

A research team from CIC bioGUNE identifies a metabolic pathway which contributes to the growth of prostate cancer

Prostate cancer often exhibits molecular changes which support its growth

The research unravels a mechanism through which prostate cancer produces metabolites essential for tumour biology

The study, led by Dr. Arkaitz Carracedo, has been published in the journal *Nature*

(Bilbao, 28 June 2017). Polyamine metabolism is controlled by molecular pathways which drive prostate cancer, according to the findings of a team from CIC bioGUNE led by Arkaitz Carracedo. Dr. Carracedo (PhD), is an Ikerbasque Research Professor, Associate Professor at the University of the Basque Country and a researcher at the recently founded Biomedical Cancer Research Networking Centre - Centro de Investigación Biomédica en Red de Cáncer (CIBERONC), which has also taken part in this work.

Prostate cancer is among the most prevalent tumours worldwide, and the major genetic alterations underlying the pathogenesis of this disease have been described. However, little is known about the metabolic changes that are required in this tumour type. The metabolic characterisation of cancer is an innovative strategy to identify new ways to effectively treat the disease. According to Dr. Carracedo, **“it’s as if we’d lifted up the bonnet of a Ferrari (prostate cancer) and can now see how the engine works. If sugars, lipids and aminoacids were the fuels of this engine, the metabolic pathway we report (polyamine synthesis) would be the oil that ensures that this engine operates at full capacity”** The findings of the research were recently published in *Nature*, one of the most internationally prestigious scientific journals.

Cancer cells use nutrients differently from normal cells, in order to support their active growth program. The aim of this research has been to identify the metabolic changes which take place at early stages of the disease. As Carracedo explains, “[...] to address this fundamental question, we used a mouse model which develops prostate cancer, and then then confirmed the findings in the human disease and studied the underlying molecular mechanism”. This work is the result of a strategic partnership of various research and innovation bodies, including the pharmaceutical industry (AGIOS Pharmaceuticals), the clinical sector (Basurto Integrated Healthcare Organisation - OSI Basurto, the Basque Biobank for Research - BIOEF, the Vall d’Hebron Institute of

Oncology - VHIO, Memorial Sloan Kettering Cancer Center in USA, etc.) and many other research centres. The key main researchers in Dr. Carracedo's research group developing this project have been Drs. Amaia Zabala and Amaia Arruabarrena. **"The results have enabled us to show that the activation of a metabolic enzyme in prostate cancer triggers greater aggressiveness of the disease"**, Carracedo says. Through an in-depth molecular and biochemical study, the authors have defined potential strategies to reduce the growth of these tumours. "This basic research lays the path for future studies to go deeper into the potential of this information for cancer treatment", Dr. Carracedo adds.

Cancer is a disease resulting from an accumulation of errors (mutations) in the operating system of otherwise healthy cells. These mutations hijack the cellular operative system, causing them to grow without control. Cellular metabolism must adapt to sustain this growth, which implies that a close connection between the "hijacked operative system" and the metabolism must exist. This study sheds light on the importance of decoding this connection for a better understanding of the vulnerabilities of cancer and for the design of better treatment. **"Resources must be invested in understanding the disease at the molecular level to subsequently innovate and convert this knowledge into social benefit. This is precisely why a strategy for founding basic research is of utmost importance"**, the biologist concludes.

CIC bioGUNE, cutting-edge research into cell biology

The Centre for Cooperative Research in Biosciences (CIC bioGUNE), located in the Bizkaia Technology Park, is a biomedical research organisation conducting cutting-edge research at the interface between structural, molecular and cell biology, with a particular focus on generating knowledge on the molecular bases of disease, for use in the development of new diagnostic methods and advanced therapies.

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