



# OTO *twin*

Bimaterial 3D ear surgery education

OTO *twin*: HIGH-FIDELITY SYNTHETIC TEMPORAL BONE FOR SIMULATION TRAINING IN OTOLOGIC SURGERY AND OTONEUROSURGERY

- Anatomical high-fidelity
- Coexistence of hard resin reproducing bone and soft resin reproducing soft tissue
- Simulation of middle ear surgery, cochlear implantation, otoneurosurgery
- Adult and pediatric versions, available in different levels of difficulty



OTO *twin*: the digital twin of human temporal bone, the 4.0 response to French National Authority for Health (HAS) recommendations : “ *Never the first time on the patient* ”

## OTO *twin*: BI-MATERIAL 3D-PRINTING INNOVATION FOR SURGICAL EDUCATION

OTO *twin* is manufactured using a bi-material high-resolution 3D printing process from real human temporal bone, combining high anatomical fidelity and innovative assembly of soft tissue and bone structures.

### ANATOMICAL HIGH-FIDELITY

OTO *twin* has been morphologically evaluated with an innovative and OBJECTIVE method derived from engineering sciences (1)(2).

OTO *twin* reproduces the anatomy of a real normal temporal bone (adult and child) with an accuracy of a tenth of a millimeter for all anatomical structures, and even a hundredth of a millimeter for certain key structures in ear surgery, such as the facial nerve (1)(2).

Its anatomical validity makes OTO *twin* a pedagogical tool that can be used for education in ear surgery, cochlear implantation and otoneurosurgery, both for initial training, continuing education, evaluation and certification.

OTO *twin*, Adult version, Basic model  
Tympanic membrane, malleus, tympanic cord

### ASSEMBLY OF BONE STRUCTURE AND SOFT TISSUE

The coexistence of hard resin, reproducing the bone, and soft resin, reproducing the soft tissues (facial nerve, tympanic cord, ossicular joints, dura mater, round window, anterior and posterior labyrinth), makes OTO *twin* a unique pedagogical tool, with a mobile ossicular chain, a secondary tympanic membrane closing the round window, as well as a faithful reproduction of the consistency of the skin in the external auditory canal and the tympanic membrane.

OTO *twin* allows to simulate middle ear surgery (mastoidectomy, pitympanotomy, posterior tympanotomy, canal approach etc.) but also cochlear implantation (cochleostomy, insertion of the electrode holder) and approaches in otoneurosurgery.

Manufactured with PolyJet technology, OTO *twin* is the result of an interdisciplinary collaboration within the University of Lorraine between Pr. C. Parietti-Winkler (ENT Service and CCF, CHU de Nancy, EA 3450 DevAH) and Pr. A.S. Bonnet (LEM3 laboratory), combining the expertise of health sector and engineering sciences.

1. J. Chauvelot et al., *Annals of Translational Medicine*, 2020 Mar; 8(6): 304.

2. J. Chauvelot et al., *Computer Methods in Biomechanics and biomedical engineering*, 2020, VOL. 23, NO. 51, 563-565

## OTO *twin*: KEY POINTS

### ENT *simulation tool*

Simulation of middle ear surgery, cochlear implantation, otoneurosurgery (surgery of the postero-lateral skull base)

### High resolution bi-material 3D printing

Based on the CT-scanned image of a real human temporal bone, OTO *twin* combines high-fidelity anatomy with an innovative assembly of bone structure and soft tissue

2 versions  
«Adult» and «Pediatric»

2 models  
For each version:  
«Basic» black soft resin  
«Advanced» white soft resin

OTO *twin* : 100% made in France

OTO *twin* is developed & produced in the east of France

## AT THE ORIGIN OF THIS PROJECT

Pr. Cécile Parietti - Winkler

Professor of ENT and cervico-facial surgery at the University of Lorraine, surgeon in the ENT and CCF department of the Nancy University Hospital.

