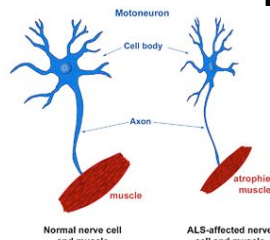


*“To move things is all that mankind can do ...for such the sole executant is muscle, whether in whispering a syllable or felling a forest.”*

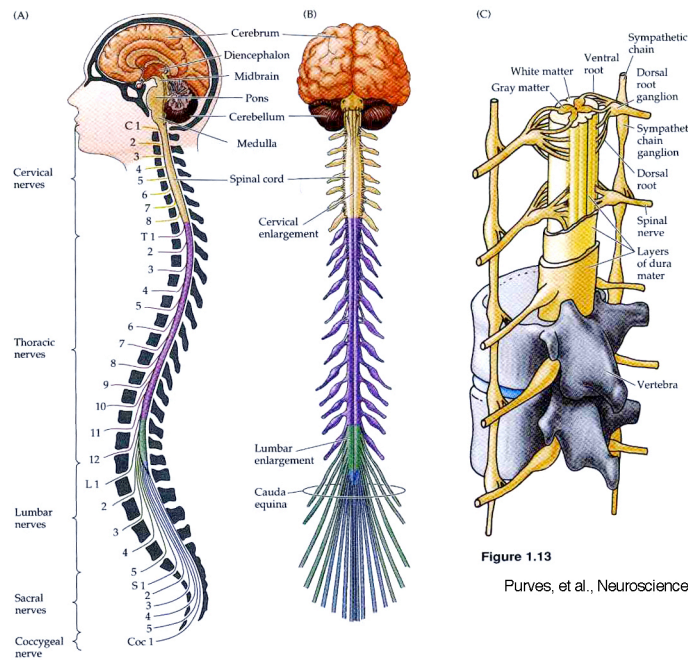
English neurophysiologist Charles Sherrington in the Linacre lecture of 1924:

