Bioelectronic Medicines
Using the Peripheral Nervous System to Treat Chronic Disease

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A treatment modality that leverage the nervous system

**Signalling control**

Small molecules leverage intra- and extra-cellular signalling cascades

**Immune control**

Vaccines and antibody drugs leverage the immune system

**Neural control**

Bioelectronic medicines will leverage the nervous system

Nerves exert control over virtually all our organs

Parasympathetic nervous system

Sympathetic nervous system


Bioelectronic Medicines
A translational outlet for innovative neurotechnology

While brain research is...

- Arguably the biggest scientific challenge of our time
- Critical for understanding most neural circuits
- A centre stage for innovative technology development

Therapeutic precision tuning will start in the periphery

- Chronic diseases affecting billions
- Near-organ nerves with lower level of complexity
- More reliable animal models of disease
- Objective clinical endpoints
- Accessible intention points; low-risk surgery

Image source: Mosby's Medical Dictionary, 8th edition
In hypertension baroreceptor stimulation reduces sympathetic outflow, heart rate and blood pressure.

Source: [Hypertension](http://example.com), 2004 Feb;43(2):306-11. ; Neurosurg Focus 2009, American Association of Neurological Surgeons
In rheumatoid arthritis, vagus nerve stimulation suppresses cytokine production

A leap towards precision treatments
Exploratory research network for proof of principle for diseases and interfaces

Philosophy

• **Integrate** experts and technologies

• Test **hypotheses** central to future medicines

• Work as a **network**, helping to accelerate

<table>
<thead>
<tr>
<th>33 projects</th>
<th>4 continents</th>
<th>16 diseases (24 nerves)</th>
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<tbody>
<tr>
<td>40 PIs (at 26 institutions)</td>
<td>9 countries</td>
<td>13 interfaces</td>
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Venture fund to nurture early manifestations of bioelectronic medicines and key platforms

Investment focus for $50m fund

• Companies developing bioelectronic medicines
  – New start-ups
  – First-generation devices pioneering aspects of bioelectronic medicines

• Companies advancing technology platforms that will be critical components of bioelectronic medicines
  • Energy
  • Material
  • Surgical

Image source: SetPoint Medical
Road-mapping and coordination with the broader research community
Innovation challenge to remove a key research barrier

A miniaturised, implantable, wireless device that can chronically record, stimulate and block functionally-specific neural signals to and from a single visceral organ

$1x + rat + 60d = $1m

organ-specific function  Implant, wireless, normal  stable, reproducible  First validated solution

http://www.bioelectronicmedicinesresearch.com

$5m Fund with up to $1.2m for teams trying to solve the challenge
BRAIN Initiative and PNS therapies linked by circuit mapping and innovative technologies

Thank You