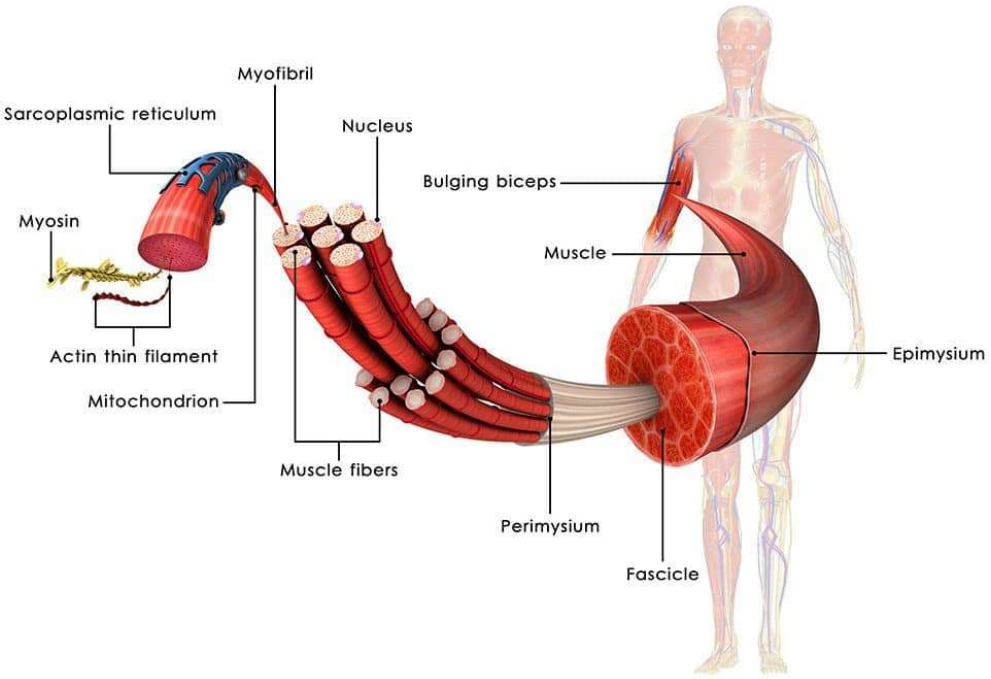
Advanced Lab Course No. 07

Molecular Motors

Many dynamic processes in biological systems do not rely on diffusion. Active transport, cell division, propulsion of bacteria and contraction of whole muscles are a few examples of mechanisms that are driven by molecular motors. Myosin is a particularly interesting motor protein since it can form bundles, often refered to as *thick filaments*. These myofilaments can bind and pull on *thin filaments* that are composed of the structural protein actin, leading to macroscopic contractions. Shown below is their organization in so called *myofibrils*, the small units that build up whole muscles in the human body.



One aim of this lab course is to study the interaction between these two key players of muscle contractions, by observing the movement of reconsituted actin filaments. Single myosin motors are attached to a surface to measure the motor activity under different conditions. Especially the effect of ATP, a small molecule that acts as fuel for many cellular processes, can be used to examine the underlying enzymatic kinetics.