

Stretching Innovation

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From a rigid past ... to a stretchable future

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Rigid wires in a polymeric sheath.



Conductive nanoparticles in a stretchable polymer.

 Stretchable conductive materials. WISE Nanocomposite

Proprietary technique (PCT/EP2011/054903).



What we mean by being stretchable

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First to produce leads for Neuromodulation

- highly conformable,
- completely stretchable,
- cost-competitive.

Fast market entry with Cortical Grids.

Market Breakthrough with Foldable SCS paddles.

We will revolutionize leads manufacturing



What is Neuromodulation?

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Deep Brain Stimulation (DBS)



Treated pathologies:

- □ Chronic pain (SCS)
- □ Parkinson's disease
- Dystonia
- Epilepsy
- □ Alzheimer (future)
- □ and many others ...

Better than pharma !

No side effects
No loss of efficacy
New therapies



The Neuromodulation Market

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Revenue data from Corporate Annual Reports (2005-2013)

- Neuromodulation Rev. (2013): \$2.8B
- Estimated 2018 Market: \$4.7B
- The Neuromodulation segment is growing for all market leaders



QIG, *The Neurostimulation Market.* April 2011

Greatbatch Investor Meeting, March 2011

- SCS (Spinal Cord Stimulation) makes up over 50% of the market (\$2.4B in 2018)
- Over 100,000 SCS implants/y in 2014

Inadequate technology is hampering the blooming of Neuromodulation

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Neuromodulation could benefit patients with many further indications ...

... but the limits of the current <u>leads technology</u> represent the major roadblock on the way to these new therapies.

EMERGING

Deep Brain Stim: Obesity, Stroke Recovery

Cortical Stim: Epilepsy

Peripheral Nerve Stim: Migraines, Extremity Pain

Carotid Artery, Sinus Stim: Hypertension

Hypoglossal & Phrenic Nerve Stim: Sleep Apnea

Spinal Cord Stim: Angina

Gastric Stim: Obesity

Sacral & Pudendal Nerve Stim: Interstitial Cystitis

FUTURE

Deep Brain Stim:

Alzheimer's, Anxiety, Bulimia, Tinnitus, Traumatic Brain Injury, Tourette's, Sleep Disorders, Autism, Bipolar

Vagus Nerve Stim:

Alzheimer's, Anxiety, Obesity, Bulimia, Tinnitus, Obsessive Compulsive Disorder, Heart Failure

Spinal Cord Stim: Asthma

Gastric Stim: Bulimia, Interstitial Cystitis



From: QIG, The Neurostimulation Market. April 2011

Current Market Problems

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SCS Leads

Cortical Grids



- Bulky
- **Poorly conformable**
- Poorly stretchable
- **Low resolution**
- **Hand assembled**



- ℬ INVASIVE
- ℬ MIGRATION
- 😕 BREAKAGE
- ➢ LIMITED COMPLEXITY
- 😕 HIGH PROD. COSTS



The WISE Solution: Next-generation leads

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Cortical Grids

SCS Leads





- Arbitrarily thin
- Highly conformable
- Highly stretchable
- High resolution
- **]** Automation



- **OW INVASIVITY**
- ONO MIGRATION
- 🙂 NO BREAKAGE
- ☺ LOWER PROD. COSTS



The WISE technology



- Unrivaled stretchability
- **☺** Applicable to any polymer
- Easy micro-patterning
- Highly biocompatible



Easy Manufacturing

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No Engineering Limitations

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^(C) Any shape



\odot Any size (from μ m to cm)



Electrochemical testing

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In vivo testing

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- 4 guinea pigs implanted for 2 months
- ✓ Each animal had 1 WISE cortical electrode and 3 references
- Animals survived & electrodes fully functional throughout the period
- ✓ High quality of the recorded signal



Stable & very good signal recording in vivo



The first "Foldable SCS Paddle lead"

An SCS lead with all the advantages of a <u>Paddle lead</u> implanted by minimally invasive surgery as a <u>Percutaneous lead</u>





WISEs Goldable SOS. Partaleterabus

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Two types of Leads are used for SCS:

- ③ **Better** performance
- Invasive/Costly insertion
- 🙂 Multi-column
- ⊗ Complex removal

- ⊗ Worse performance
- Easy/Cheap insertion
- 🙁 Single column
- Easier removal

Two types of Leads are used for SCS:

Requires WISE's technology

WISE's Foldable SCS Paddle lead

This will change the SCS paradigm

Better performance
 Easy/Cheap insertion
 Multi-column
 Easier removal

Early Market Entry Opportunity

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OEM Sales

Cortical Grids: WISE vs. Commercial

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The Past

The **WISE** future

Standard electrode for cortical monitoring today in use

WISE's highly comformable Cortical Grid

Test performed on an explanted bovine brain

WISE's Roadmap

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Management

Luca Ravagnan, Ph.D

+12ys in nanotechnology. Founder of WISE. Business Development.

Sandro Ferrari, Ph.D R&D Manager +15vs in Basic & Applied rese

+15ys in Basic & Applied research. Certified Project Manager IPMA.

Mario Zanone Poma Chairman

Former Manager in Hoechst, Telepiù, Mediocredito. President of Agite!

Giulia Salzano Admin. Manager & Board Member +10ys in Grants management, Admin. & Tech transfer (Master).

Armin Bolz, Ph.D Board Member

MD & partner of Corscience GmbH. Former Head of Development at Biotronik. Professor for Biomedical Eng. at the Karlsruhe Institute of Technology.

Pierluigi Bertolotto Board Member

Owner at Marvamed Srl. 22 years' experience in Neuromodulation. 17-year experience in Medtronic Inc. in DBS and Pain Therapy.

Scientific Advisory Board

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Advisory Board

Prof. Paolo Milani (Head of Advisory Board) Department of Physics – University of Milan - Milan (Italy)

- Director of the University Center for Nanomaterials;
- International reputation for nano- and biotechnology.

Prof. Dr. Maximilian Mehdorn

Department of Neurosurgery - UKSH - Kiel (Germany)

- Head of the Department of Neursurgery;
- Neurosurgeon focused in DBS surgery.

Prof. Yosi Shacham-Diamand Dept. of Physical Electronics - Ramat-Aviv (Israel)

- Director of the Institute of Nano-science and Nano-technology;
- International reputation for polymer supported electronics.

The WISE Team

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www.wiseneuro.com

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Locations:

Milan (Italy) Fondazione Filarete

R&D, Product development & Administration

Current Investors:

Hgite!

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Trials & Regulatory

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