

Assistive Technology for Persons with Spinal Cord Injury

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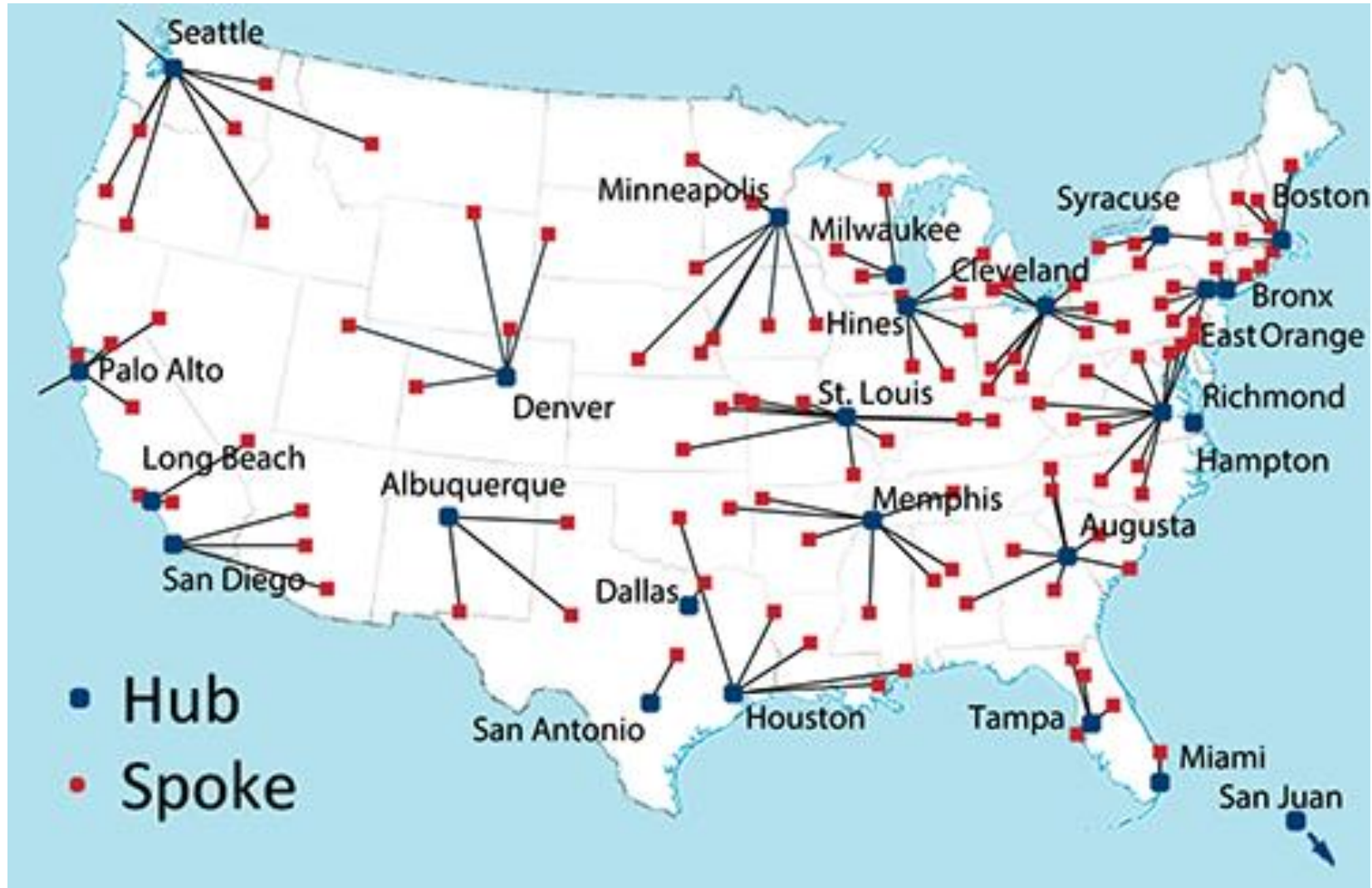


Veterans Affairs Health Care System

- VA – US Cabinet Department for Veterans Affairs
- VHA – The Veterans Health Administration is America’s largest integrated health care system, providing care at [1,293 health care facilities](#), including 171 medical centers and 1,112 outpatient sites of care of varying complexity (VHA outpatient clinics), serving 9 million enrolled Veterans each year.
- VA’s Spinal Cord Injuries and Disorders (SCI/D) System of Care provides a coordinated life-long continuum of services for Veterans with a spinal cord injury or disorder. VA serves Veterans in a convenient and connected network that delivers care for each phase of life.
- SCI/D does not have to be related to military service or combat.



