New guide to the genetic jungle of muscles can help health research

November 26 2014

Researchers from Aarhus University and Bispebjerg Hospital have created a comprehensive overview of how tens of thousands of genes interact in relation to the behavior of muscles. At the same time, they have developed a guide to the huge amounts of data.

How do the genes in the cells inside the body's muscles respond when the muscles are put to work? And how are these genes affected when muscles are not used? What importance do activity and, on the other hand, lack of activity have for the organism's metabolism, and thus also for diseases such as diabetes and obesity?

These questions form the basis for a new study from the Department of Public Health at Aarhus University and the Institute of Sports Medicine at Bispebjerg Hospital. For the first time, the study compares the reactions of all genes in the muscles to diverse muscular work on the one hand, and a lack of activity on the other. This has been achieved partly by means of taking muscle tissue samples from twenty young, healthy male test subjects, and partly by means of genetic screening.

The results have just been published in the Nature's journal *Scientific Data* and represent an enormous volume of data which is now available to researchers all over the world.

Platform for future research

"Genetic screening faces a major challenge in that tens of thousands of genes multiplied by a given number of test subjects involved and by a given number of points in time selected for measurement, quickly develops into hundreds of thousands of data points that you have to be able to comprehend and interpret," says Associate Professor Kristian Vissing from Aarhus University.

Even though you can systematise data, this type of bioinformatic analysis also has limitations. For instance, reported data most often rely on highest ranking of response. While this may serve to highlight genes that are highly responsive, it is not necessarily telling of their biological importance. Oppositely, potentially important genes responding below a pre-set cut-off level are easily ignored, but may be just as important or even more important to our understanding of a biological mechanism that is at the root of a disease.

"As part of the study we have therefore developed a search tool, or manual, which makes it easy for other researchers to find their way around the large volumes of data and obtain knowledge about the genes they are particularly interested in," says Kristian Vissing.

Together the two elements of the study provide a platform for further research into disease and treatment options. For example for examining muscle genes that are involved in the carbohydrate metabolism, which may help to direct the development of medicine to help against diabetes.

Provided by Aarhus University