

# Bioengineering for Better Health

## What future for Targeted Drug Delivery?

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# TARGETED LOCAL DELIVERY

✓ RIGHT DRUG

✓ RIGHT PLACE

✓ RIGHT DOSE

✓ RIGHT TIME

# **ADVANTAGES TO SITE DIRECTED THERAPY**

- 1. Deliver high levels of drug to target**
- 2. Limited exposure to other organs**
- 3. Deliver complex dosing pattern**
- 4. Limits peaks and troughs of oral dosing**
- 5. Bypass liver metab, degradation in blood**

# ADVANTAGES TO SITE DIRECTED THERAPY

6. Bypass anatomical blockages (e.g. BBB)
7. Reduce effective drug dosage & cost
8. Increase speed of drug effect
9. Ensure drug regimen compliance
10. Create new IP / Extend life cycle

- **Navigation**
- **Targeted Depots**
- **Pumps & Catheter System**
- **Formulation**

# BREACHING THE BLOOD BRAIN BARRIER

## ELECTRONS AS DRUGS

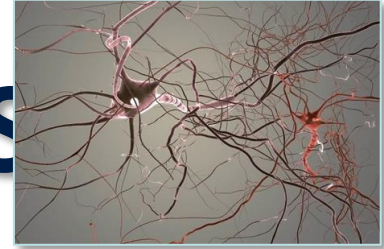
**Neuromodulation**

Deep Brain Stimulation

Vagal Nerve Stimulation



# “**ELECTROCEUTICALS**”



- **Cyberonics** vagal nerve stim **depression, epilepsy**
- *f(nm)* CNS pacing for **Alzheimer's**
- **NeuroPace** CNS pacing for **epilepsy**
- **Inspire Medical** hypoglossal nerve stim for **OSA**
- **Novocure** electromagnetic fields for **solid tumors**
- **Mainstay** “neuro rehabilitation for **axial back pain**”
- **Nevro** spinal cord stim for **pain**
- **IntraPace** gastric pacing for **obesity**
- **BioControl** vagal nerve stim for **heart failure**
- **SetPoint Medical** vagal nerve stim for **inflammation**

## TODAY'S PANEL

**Cheryl Blanchard, PhD**  
MicroChips Biomedical

**Sean Caffey, MD**  
MiniPumps

**William Doyle**  
Novcure

**Kevin Tracey, MD, PhD**  
SetPoint Medical