Immunology: Poly-Pill physical activity?

Frequent physical activity keeps you healthy and prevents the so called western diseases. This is known for several years and scientifically proven. The beneficial effect of physical activity not only covers preventive strategies but also therapeutic approach as i.e. seen in physical therapy or cardiology. Thus, benefit on musculoskeletal as well as cardiovascular system is unquestionable.

But what are the so called health-effects of physical activity? Modern humans, or species homo sapiens, are mammals whose evolutionary development has been determined by different environmental conditions. One of these conditions was the availability of food resources and therefore the capability of managing this successfully. Additionally there has been a massive change in brain volume. Muscular energy production had to become flexible because the environment never has been stable and food not always has been available properly. These changes made it necessary to travel huge distances in order to get access to food. Hence, muscles had to adapt and finally we are talking about an organ being able to react on external and internal changes. Improvement of muscular performance in general covers structural as well as metabolic alterations, which is known quite well. But are there effects of muscular improvement that can be seen in other organs? Here, interactions of neurotransmitters and hormones are of interest and we can see a complex but nonetheless interesting interplay of communicational structures that i.e. organize the distribution of energetic resources: active muscles have to maintain energy flow for themselves. This often requires compromises in other organs and means that the latter could be energetically neglected in order to guarantee supply elsewhere. Here, a well known mechanism is insulin resistance: by changing receptor activity or second messenger systems glucose distribution can be allocated. Because muscle cells contain various receptors, hormones and cytokines (so called 'myokines') respectively they are able to communicate and influence other cells and organs. This determines that our musculoskeletal system can influence i.e. the immune system in the short and long term. Furthermore replenishment of energy sources has to be maintained, so muscles are able to adapt their own activity to peripheral changes. Finally they even may influence central nervous activity and by that could change i.e. neuroplasticity which in turn alters the quality of therapeutic strategies. Finally we could question which the differences of physical activity. High intensity causes different changes compared to low intensity – and talking of lack of physical activity – could it also be too much?