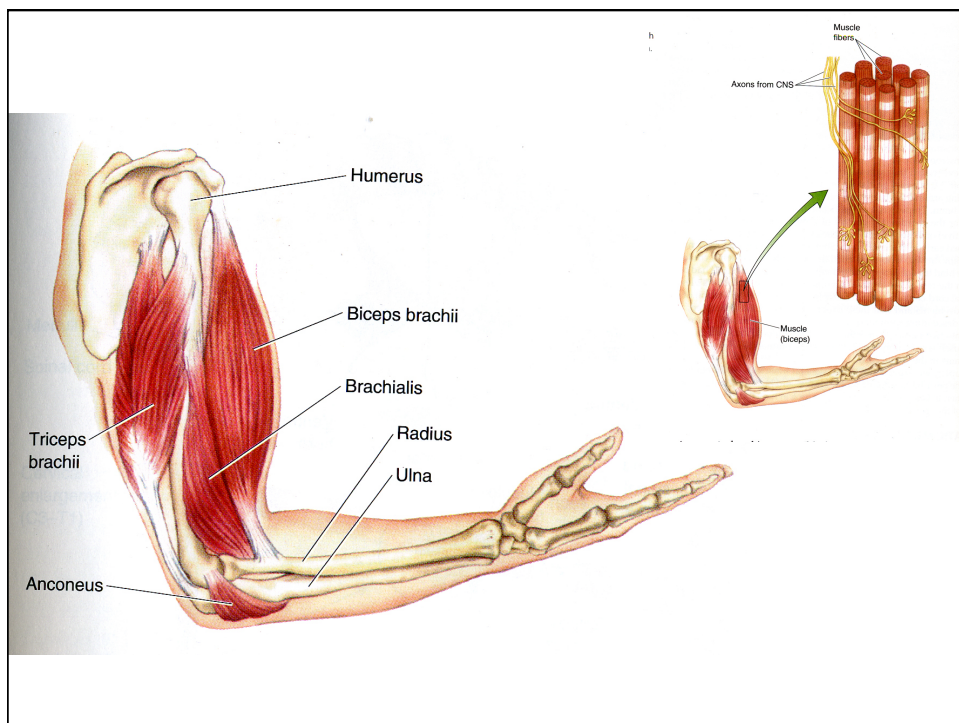
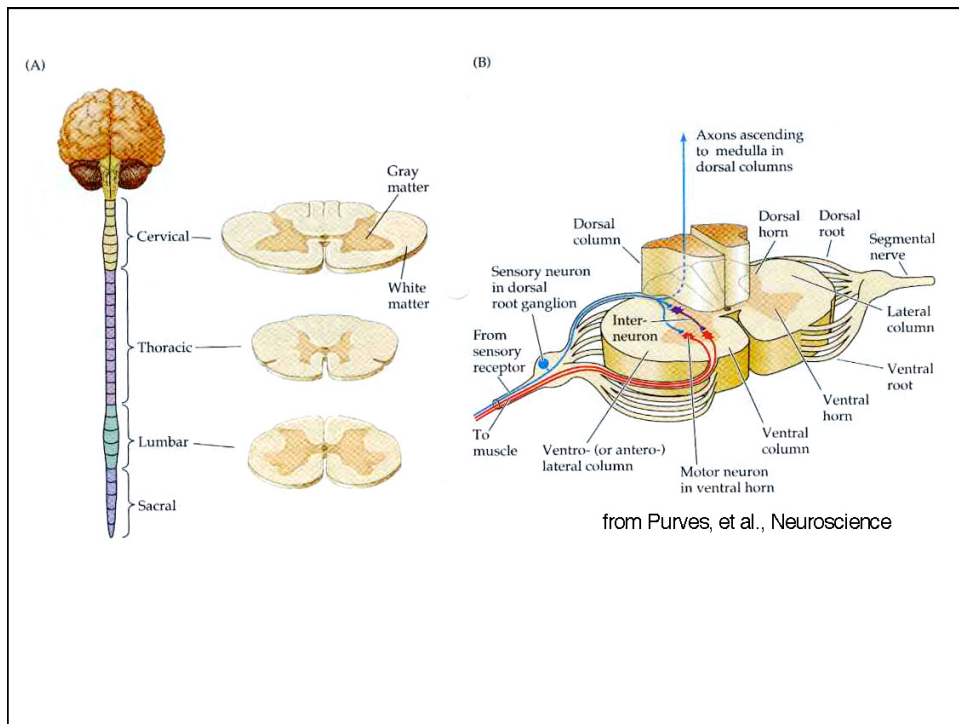


