How Exercise May Make Us Healthier

By Gretchen Reynolds, The New York Times, Dec. 19, 2018

People who exercise have different proteins moving through their bloodstreams than people who do not, according to an interesting new study of the inner landscapes of sedentary and active people.

The proteins in question affect many different aspects of our bodies, from immune response and blood-sugar levels to wound healing, so the new findings may bring us closer to understanding just how exercise enhances our health at a deep, molecular level.

By now, we can all agree, I hope, that being physically active is good for us. It raises fitness, reduces disease risks, lengthens life spans, improves heart health and, in multiple other discrete ways, makes us stronger and more well.

But scientists have surprisingly little full knowledge of just how exercise accomplishes all of this. They can see or measure most of the desirable outcomes of being active. But many of the underlying, intricate physiological steps involved remain mysterious.

In the past several years, though, there has been growing scientific interest in delving into the various "'omics" of exercise. In broad terms, "'omics" refers to the identification and study of molecules related to different biological processes and how they work together. Genomics, for example, looks at molecules related to the operations of genes; metabolomics at those involved in our metabolisms, and so on.

But one of the more compelling 'omics fields is proteomics, because it focuses on proteins, which are expressed by genes and subsequently jump-start countless other physiological processes throughout our bodies.

Proteins are at the heart of our busy interior biology.

But almost nothing has been known about the proteomics of people who exercise and whether and how they might differ from those of people who rarely move and what it might mean if they do.

So, for the new study, which was published in November in the Journal of Applied Physiology, researchers at the University of Colorado, Boulder, set out to look at various people's proteins.

They first gathered 31 healthy young men and women, about half of whom exercised regularly, while the rest did not. They also recruited an additional group of 16 healthy middle-aged and older men, half of whom were physically active and half of whom were sedentary.

They measured everyone's aerobic fitness and markers of their health, including blood pressure and insulin control. Then they drew blood and sent it for proteomics analysis.

In this study, the analysis looked for the presence or absence of about 1,100 known proteins and also for complicated, teensy physiological indicators showing that certain proteins had or had not been expressed, or activated, at about the same time as one another or otherwise were interrelated.

The analysis found that, over all, about 800 of the proteins in the volunteers' blood bore marks showing that they were interrelated.

The analysts grouped these proteins together based on how related they seemed to be. Ultimately they wound up with 10 different "modules" of proteins that they concluded were likely to be working in tandem with one another to perform various physiological tasks.

Each module contained anywhere from 14 to more than 500 related proteins, although the amounts of each protein within a module could vary from person to person.

Interestingly, the 800 proteins included many that already are known to be involved in health-related processes, such as starting or slowing inflammation and other immune-system responses.

Finally, the analysts checked to see whether the makeup of the 10 modules differed in people who were active.