Collaboration Recherche-Industrie-Hopitaux: exemple des ultrasons

François TRANQUART, Léandre POURCELOT
Frédéric PATAT

INSERM 619, GIP Ultrasons,
FRE2448 CNRS, CITH CHRU
Companies

Clinical applications

Research laboratory

Validation
Link between companies, research lab, validation and clinical dept

Restrictions: high added value, competence, closeness, respect of partners, respect of standards, license and copyrights
## Short story of Ultrasound in Tours

<table>
<thead>
<tr>
<th>Year</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968</td>
<td>Starting of Delalande Electronique, 25 persons</td>
</tr>
<tr>
<td>1970</td>
<td>Structuration of a University Lab in imaging</td>
</tr>
<tr>
<td></td>
<td>Numerous european and world discoveries</td>
</tr>
<tr>
<td>1982-2004</td>
<td>Development of ultrasound systems for astronautes monitoring during flight (CNES, ESA)</td>
</tr>
<tr>
<td>1984</td>
<td>Starting of Vermon SA, 120 persons</td>
</tr>
<tr>
<td>1988</td>
<td>Starting of Inserm U316/U619</td>
</tr>
<tr>
<td>1990</td>
<td>Starting of Groupement d’Intérêt Public Ultrasons</td>
</tr>
<tr>
<td>1994</td>
<td>Starting of LUSSI/CNRS research Unit</td>
</tr>
<tr>
<td>1997</td>
<td>Starting of Ultrasons Technologies SARL, 8 emplois</td>
</tr>
<tr>
<td>2002</td>
<td>Starting of Centre national d’Innovation Technologique Ultrason (CHRU), 3 persons.</td>
</tr>
<tr>
<td>2002</td>
<td>Starting of start-up Sonophorèse, 2 persons</td>
</tr>
<tr>
<td></td>
<td>&gt; more than 100 projects with companies</td>
</tr>
<tr>
<td></td>
<td>&gt; 9 european projects</td>
</tr>
<tr>
<td></td>
<td>&gt; role in starting of Spincontrol, 35 persons</td>
</tr>
</tbody>
</table>
Echo-Doppler scanner for space 2nd type. As de Cœur 1988-1999 (CNES)
Ultrasound: which local partners?

CIT Ultrasons Univ. Hospital
validation

LUSSI (Tours/Blois)
CNRS FRE 2448
research development teaching

GIP Ultrason University
management, transfer

Inserm 619
applications

Vermon
Ultrasons Technologies
Transderm systems
development and industrialisation

Spincontrol
applications

ST Microelectronics
CEA
collaborations
GIP Ultrasons

- Management
- Transfer
- Financial control
- Role in the relationship between research laboratories and companies
GIP-LUSSI FRE 2448

• Fundamental research on
  – piezo-electric materials,
  – tissue characterization,
  – high frequency imaging,
  – Signal processing
  – Modelisation
  – Non destructive control.
Ultrasonic flowmeter (Faure Herman)

Accuracy of around 1/1000

Trials on oil site in Texas
Ultrasound osteodensitometer (ESA program)

Attenuation and velocity measurements are shown with a focus on the calcaneum region.

Parameters:
- Beam scanner:
  - 25; 110 dB/MHz
  - 1450; 1800 m/s
  - Attenuation velocity

Other measurements:
- <BUA> ROI 53.88
- 108
- <SOS> ROI 1483.01
- 130
Vermon SA

- Located at less than 1 mile from our hospital
- Leader in probe manufacturing: low and high frequency probes including modern materials (15,000 transducers in 2005)
- External and endocavitary probes
LUSSI-FRE 2448
Fondamental research

INSERM U619

CIT Tours

PRECLINICAL STUDIES

Companies
Labsatories

Clinical dept

Ultrasound

High frequency imaging
Actifoetus
Contrast - Quantification
Endo-bronchial imaging
Characterisation of blood
Elastography
INSERM U619: Dynamic and pathology of brain development

- Nervous system foetus/neonate
- Non invasive imaging
- Technological and Methodological developments
- Diagnosis/Therapy
- Animal models
- Physiopathology
Clinical Department

- 30 000 exams a year
- All applications excepted MSK
- Connected to ICU and Ob-Gyn
COMMERCIAL SCANNER DERMCUP 2020

(Procédure ACE GBM avec L’ANVAR)

DERMCUP 2020
marquage CE

Probe
(license)

Software

Front part of the probe with transducer
Commercial scanner

Eye

Probe 20 MHz

Mouse fœtus ED11

ATYS Médical
69510 Soucieu en Jarrest
33 (0)4 78 56 70 40
www.atysmedical.com
12 capteurs ultrasonores regroupés sur trois zones d'exploration.

Exploration en profondeur sur 5 portes Doppler / voies.

Etendue de la zone d'exploration du fœtus.

Exploration des membres supérieurs.

Exploration des membres inférieurs.

Structure souple.

Module Doppler.

Capteur ultrasonore.

Support des capteurs.

ACTIFOETUS
Actifoetus: active movements (1 sensor on 12)

1. Amplitude vs. Time (s)
2. Phase vs. Time (s)
3. Doppler

Results
Intracavitary probes (with Vermon SA)
Monitoring of response to neoadjuvant chemotherapy

C0

C2
European Spatial Agency

National network « Ultrasound »

National Institute « Technology for Health »

Ultrasound

research

transfer

Erit-M Angers
Inserm 556 Lyon
Créatis Lyon
Inserm 494 Paris
UMR 7623 Paris
INRA/Ecole Véto

Pierre Fabre
Atys
Faure Herman
Bracco
Esaote
Siemens-Acuson

DMS
EDAP-Technomed
…
Why an Ultrasound Institute?

To improve the local perception of research and industrial potential in ultrasound by adding the partners in the same structure: research, training, transfer and evaluation.

Continue the development of techniques and insert the relationship research-industry and employments

To be involved in the national and european development of ultrasound techniques: imaging and therapy in medicine, industrial and space applications
Ultrasound: which local partners?

CIT Ultrasons Univ. Hospital
validation

LUSSI (Tours/Blois)
CNRS FRE 2448
research development teaching

Inserm 619
applications

GIP Ultrasons
University
management, transfer

Vermon
Ultrasons Technologies
Transderm systems
development and industrialisation

Spincontrol
applications

ST Microelectronics
CEA
collaborations
Conclusion

• Link between companies, research lab, validation and clinical dept essential for the dissemination of knowledge and clinical use of new developments
• Trust is essential for companies
• Complete overview from development to clinical application on the same area is of great value for technical research and acceptance of new methods