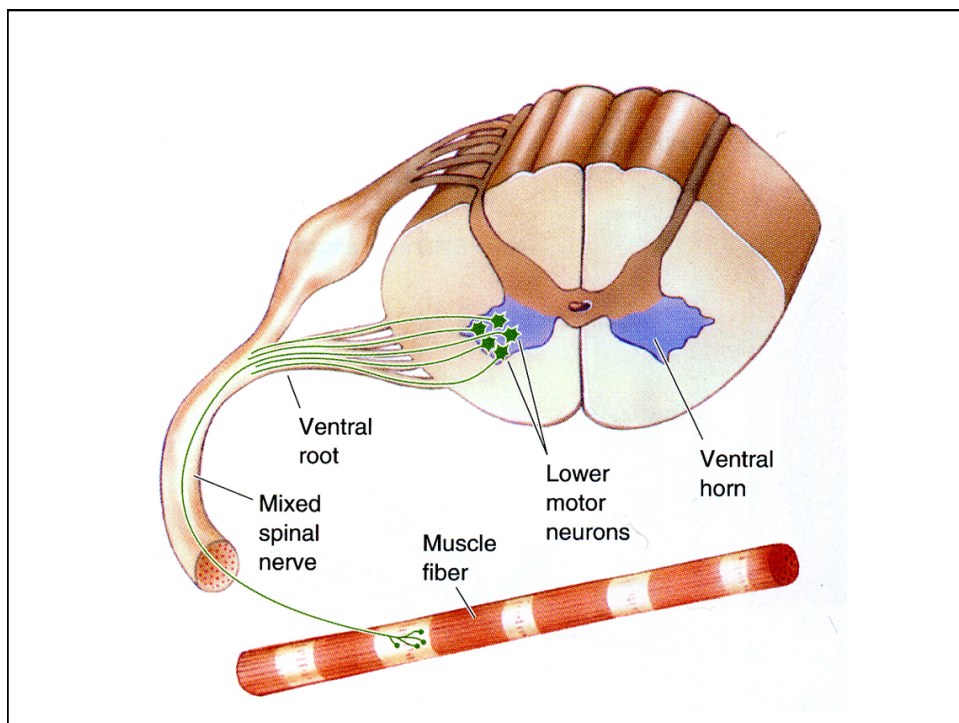
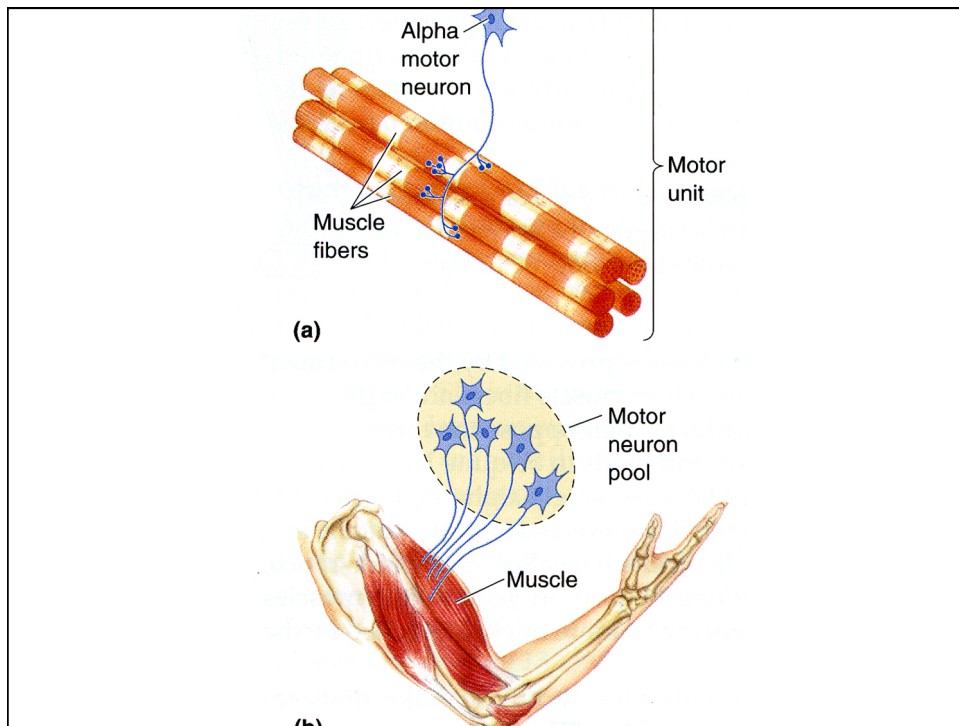
Muscular Dystrophy