VA SCI/D System of Care – 25 Hubs

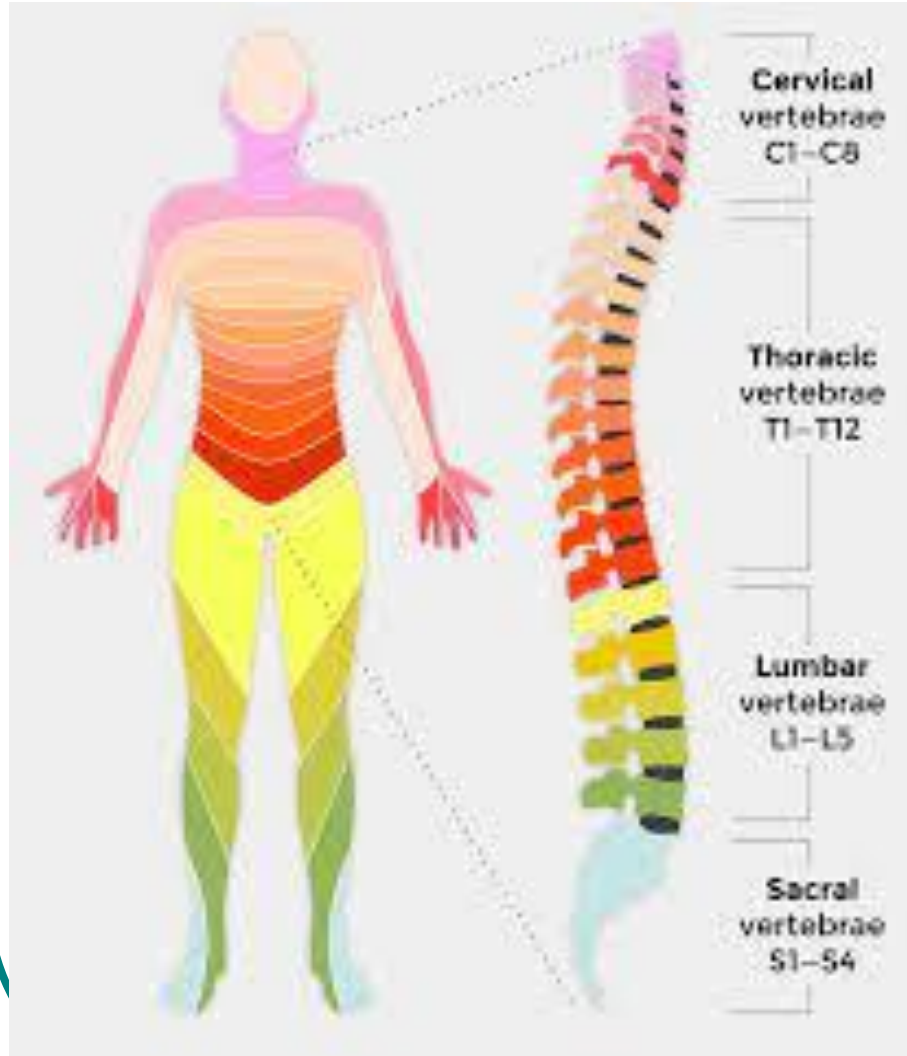


VA Palo Alto Health Care System

- Provides to >1000 Veterans with SCI/D
- 5 Spokes – San Francisco, Fresno, Sacramento, Reno, Hawaiian Islands & Pacific Rim
- Lifelong Comprehensive Care – Physicians, nursing, Therapy (Physical, Occupational, Recreation), Psychology, Social Work, Dietary, Pharmacy
- Care Settings - Inpatient, Outpatient, Homecare, Telehealth
***COVID-19 resulted in expanded care by Telehealth*



