Neurodiagnostic Medical Devices

Patrick Jensen, Ph.D., CEO
Cadwell brings you innovative Neurodiagnostic, Neuromonitoring, and Sleep Solutions Medical Equipment.
The Nervous System

- The nervous system has two parts:
  - The **central nervous system (CNS)** is made up of the brain and spinal cord.
  - The **peripheral nervous system** is made up of nerves that branch off from the spinal cord and extend to all parts of the body.
The Peripheral Nervous System

- 100 – 1,000 axons in a functional nerve
- Mixed Motor and Sensory fibers
- 100,000 – 1,000,000 muscle fibers in a muscle
- The longest neurons in your body are about 3’ long and go from your spine to your foot.
The Neuron

- The building block of the nervous system is the **Neuron**
- There are **Billions** of Neurons in the nervous system
Action Potentials – how nerves communicate

**Axon alone**

- **Nerve Impulse 5 m/sec.**
- **Axon**
- **Signal from other neurons**
- **Neuron**
- **Peripheral Nerve**
- **Muscle Fibers**
- **Neuromuscular junctions**

**Direction of Action Potential travel**

- **Nucleus**
- **Membrane**
- **Myelin**
- **Schwann cell**
- **Nodes of Ranvier**

**Intracellular medium**

- **Cl⁻ Na⁺**
- **K⁺**
- **IN**
- **OUT**
- **Depolarized**
- **Repolarized**

**Ref. External of Cell**

- **NAD**
- **IN**
- **OUT**

- **Muscle Fibers**
- **Peripheral Nerve**
- **Neuron**
- **Axon**
- **Myelin**
- **Schwann cell**
- **Nodes of Ranvier**

**Brain**

**Autonomic**

**IONM**

**Introduction**

- **Action Potential**
- **Electrodes**
- **Amplifier**
- **Filter**
- **Stimulator**
- **Motor**
- **Sensory**
- **Muscle**
- **NM Junction**

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Action Potentials – how nerves communicate

Action potentials can be both initiated and measured using electrical equipment

Nerve Impulse 5 m/sec.
Neurodiagnostic Equipment
Electromyography (EMG) diagnosing conditions of the nerves and muscles

Electroencephalography (EEG) diagnosing conditions of the brain including epilepsy

Intraoperative Neural Monitoring (IONM) preserving function of nerves during complex brain and spine surgeries

Sleep diagnosing sleep related conditions
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Sleep diagnosing sleep related conditions
Electromyography (EMG)

- Applying an electrical field can evoke motor and sensory **Action Potentials** that are then **measurable** using our equipment
- Useful for diagnosing **nerve and muscle issues** (e.g. carpal tunnel, optic neuritis, etc)
Flexible and scalable NCS, EMG, SFEMG, and EP with the option of completely integrated ultrasound.
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Electroencephalography (EEG) diagnosing conditions of the brain, including epilepsy.

Intraoperative Neural Monitoring (IONM) preserving function of nerves during complex brain and spine surgeries.

Sleep diagnosing sleep related conditions.
Epilepsy

- Epilepsy is the onset of abnormal electrical activity in the brain
- 3.4M active cases of epilepsy in the US with 150,000 new cases each year; 65M active cases globally
- 1 in 26 people in the US will be diagnosed with epilepsy at some point in their lifetime
- Epilepsy can significantly impact quality of life and health depending on severity
Electroencephalography (EEG)

- 100 x Billions of active neurons
- Brain is always active
- Able to measure electrical activity on the scalp (microvolts)
- EEG gives us a window into brain activity

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Measuring brain activity plays a critical role in clinical settings, epilepsy monitoring and neurocritical care.

**Arc EEG**

- Durable EEG anywhere for routine EEG
- High channel count EEG & Stim for intracranial studies and brain resection preparation

**Essentia EEG**

Wireless EEG solution for ambulatory EEG studies

**Apollo EEG**

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Sleep
diagnosing sleep related conditions
Sleep Disorders

- Between 10% and 30% of adults struggle with chronic insomnia
- As many as 15-30% of adults in the U.S meet a broad definition of obstructive sleep apnea (OSA)
- A 10% increase in body weight can equate to a six-fold rise in the risk for OSA
- Between 135,000 and 200,000 people in the U.S have narcolepsy

Source: Sleep Foundation
Diagnose sleep disorders and determine appropriate treatment options.
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Sleep diagnosing sleep related conditions
Intraoperative Neuromonitoring (IONM)

- Used during complex surgical cases near nerves
- Constant monitoring of motor and sensory nerves during surgery
- Alerts the surgeon before any damage is done

Used during:
- Brain surgery
- Spine surgery
- Tumor resection near nerves
Intraoperative Neuromonitoring (IONM) Solutions

Cascade MAX

Cascade PRO

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Together with his brother Carl Cadwell, DDS, they formed Cadwell Laboratories in 1979.

John designed the world’s first microprocessor-controlled EMG instrument in his Seattle basement.

During medical school, John Cadwell, BSEE, MD saw a need for innovative and reliable neurophysiology instruments.
Cadwell Today – 3rd Largest Global Neuro Company

170+ employees
Many at Cadwell 30+ yrs

Rated #1 in Service and Support

Located in Kennewick, WA
Cadwell’s Global Presence

**U.S.A.** – Direct sales and support

**Outside of U.S.A.** - 59 Distributors + Cadwell Sales Offices in Beijing, Singapore, Netherlands and U.A.E.
Committed to Innovation, Product Quality, and Delighting our Customers

Half of all Cadwell employees are dedicated to Product Development and Customer Support
A Great Company Culture

On a scale from 1-10 (with 10 being the highest) how do you rate the overall employee experience (including culture, benefits, facilities, amenities, policies, and the opportunity for personal and career growth) at Cadwell?

115 responses

Results from 2020 Annual Employee Survey
Questions?