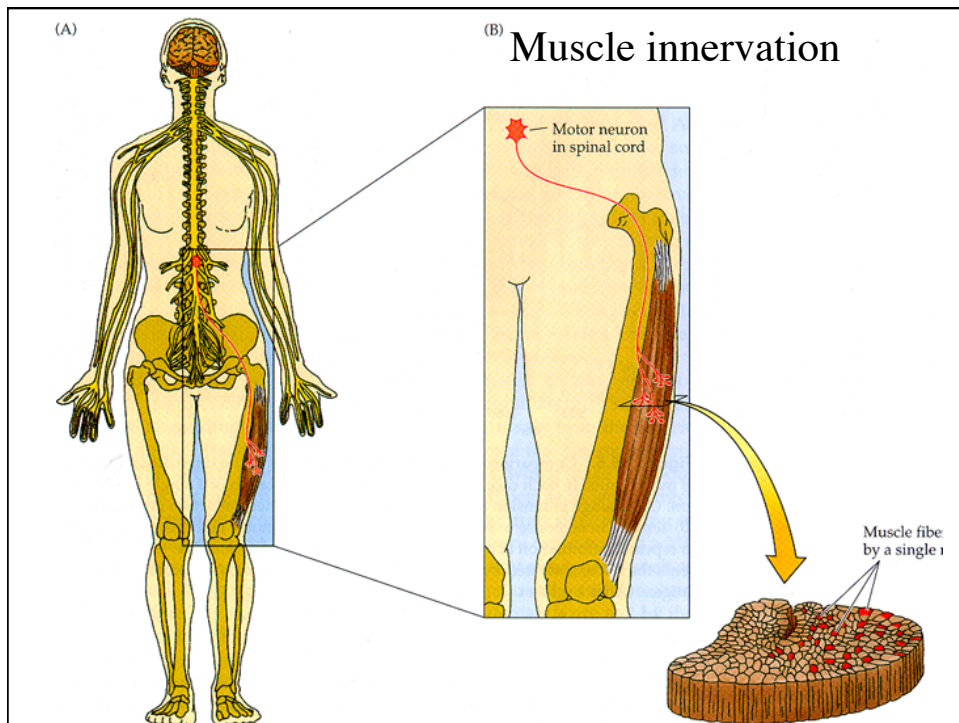
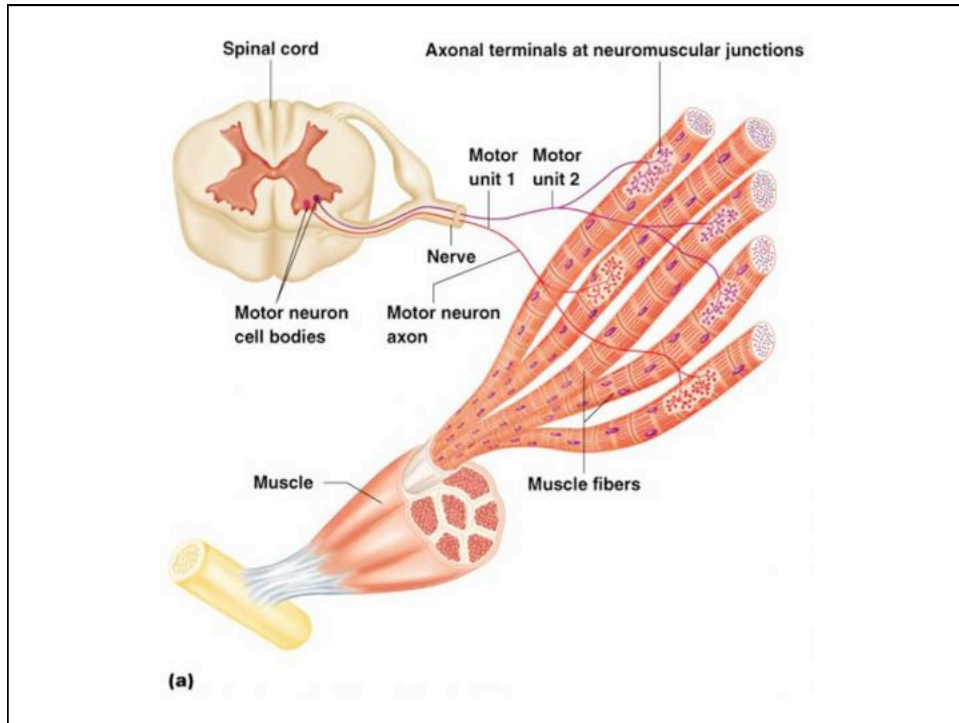


