



Neuroprosthetics Symposium Introduction

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Financial Disclosure

- I have no financial conflicts to disclose.

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Neuroprosthetics

- Technologies utilizing spared spinal/brain circuits to augment or replace sensorimotor functions¹
- A variety of technologies applicable to several diseases;² however, this symposium will focus on implantable machine-nerve interfaces after amputation.

Challenges for Upper Limb Myoelectric Prostheses

- 23% abandonment rate³
- Only 1-3 degrees of freedom⁴
- Lack of haptic (tactile) feedback
- Signal quality^{4,5}
 - Superficial Muscles
 - Adjacent Muscles
 - Noisy Signals
 - Variable skin impedance (perspiration)

Pertinent Clinical Challenges for Lower Limb Amputees

- Skin breakdown
- Residual Limb Pain⁶
 - Neuromas
 - Phantom Limb Pain
- Falls⁷

Electroneurographic Interface (ENG)

- Direct communication between device and peripheral nervous system⁷
- Sensory feedback⁸
 - Electrotactile
 - Vibro-Tactile
 - Modality Matched
 - Invasive Stimulation

Implantable Interfaces

- Extraneural
- Intrafascicular (i.e. Utah Slanted Electrode Array)
- Reconstructed Peripheral Nerve Interfaces (RPNIs)

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