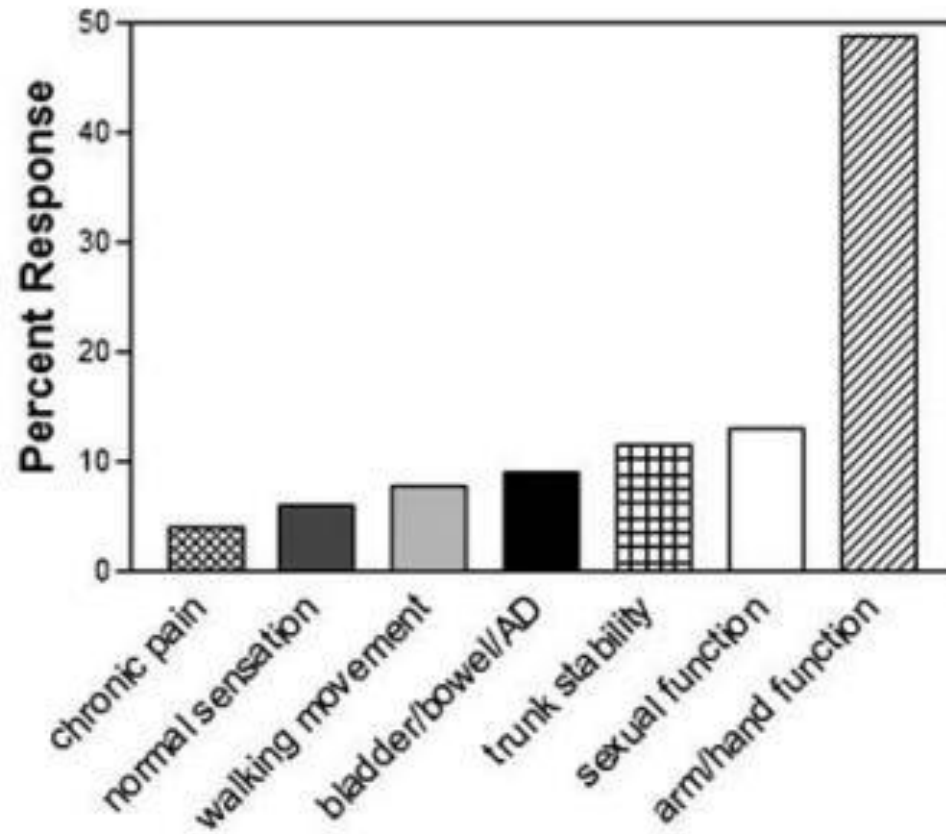
Spinal Cord Injury & Disorders (SCI/D)



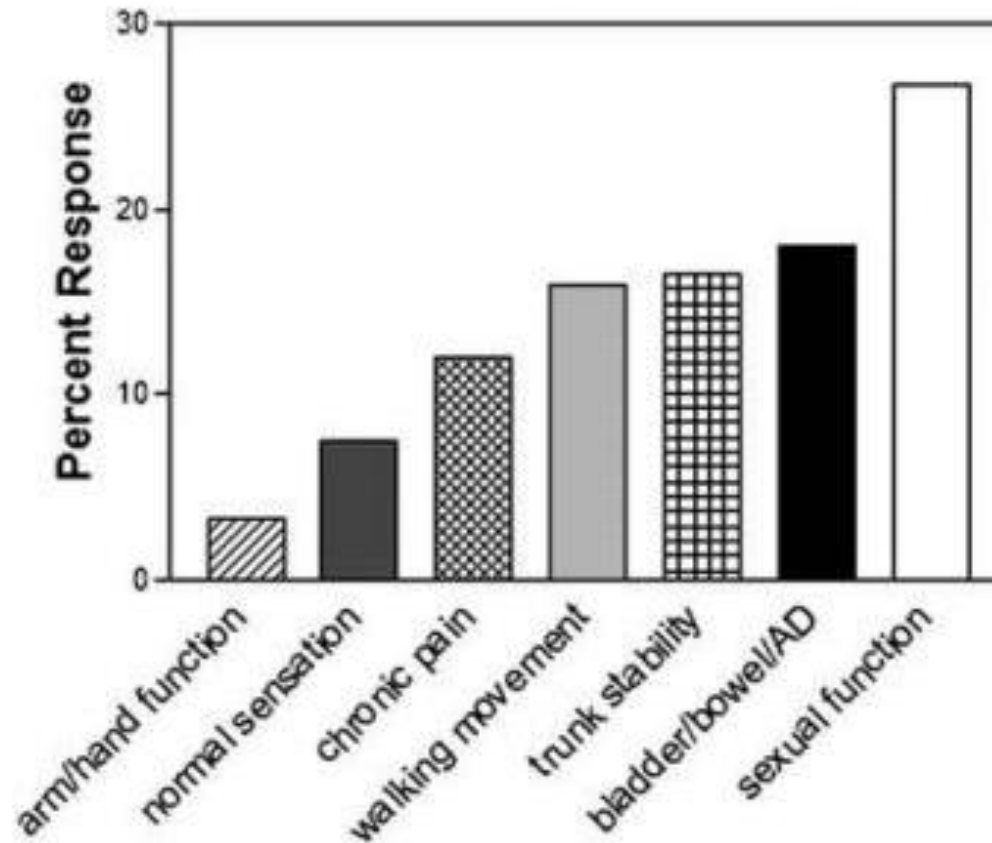
- SCI/D – Damage to the spinal cord, may be traumatic or non-traumatic; can be caused by disease or medical disorder
- Designated by neurological level of function
- Tetraplegia/Quadriplegia – Upper & Lower extremities
- Paraplegia – Lower extremities
- Motor and Sensory Effects
- Complete or Incomplete
- 80% male