Amyotrophic Lateral Sclerosis

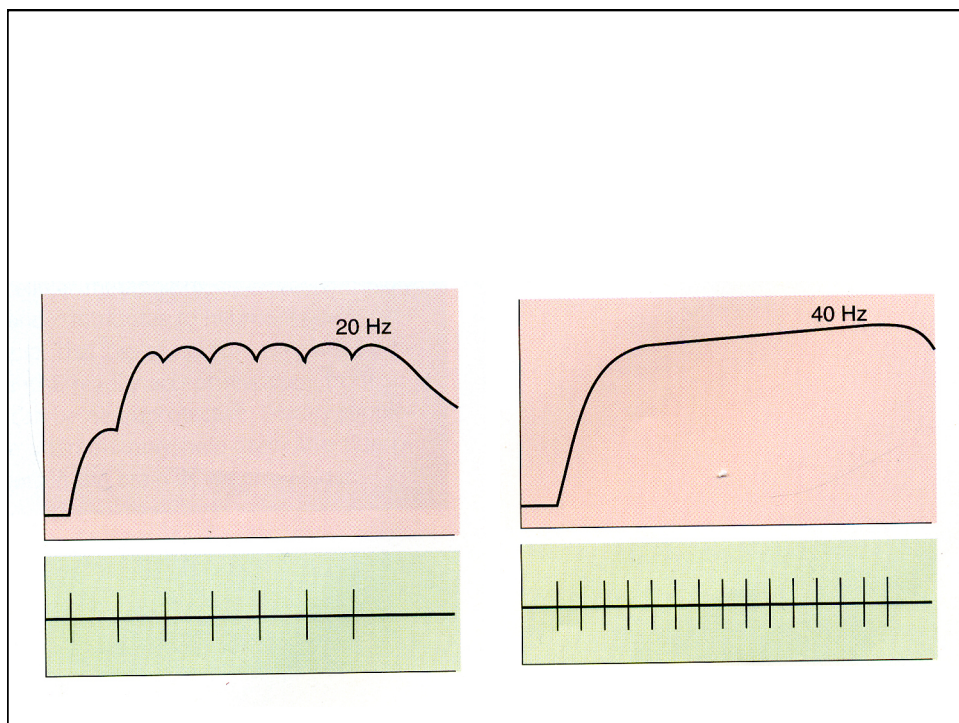
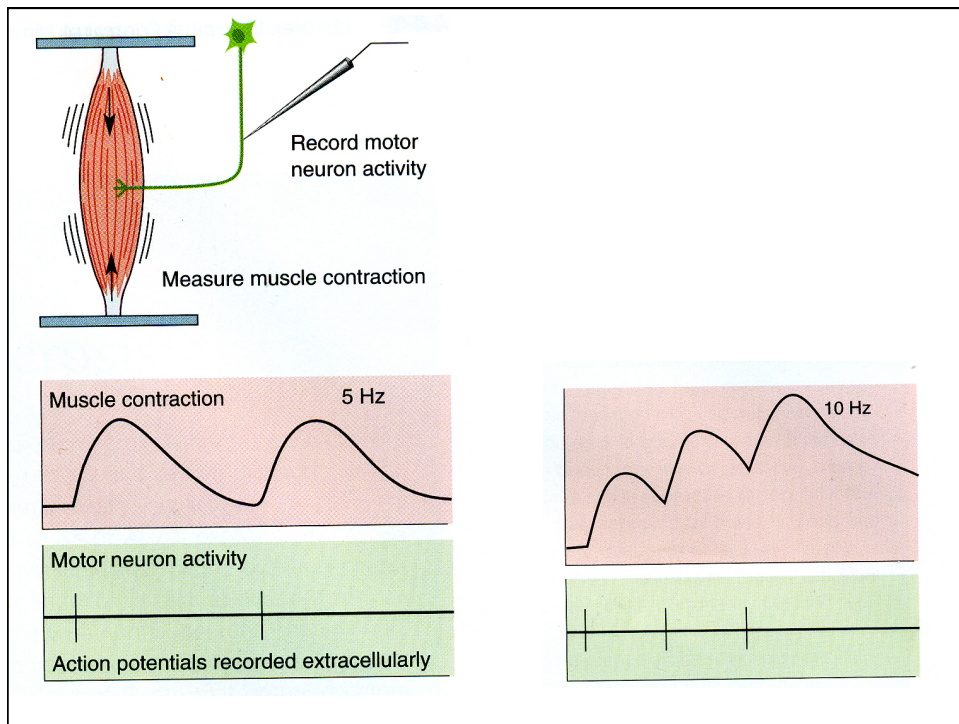