Medical and surgical referent for ear pathologies, responsible for the cochleo-vestibular functional explorations sector.

Senior researcher, laboratory EA 3450 DevAH (Development, Adaptation, Handicap).



"OTO *twin* is the result of a transdisciplinary collaboration between the health sector, the engineering sciences and the multi-material 3D printing industry. This digital twin of human temporal bone allows the progressive acquisition by future ENT specialists of the anatomical knowledge and technical skills necessary for the practice of ear surgery, cochlear implantation and otoneurosurgery, promoting the development of qualitative and safe professional practices."

OTO *twin*, Adult version, Basic model

OTO *twin*, Pédiatric version, Basic model

OTO *twin*: SEVERAL TYPES OF PRODUCT FOR A STEP-BY-STEP LEARNING OF OTOLOGIC SURGERY AND OTONEUROSURGERY

## 2 VERSIONS FOR THE SAFETY OF ADULT AND PEDIATRIC PATIENTS

OTO *twin* is available in *Adult* and in *Pediatric* versions.

These 2 versions ensure, before performing real surgeries, the safe acquisition of procedural skills through simulation for adults and children, for whom cadaveric anatomical parts are non-existent.

OTO *twin*, *Adult version*, *Basic model*  
Macro view, stapes and tympanic cord



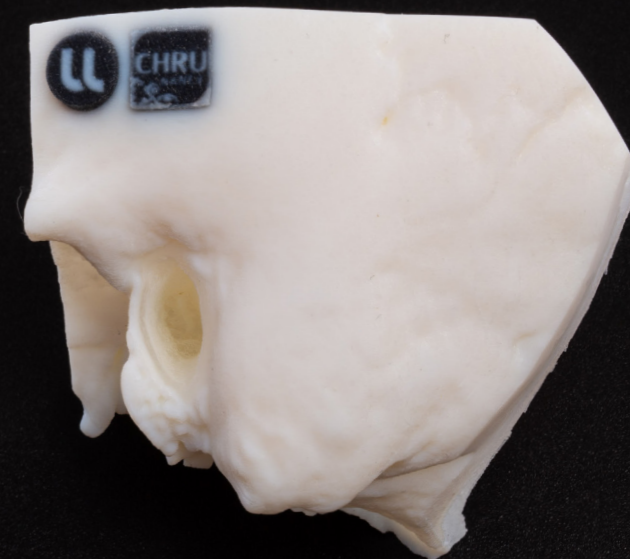
## 2 MODELS FOR A WELL-STRUCTURED TEACHING PROGRAM

Each version is available in *Basic* (black soft resin) and *Advanced* (white soft resin) models, depending on the color of the soft resin.

With the beginner model, the high contrast between white hard resin and black soft resin allows the trainee to easily visualize noble structures (facial nerve, dura mater, secondary tympanum) and facilitates their localization.

With the expert model, the low contrast between the hard and soft resins in same color, makes the localization of noble structures more complex and closer to reality.

Due to the diversity of models and versions, OTO *twin* is the only educational device that allows the construction of a teaching program in otologic surgery and otoneurosurgery, with a progressive complexity of the learning objectives.



OTO *twin*, *Adultte version*, *Advanced model*



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## AVAILABILITY & PRICES \*

OTO *twin* is distributed by UL Propuls

For any question or order please contact [ototwin@ul-propuls.fr](mailto:ototwin@ul-propuls.fr)

Find more information and visuals on [ototwin.com](http://ototwin.com)

Unit cost	<i>Basic</i>		<i>Advanced</i>	
	Adult	Pediatric	Adult	Pediatric
From 0 to 4	<b>239 €</b>	235 €	259 €	255 €
From 5 to 9	<b>219 €</b>	215 €	239 €	235 €
From 10 to 19	<b>205 €</b>	199 €	225 €	219 €
Over 20	<b>199 €</b>	195 €	219 €	215 €

\*Prices are effective on October 1<sup>st</sup>, 2022, please contact us for a quote.  
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