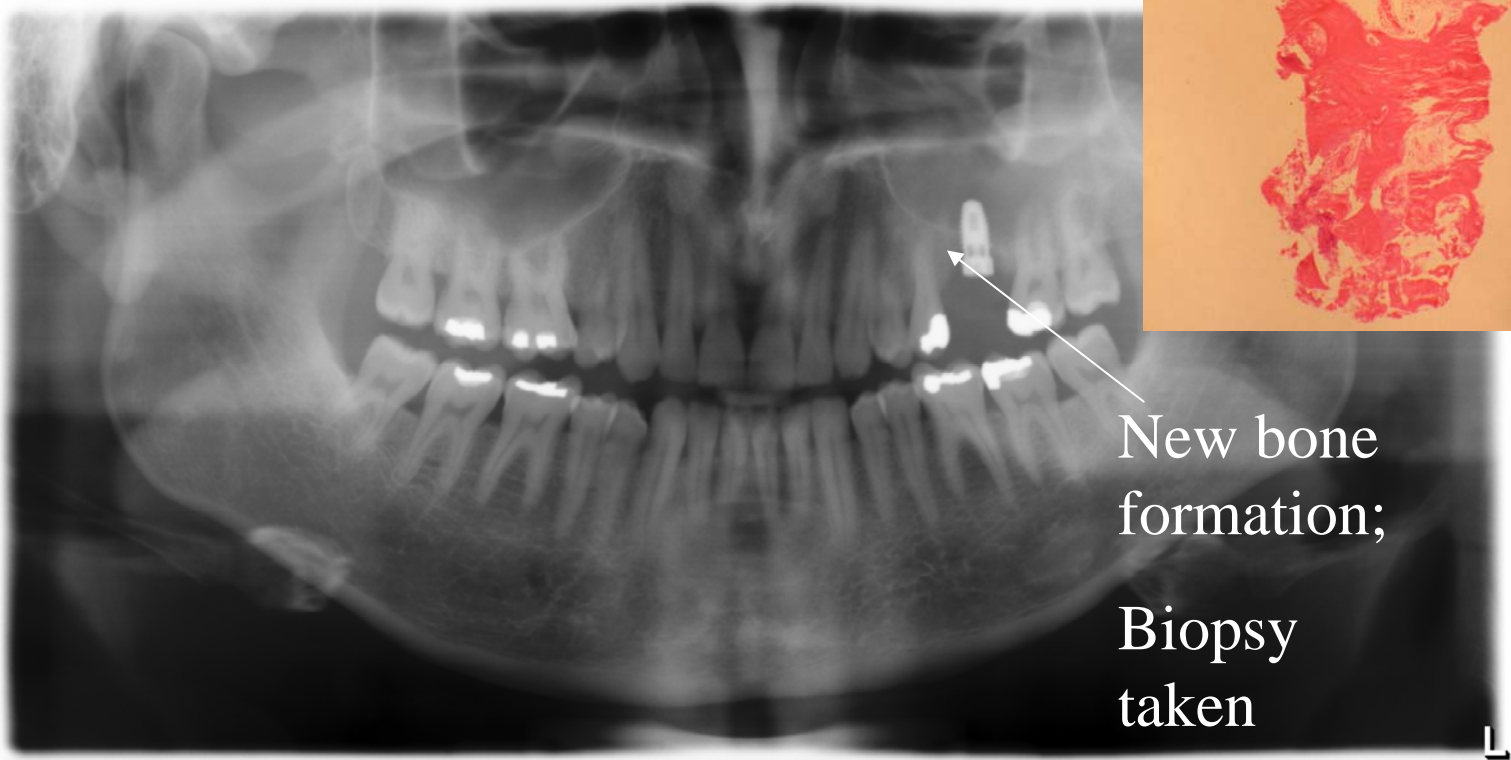


FIGURE 3b. Same patient treated with the composite hBMP material and internal nail. Complete healing and visible new bone evidenced at 16 weeks post operatively.

Radiographic Evaluation- Rescaled Data



4 months post-op



■ Patents Filed

- RSA 2002/4977 granted; prosecuted further under PCT
- PCT/IB03/0234- prosecution completed.
National Phases entered
- PCT National Phases
 - China, EPO, USA, Japan

■ Market Segments

Health care type	Intended use of Altis osteogenic implant
Orthopaedic	<ul style="list-style-type: none"> • Non-unions • Malunions • Bone void filler following surgical excision of benign lesions • Trauma • Arthrodesis e.g. spinal fusions
Periodontal	<ul style="list-style-type: none"> • Periodontal regeneration to prevent loss of teeth and restore bone
Dental	<ul style="list-style-type: none"> • Filling of root voids following extraction to promote rapid bone regeneration for titanium implant procedure.
Cranio-maxillofacial	<ul style="list-style-type: none"> • Trauma • Developmental defects • Resection • Repair of deformities, trauma to facial bone structures
Plastic and reconstructive	<ul style="list-style-type: none"> • Repair of trauma defects to face, cleft palates, hand surgery

■ Competitive Advantage

- The key innovations that characterize the Altis OBM & differentiate it from competitors' products are listed:
 - First extrudable, injectable BMP device to be tested in humans- offers ease of use and controlled and precise delivery
 - Biocompatible
 - Low cost due to proprietary high yielding process

■ Differentiation to Competition

- Altis BMP™ is a “cocktail” of proteins.
- “ BMP’s will work more effectively if several of them are put together in “cocktails”.
- it highly feasible from a cost and complexity perspective.

THANK-YOU