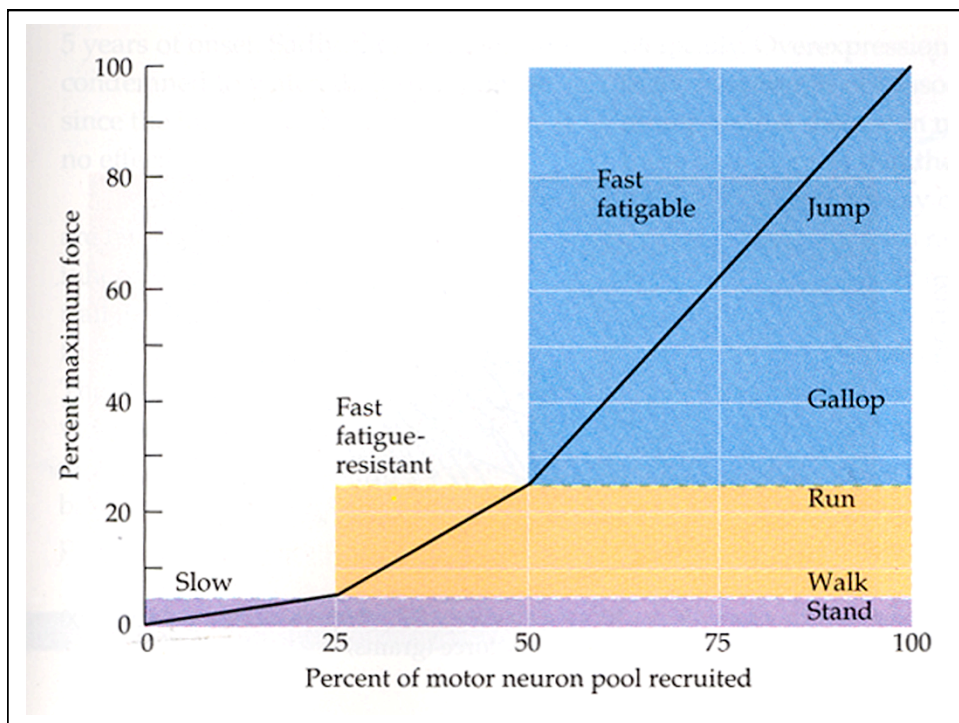
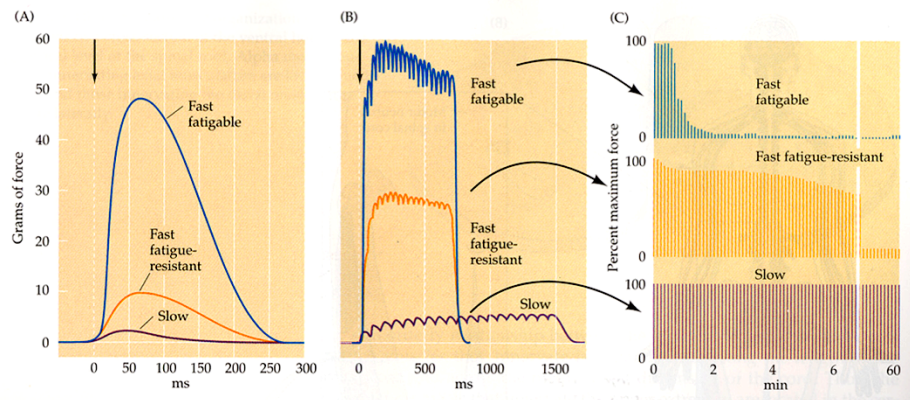