Recovery Priorities

Highest Priority to Quadriplegics

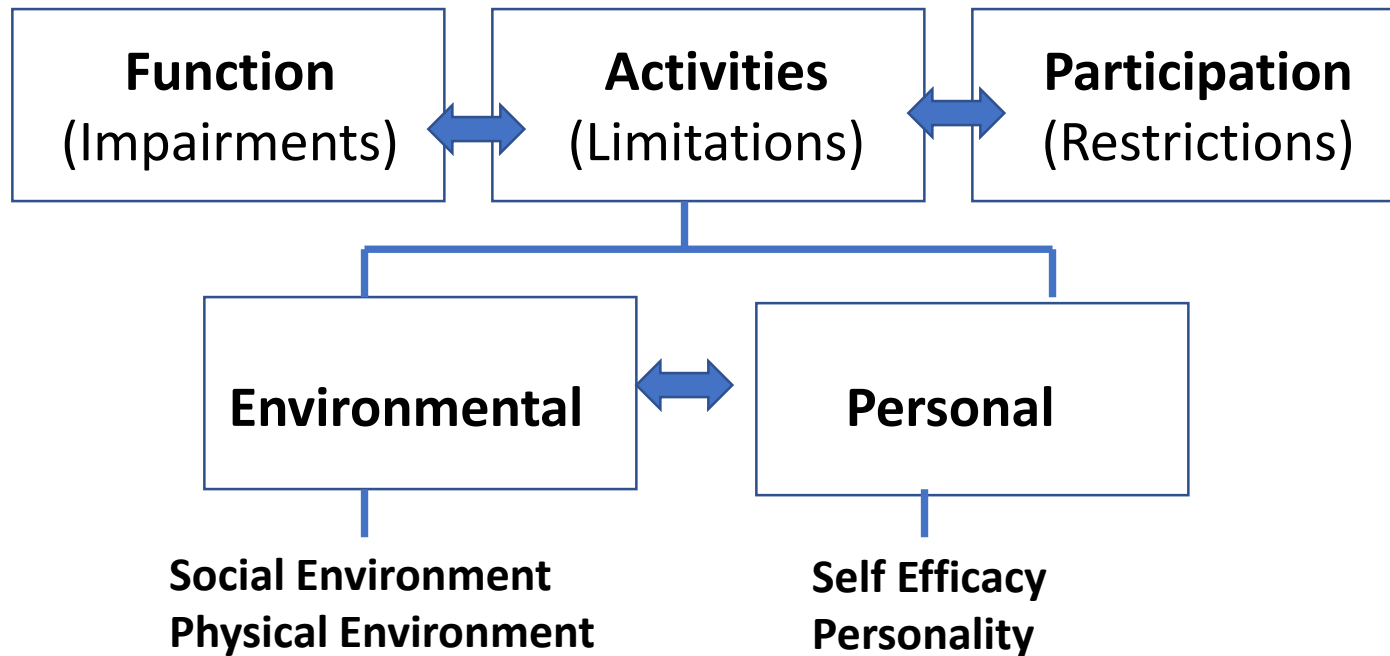


Highest Priority to Paraplegics



Anderson KD. Targeting recovery: priorities of the spinal cord-injured population. *J Neurotrauma*. 2004;21(10):1371-83.

