

A JOINT STUDY BETWEEN THE CNIO AND CIC bioGUNE IDENTIFIES METABOLIC BIOMARKERS THAT COULD PROVE USEFUL IN PREVENTIVE MOLECULAR MEDICINE

- **These findings were obtained in a study of 1500 metabolites in blood, thus making it the most in-depth analysis to date in this research field.**
- **The work, which is published today in the on-line version of the journal *Aging Cell*, is an important breakthrough in the field of preventive molecular medicine and the identification of new biomarkers for early detection of disease risk.**

Madrid, 5 December 2012. A better understanding of the origin of diseases in order to improve their early detection and therefore improve their cure rates is one of the greatest challenges facing biomedicine. Such progress would also benefit what CNIO scientists refer to as *preventive molecular medicine*, which consists of identifying those individuals who are at highest molecular risk of suffering certain diseases in order to prevent them. Ageing of the body, and therefore the cells and tissues of which it consists, is the most significant risk factor for the majority of diseases in the developed world, including cancer.

A team of scientists from the Spanish National Cancer Research Centre (Centro Nacional de Investigaciones Oncológicas, CNIO), led by its head María Blasco, together with Jose M. Mato, head of the Center for Cooperative

Research in Biosciences (CIC bioGUNE), has shown that the metabolic profile of a body indicates its degree of cellular ageing and general health status in mice. These findings may prove to be of great use in the field of preventive molecular medicine as they could indicate health status in a fast and minimally invasive manner, thus helping to prevent diseases or to diagnose them in their early stages.

Metabolism is one of the processes that best defines an organism's general status. As such, in order to study the possible relationship between metabolism and ageing, the authors of this study used a new methodology involving liquid chromatography and **mass spectrometry** techniques to study up to 1500 metabolites (metabolic intermediaries or products) in very small samples (only 5–10 µL) of blood serum from 130 mice.

“This new technique has allowed us to demonstrate that the metabolic profile of mice depends on their biological age; specifically, we have found that the levels of 48 metabolites vary very significantly with age”, states CNIO researcher Bruno Bernardes de Jesús, one of the authors of this study.

When the researchers performed the same analyses in mice expressing a higher level of telomerase, which, according to a study published recently by Blasco's group in the journal *EMBO Molecular Medicine*, age more slowly, they found that the metabolic signature was very similar to that found in younger mice. The same analyses in telomerase-deficient mice, which age more quickly, gave a metabolic signature which closely resembled that found in older mice.

Recent studies in humans have shown a possible relationship between metabolism and life expectancy. “Our large-scale analyses, which include the largest number of metabolites analysed to date, confirm the theory that the metabolome reliably reflects the *biological clock* of cells”, declares Jose M. Mato, a researcher at CIC bioGUNE.

NEW BIOMARKERS FOR ASSESSING HEALTH STATUS

Ageing is mainly characterised by a metabolic decline that results in a loss of liver, kidney, coronary and heart function as well as a higher risk of cancer. Indeed, some of the 48 metabolites identified in this study have previously been linked to age-related diseases such as Alzheimer's or cardiovascular disease.

The results of this research may prove useful for predicting the overall health status of humans from a small sample of blood. They may also prove useful for preventing the age-related diseases that make up the majority of fatal diseases in the developed world.

In light of their findings, these researchers intend to search for diagnostic biomarkers associated with other health problems with a high socio-economic impact, such as diabetes, obesity or cardiovascular disease.

Reference article:

***A metabolic signature predicts biological age in mice.* Antonia Tomás-Loba, Bruno Bernardes de Jesus, Jose M. Mato, Maria A. Blasco. *Aging Cell* (2012). doi: 10.1111/accel.12025**