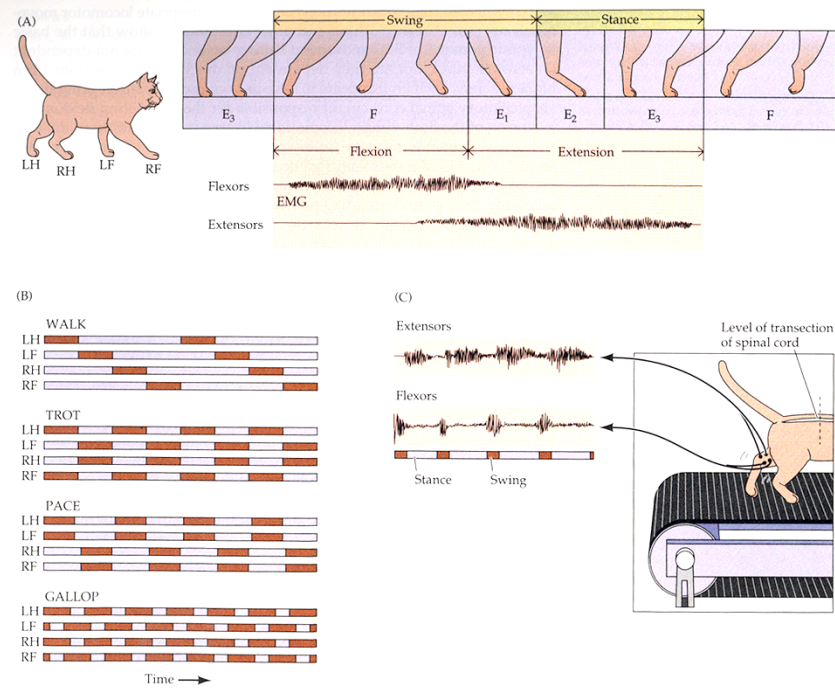




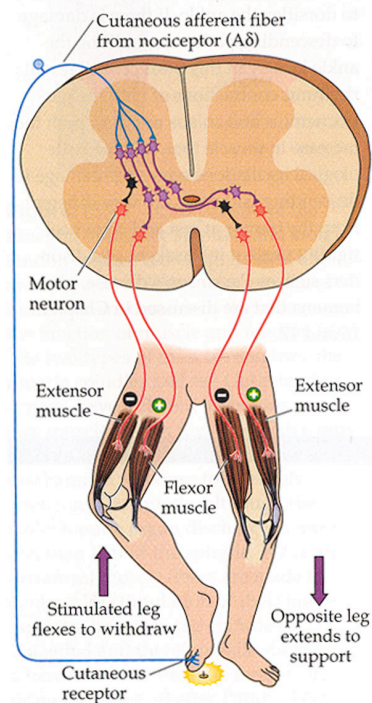
### 3 different types of motor units



# Locomotion is spinal circuit

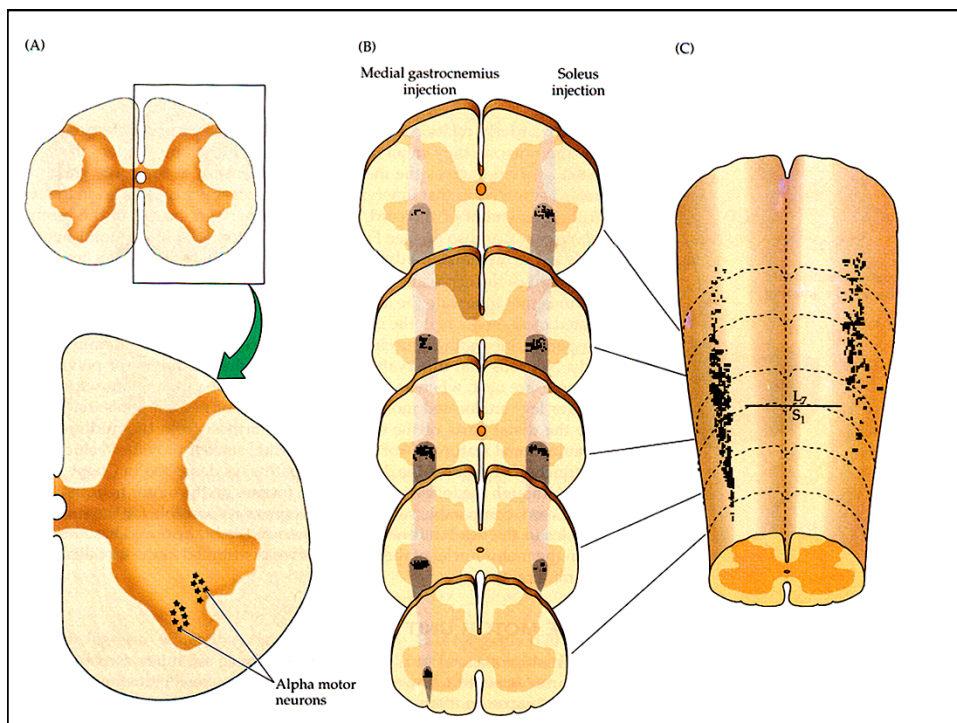
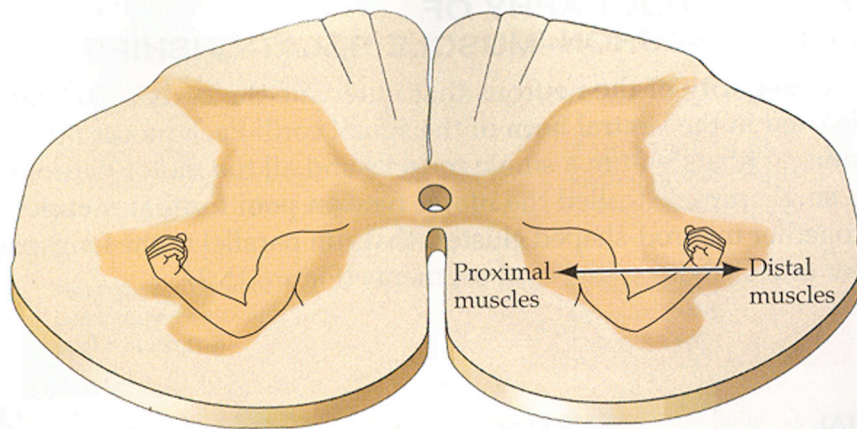


