

## Cancer patient receives 3D printed ribs in world first surgery

A patient in Spain suffering from cancer in the chest has received a 3D printed titanium sternum and rib implant that was designed and manufactured in Melbourne by Anatomics, Minister for Industry and Science Ian Macfarlane announced today. After being diagnosed with a chest wall sarcoma, the 54-year-old man's surgical team made the decision to remove his sternum and a portion of his rib cage and replace it with an implant.

The implant was designed and manufactured by Melbourne-based medical device company, Anatomics, who specialise in the manufacture of patient specific implants for surgeons around the world. Anatomics utilised the CSIRO's titanium 3D printing facility, Lab 22, at Clayton.



Minister Macfarlane said this decision led to a collaboration that crossed disciplines and international boundaries to solve a significant problem for the patient. "This breakthrough is an impressive example of what can be achieved when industry and science come together," Minister Macfarlane said.

The surgical team, Dr José Aranda, Dr Marcelo Jimene and Dr Gonzalo Varela from Salamanca University Hospital, knew the surgery would be difficult due to the complicated geometries involved in the chest cavity. "We thought, maybe we could create a new type of implant that we could fully customise to replicate the intricate structures of the sternum and ribs," Dr Aranda said.

“We wanted to provide a safer option for our patient, and improve their recovery post-surgery.” That’s when the surgeons turned to Anatomics. After assessing the complexity of the requirements, Anatomics CEO Andrew Batty said the solution lay in the complex design of the part. “Online planning sessions with our friends in Spain made the process very simple. We then wanted to 3D print the implant from titanium because of its complex geometry and design,” Mr Batty said.

“While titanium implants have previously been used in chest surgery, designs have not considered the issues surrounding long term fixation. Flat and plate implants rely on screws for rigid fixation that may come loose over time. This can increase the risk of complications and the possibility of reoperation.” Through high resolution CT data, the Anatomics team was able to create a 3D reconstruction of the chest wall and tumour, allowing the surgeons to plan and accurately define resection margins. “From this, we were able to design an implant with a rigid sternal core and semi-flexible titanium rods to act as prosthetic ribs attached to the sternum,” Mr Batty said.

Once the prosthesis was complete it was couriered to Spain and implanted into the patient.

“The operation was very successful,” Dr Aranda said. “We were able to create a body part that was fully customised and fitted like a glove.”

According to Minister Macfarlane, it is this type of collaboration that can transform the way our industries operate and the way they compete in international markets.

The patient was discharged 12 days after surgery and has recovered well. A description of the procedure has been published in the [European Journal of Cardio-Thoracic Surgery](#).