World Health Organization International Classification of Functioning, Disability & Health (ICF)

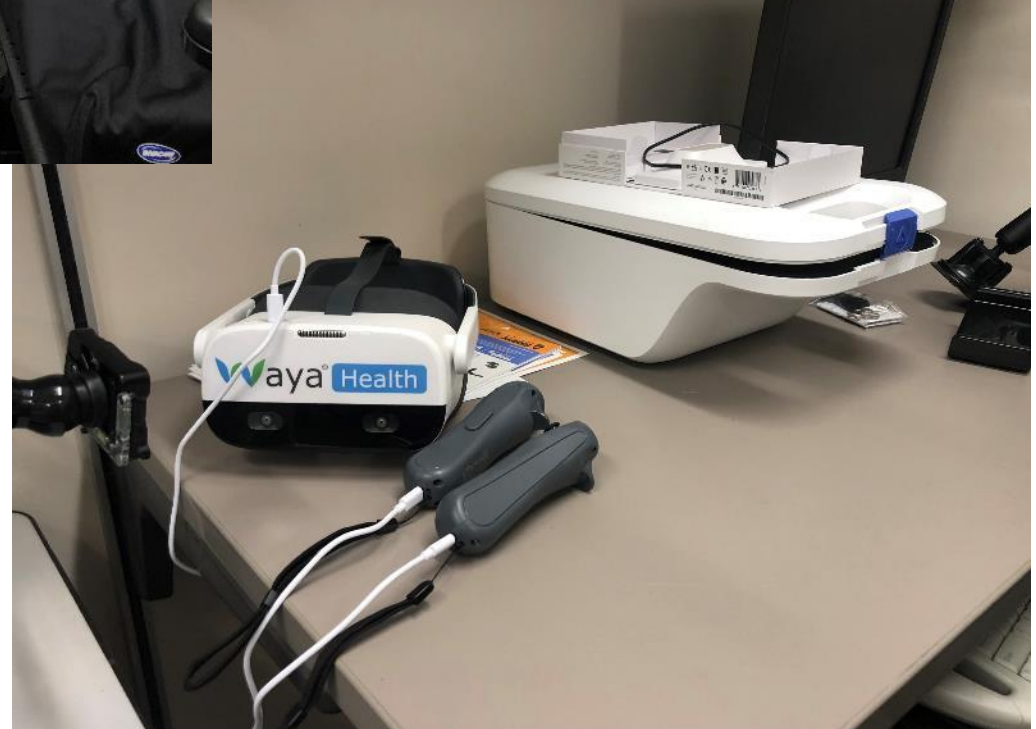


Leveraging Technology for Active Lifestyles



VA Palo Alto SCI Assistive Technology Lab





AutonoME - Environmental Control Unit



autonoME ECU/SGD tablet



**All in One microphone/
sip and puff system**



Floorstand



**autonoME
command center**

AutonoME - Environmental Control Unit



Voice

The autonoME features a microphone so it can be controlled with vocal commands.



Touch

Individuals with use of their hands can operate the autonoME using its capacitive touch screen.



Sip and Puff

The sip and puff switch operates using a straw which allows users to activate the ECU / SGD switch by sipping and puffing to move across and down the screen.



Eye Tracking

Equipped with Eye Gaze, the autonoME's commands can be activated by the user's eyes. A camera tracks the pupils to move the cursor up, down, left and right.



Head Tracking

This feature works much like Eye Gaze, tracking the movements of the user's head to control the cursor.