# Reflexes are complex (coordinated)





## Somatotopic organization of motor neurons





## The passive voice

## Short-Term Enrichment Makes Male Rats More Attractive, More Defensive and Alters Hypothalamic Neurons

Rupshi Mitra<sup>1,2\*</sup>, Robert M. Sapolsky<sup>3</sup>

<sup>1</sup>School of Biological Sciences, Nanyang Technological University, Singapore, Singapore, <sup>2</sup>Division of Psychology, Nanyang Technological University, Singapore, Singapore, <sup>3</sup>Department of Biology, Stanford University, Stanford, California, United States of America

### Abstract

Innate behaviors are shaped by contingencies built during evolutionary history. On the other hand, environmental stimuli play a significant role in shaping behavior. In particular, a short period of environmental enrichment can enhance cognitive behavior, modify effects of stress on learned behaviors and induce brain plasticity. It is unclear if modulation by environment can extend to innate behaviors which are preserved by intense selection pressure. In the present report we investigate this issue by studying effects of relatively short (14-days) environmental enrichment on two prominent innate behaviors in rats, avoidance of predator odors and ability of males to attract mates. We show that enrichment has strong effects on both the innate behaviors: a) enriched males were more avoidant of a predator odor than non-enriched controls, and had a greater rise in corticosterone levels in response to the odor; and b) had higher testosterone levels and were more attractive to females. Additionally, we demonstrate decrease in dendritic length of neurons of ventrolateral nucleus of hypothalamus, important for reproductive mate-choice and increase in the same in dorsomedial nucleus, important for defensive behavior. Thus, behavioral and hormonal observations provide evidence that a short period of environmental manipulation can alter innate behaviors, providing a good example of gene-environment interaction.

Once upon a time, as a walk through the woods was taking place on the part of Little Red Riding Hood, the Wolf's jump out from behind a tree occurred, causing her fright.

Once upon a time, Little Red Riding Hood was walking through the woods, when the Wolf jumped out from behind a tree and frightened her.

The Federalists' argument in regard to the destabilization of government by popular democracy was based on their belief in the tendency of factions to further their self-interest at the expense of the common good.

The Federalists argued that popular democracy destabilized government, because they believed that factions tended to further their self-interest at the expense of the common good.

The collapse of a dead star into a point perhaps no larger than a marble **creates** a black hole.

A black hole **is created** by the collapse of a dead star into a point perhaps no larger than a marble.

Some astonishing questions about the nature of the universe have been raised by scientists studying black holes in space. The collapse of a dead star into a point perhaps no larger than a marble **creates** a black hole. So much matter compressed into so little volume changes the fabric of space around it in puzzling ways.

Some astonishing questions about the nature of the universe have been raised by scientists studying black holes in space. A black hole **is created** by the collapse of a dead star into a point perhaps no larger than a marble. So much matter compressed into so little volume changes the fabric of space around it in puzzling ways.

We discussed the problem.

The problem was the topic of our discussion.

“Some claim that **our genes** influence aspects of behavior that we think are learned. **Our genes** for example, seem to determine....”

“Some claim that aspects of behavior that we think are learned are in fact influenced **by our genes**. **Our genes**, for example, seem to determine....”