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LECTURE: THE WONDERFUL MACHINE

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In this talk I will focus on the notion that skeletal muscle is the central component of a wonderful musculo-skeletal machine specialized in the generation of movement. I will briefly touch on following points:□1. The view that the human body is a machine emerged with the anatomical dissections in Italian universities in the XV century and was first formalized by René Descartes in his treatise on man (L'homme, around 1630-35).□2. The working of this machine requires four major components: a motor which generates the force required for the movement (muscle), a mechanical actuator to perform the various movements (skeleton: tendons, bones and joints), a control center which plans the movement and activates the motor (brain and nerves), and an energy supply system which provides the fuel (substrates and O2), with many organs and cells contributing to this function. Indeed, the whole body is actually involved in the working of the machine.□3. The human musculo-skeletal machine has distinct properties, not shared by other primates, which were acquired during evolution by the ancestors of Homo sapiens ("born to run").□4. This machine differs from man-made machines in that it can self-repair, e. g. through muscle regeneration, and adapt in response to appropriate stimuli through structural and functional changes, e. g. muscle atrophy/hypertrophy.□5. Our machine must be kept continuously in function, otherwise it deteriorates: physical exercise has an essential role not only for keeping the machine in good shape but for contributing to the well-being of the whole body. The essential role of muscle activity is first evident before birth, during fetal development, and lasts throughout life, being a condition for healthy aging.