Bed -lights – phone -internet

Power Assist Wheelchair - Technology



Quickie
Xtender



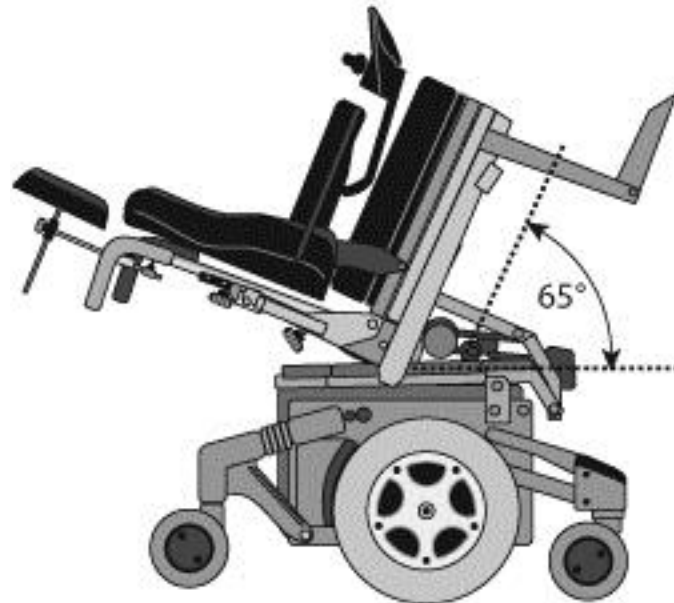
NEXT
Tailwind



Frank Mobility
Emotion



Wheelchair - Technology



Mobius Mobility –iBOT Wheelchair



LEVO - Mobile Manual Standing Wheelchair



Multi-Purpose Arm Cycle Ergometer (M-PACE)





Exoskeletons

Then...



Now...



Future...

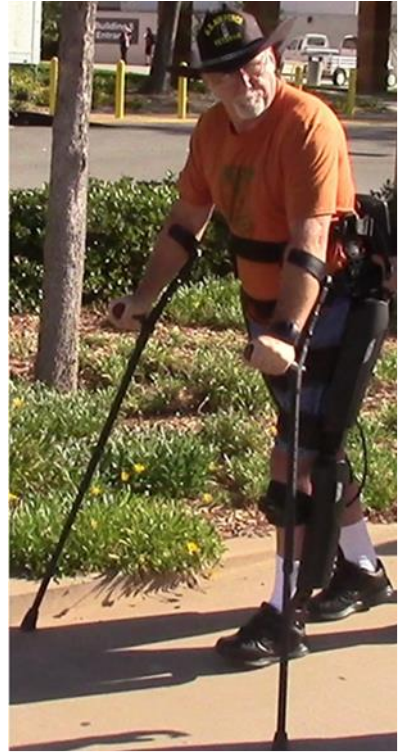


Futuristic...









Available and Emerging Technologies

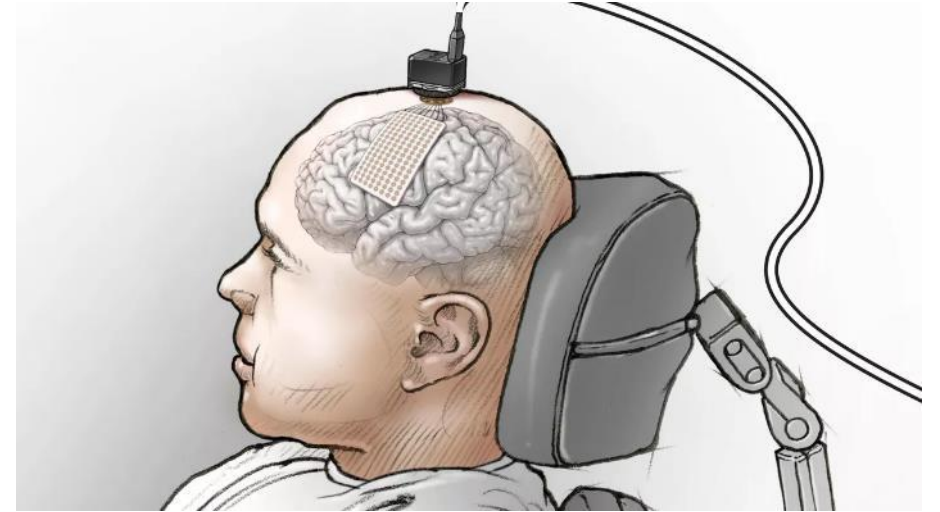
JACO – robotic arm with three-fingered hand



Brain Computer Interface



https://news.uci.edu/files/2015/09/walk_cropped-768x1134.jpg



<https://www.cnet.com/a/img/LI6PgqYf417kfOPNkcLbBlie1-Q=/1200x675/2021/07/14/1329d5a4-ed85-425a-8237-fd10d2521f55/ucsf-chang-patient-setup-illustration.jpg>

