

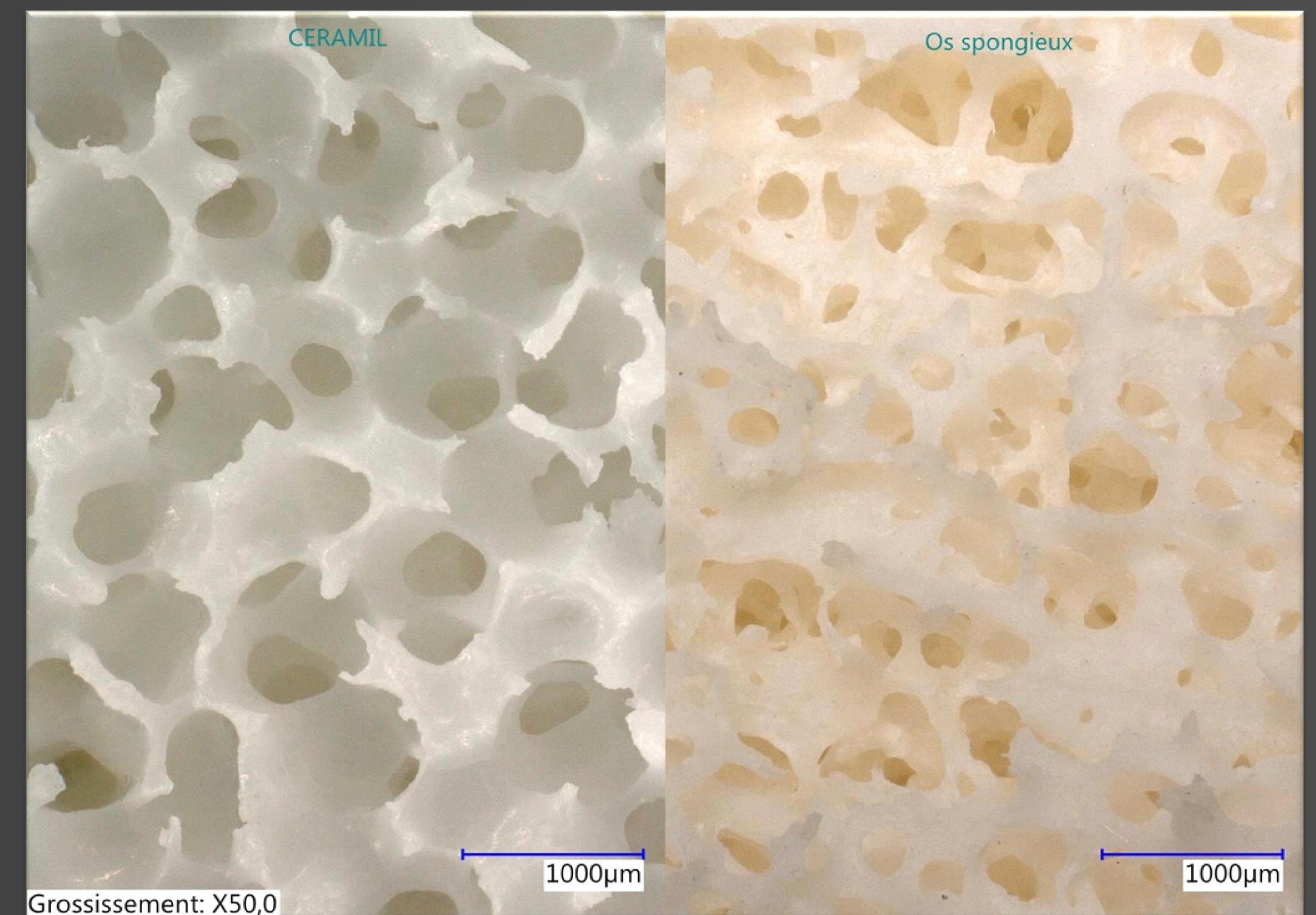
Sternal Replacement with a porous Alumina Ceramic Sternum

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Introduction : Sternal tumours are rare and difficult to treat from a reconstruction point of view. For high grade primary tumours, wide resection remains the standard treatment.

Numerous kind of prosthesis or artificial and non artificial bone substitutes have been reported in the literature to reconstruct the sternal defect after resection but none have been successful regarding functional results and quality of reconstruction. The aim of the reconstruction should be an adequate stability to prevent any paradoxal breathing and sufficient solidity to protect mediastinal organs. Furthermore, it should be biologically neutral with a low risk of infection and radiologically transparent in order to allow an easy follow up.



Comparison between Ceramil porosity and cancellous bone porosity



The current authors report three patients who had a sternal replacement with a porous Alumina Ceramic prosthesis after total resection of the sternum for high grade sarcomas or metastatic disease. The mean follow up was 9 months (6-12).

There were three women aged 37, 52 and 55. There was one radio induced sarcoma and two patients presented with metastatic disease from breast carcinoma.

At latest follow up, patients were all alive with no local complications.

There were one respiratory complication (pneumonia). All patients had a stable, painless chest.

Ct scan at 3 and 6 months after surgery showed early sign of osseointegration in the prosthesis.

Discussion :

The prosthesis is made of alumina of the highest standard. It's a chemical component of mineral source non resorbable and radiologically transparent. It is chemically and physically stable especially in case of associated treatment like radiotherapy. Mechanical resistance is high, around 20 Mpa (cancellous bone = 7Mpa), thus limiting the risk of breakage. Its interconnected porosity of 200 to 800 µm allows this material to act as an osteoconductive scaffold which improves osseointegration. In orthopaedic surgery, secondary osseointegration has been showed at 3 months when this material was used as a wedge in open tibial osteotomy.

Conclusion :

Total sternal reconstruction with a porous Alumina Ceramic prosthesis is a safe and reliable method for reconstruction of the sternal bone after resection of select high grade sarcomas.

The authors emphasize the clinical indications, prosthesis design, surgical technique and early functional results. These preliminary results need to be confirmed by a multi-centered study which will start in France in 2016.

