

**How flexible is reflex?  
On the modulation of reflex during normal movement and spasticity**

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Abstract: When the ongoing movement is disrupted by unexpected perturbations, human reflex is able to provide fast -- and usually adequate -- compensations against external perturbations. It has been shown that reflex behavior can vary significantly when dealing with different movement tasks. One reason why reflex can be flexible and task-dependent is that in order to achieve certain control outcomes the reflex behavior can be fine-tuned by the descending modulations from the brain. I will review some of the recent evidence to reveal which reflex features could be modulated during movement. These features include the timing of short-latency spinal response, the magnitude of long-latency spinal response, the weighting between static and dynamic proprioceptive information, etc.

At University of Southern California, we are also emulating human motor nervous system on electronic chips using Very-Large-Scale-Integrated-circuit (VLSI) technology. This allows us to validate the experimentally identified reflex modulation with on-chip emulations and even robots. I will also introduce this part of our work in order to demonstrate how abnormalities in the modulation of reflex will result in movement disorders such as spasticity.