김 호 정 선임연구원

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Lab: NeuroMuscular Systems Laboratory

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Research Interests

- Neural control of biological movement
- Neuronal dynamics and computation
- Computational physiology & medicine
- Neuromodulation

Education

- 2011: University of Alberta (PhD, BMS)
- 2002: GIST (MS)
- 2000: Chung-Ang University (BS)

Professional Experience

- 2013-Present: Senior Researcher, DGIST, Korea
- 2011-2013: Research Associate, Northwestern University, USA
- 2002-2006: Researcher, Agency for Defense Development, Korea

Introduction to Research

Movement underlies almost every interaction that humans and other animals have with the outside world and each other. My research focuses on elucidating and formulating how the brain and spinal cord computes, encodes and modulates motor commands for proper activation of skeletal muscles in normal and pathological states. For systematic investigation, both computational and experimental approaches are applied including empirically-based computer modeling & simulation of neuro-musculo-skeletal system, neuroimaging of brain-spinal cord interplay and electrophysiology of neural intervention. If my investigation is successful, it will be possible to decode the neural code underlying movements and thus understand how a biological system of actuators and distributed control functions. My research has clinical implications for the field of neuromodulation, physical therapy and rehabilitation medicine.

Research Publication(selected)

1. H. Kim, “Cerebral hemodynamics predicts the cortical area and coding scheme in the human brain for force generation by wrist muscles”, Journal of Behavioral Brain Research, doi:10.1016/j.bbr.2020.112865, 2020.
2. H. Kim, “Muscle length-dependent contribution of motoneuron $Ca_v1.3$ channels to force production in model slow motor unit”, Journal of Applied Physiology, 123(1):88-105, 2017.
3. H. Kim, “Impact of the location of dendritic calcium persistent inward current on the input-output properties of spinal motoneuron pool: a computational study”, Journal of Applied Physiology, 123(5):1166-1187, 2017.
4. H. Kim, Thomas G. Sandercock and C. J. Heckman, “An action potential-driven model of soleus muscle activation during locomotor-like movements”, Journal of Neural Engineering, 12(4):046025, 2015.
5. H. Kim and K. E. Jones, “Asymmetric electrotonic coupling between the soma and dendrites alters the bistable firing behaviour of reduced models”, Journal of Computational Neuroscience, 30(3):659-74, 2011.

Awards & Honors (selected)

1. Queen Elizabeth II Award, Canada (2009)
2. 75th Anniversary Graduate Student Award, Canada (2007)
3. CCCK/AECL R.K. Keating Memorial Award, Canada (2006)
4. Defense Science Award from Agency for Defense Development, Korea (2005)