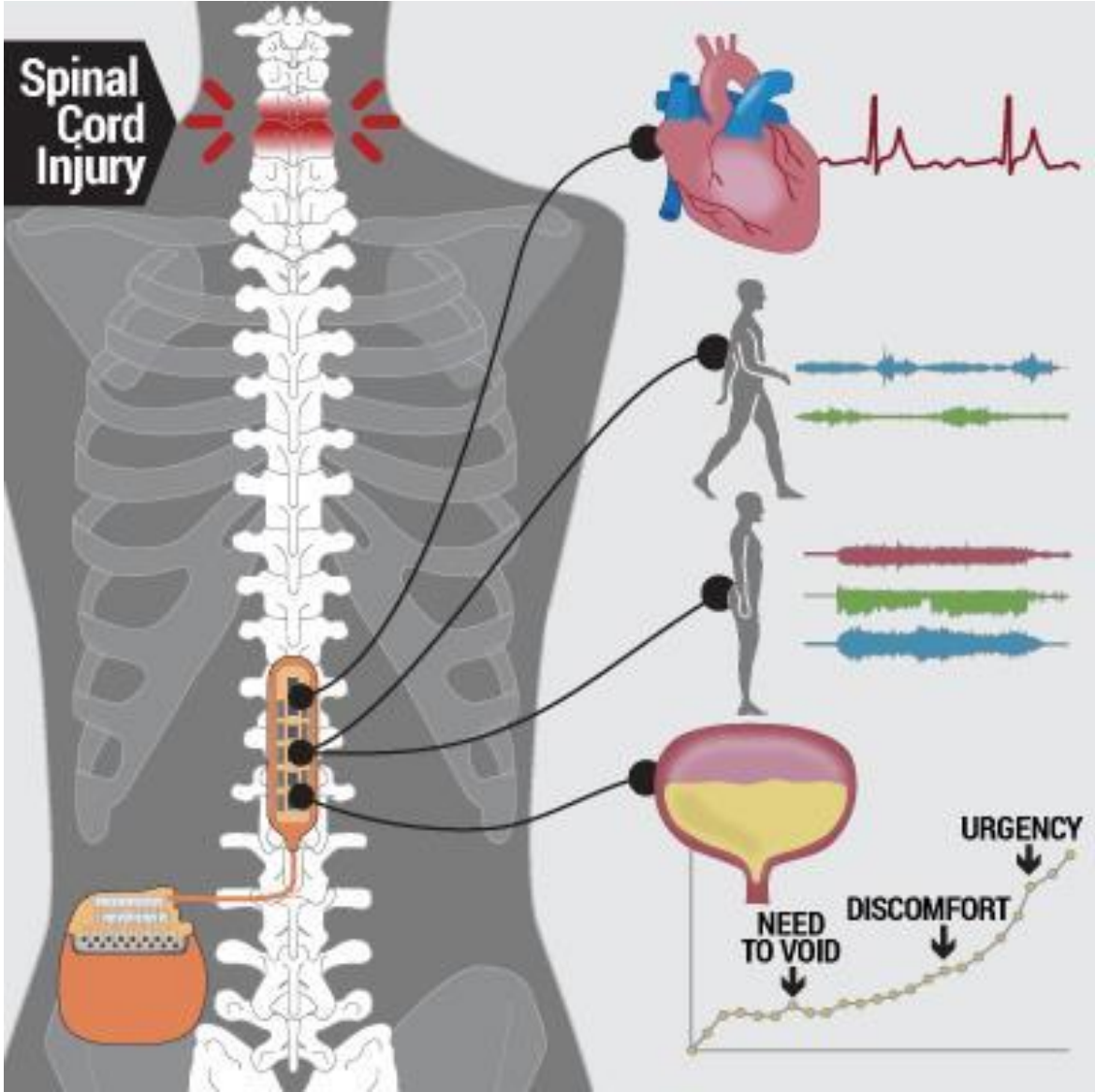


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Spinal Cord Epidural Stimulation



<http://depts.washington.edu/moritlab/wordpress/wp-content/uploads/2018/07/Researchmatters-600x400.jpg>



<https://www.frontiersin.org/image/researchtopic/11075>