High-resolution image-based computational inner ear modelling for surgical planning of cochlear implantation

Fact Sheet

Project Information

HEAR-EU
Grant agreement ID: 304857
Status
Closed project

Funded under
FP7-HEALTH
Overall budget
€ 4 737 501
EU contribution
€ 3 551 284,75

Coordinated by
UNIVERSIDAD POMPEU FABRA
Spain

Objective

Cochlear implantation is a surgical procedure that aims to overcome hearing loss by direct electrical stimulation of the spiral ganglion cells in the cochlea of the inner ear. The surgical scenario of implantation surgery is very complex. It requires high clinical expertise in order to 1) efficiently access the surgical site, the cochlea, localize nearby critical structures (e.g. facial nerve) and 2) optimize the position of the implantable device (electrode array) inside the cochlea. Furthermore, there is a vast anatomical variability amongst patients. This makes individual optimal fitting an extremely difficult task and strongly influences the success of the surgery and subsequently hearing restoration.

We hypothesize that a comprehensive understanding of the shape variability of the middle and inner ear among patients will enable the design improvement of hearing implants, and will be of assistance during surgical planning. Consequently, the aim of
this project is: 1) to develop a novel high-resolution high-energy microCT device to obtain detailed images of the middle and inner ear, even in the presence of metallic implants, 2) to build a model of the shape variability of the middle and inner ear from high-resolution images, also incorporating functional information, 3) to build a computer-assisted patient-specific preoperative planning system, and 4) to improve the design of cochlear implant (CI) electrode arrays and associated insertion tools using a population-based optimization framework. All objectives revolve around the criteria of minimizing invasiveness, insertion-induced trauma and enhanced functional outcome through patient-specific frequency mapping.

The consortium is composed of two research-intensive SMEs, one university hospital, two universities, and a large European enterprise. This project will lead to important strategic benefits for all partners, and very especially for the SMEs.

Field of science

/medical and health sciences/clinical medicine/surgery
/medical and health sciences/clinical medicine/surgery/surgical procedure
/medical and health sciences/medical biotechnology/medical bioproducts/implants

Programme(s)

Topic(s)

Call for proposal

FP7-HEALTH-2012-INNOVATION-2

Funding Scheme

CP-FP - Small or medium-scale focused research project

Coordinator

UNIVERSIDAD POMPEU FABRA

Address

Placa De La Merce, 10-12
08002 Barcelona
Spain

Activity type

Higher or Secondary Education Establishments

EU contribution

€ 202 800

Website

Contact the organisation
Participants (5)

UNIVERSITAET BERN
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Website: [Contact the organisation](#)
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<thead>
<tr>
<th>Organisation</th>
<th>Country</th>
<th>EU contribution</th>
<th>Address</th>
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<tbody>
<tr>
<td>SCANCO MEDICAL AG</td>
<td>Switzerland</td>
<td>€ 984 400</td>
<td>Fabrikweg 2 8306 Bruettisellen</td>
<td>Private for-profit entities (excluding Higher or Secondary Education Establishments)</td>
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<tr>
<td>Alma IT Systems, S.L.</td>
<td>Spain</td>
<td>€ 860 800</td>
<td>Vilana 4B 4-1 08022 Barcelona</td>
<td>Private for-profit entities (excluding Higher or Secondary Education Establishments)</td>
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**Last update:** 18 December 2017  
**Record number:** 104083  
**Permalink:** https://cordis.europa.eu/project/id/304857/  
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