

3P Medicine Laboratory

How gene mutations acquired throughout life affect the development of cancer and other diseases



The centre is implementing a project entitled: „Mutations acquired during lifetime that lead to increased risk for human disease, with focus on cancer.“ Researchers at the 3P Medicine Laboratory are focusing especially on the development of breast cancer in women, prostate cancer in men, and colon and bladder cancers in both genders, and also Alzheimer’s disease in men related to their loss of chromosome Y in leucocytes. Results of this research could lead to the identification of new cancer risk biomarkers and help better understand early stages of Alzheimer’s disease.



3P (Preventive, Personalized, Precision) Medicine Laboratory



Prof. Jan Dumanski and Prof. Arkadiusz Piotrowski



Somatic mosaicism, structural rearrangements, mutations, aneuploidy, loss of chromosome Y (LOY), cancer, genetics, genomics, diagnostics, Alzheimer’s disease



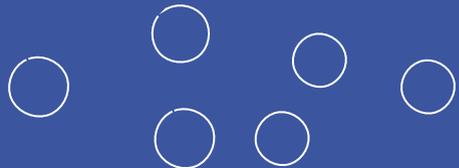
Research into genetic anomalies developed throughout life as risk factors for cancer and other diseases



Quotes

*We plan to describe mutations that take place during human life and which contribute to cancer, and then to use this knowledge to diagnose cancer early, before any symptoms are displayed. Since in the vast majority of cases, early diagnosis determines the chances of successful treatment, our research can have an impact on reducing mortality among cancer patients – **prof. Jan Dumanski.***

*It seems that the loss of chromosome Y (LOY) in leucocytes in men causes the impairment of immune surveillance. Healthy leucocytes eliminate all cells other than normal, but following the loss of chromosome Y this process becomes less efficient. If our research confirms this hypothesis, the analysis of LOY in the blood of geriatric males could become a new biomarker for several common diseases – **prof. Jan Dumanski.***





Prof. Jan Dumanski – He studied medicine at the Jagiellonian University in Krakow, Poland. Began research in 1986 at the Karolinska Institutet in Stockholm, Sweden. There he obtained his doctorate and in 2000 received the title of professor at Uppsala University in Sweden, in the field of Experimental Pathology, at the Department of Immunology, Genetics and Pathology. He was also a professor at the University of Alabama in Birmingham, USA, where he headed the Howell and Elizabeth Heflin Center for Human Genetics. He participated in many international research projects on cancer genetics, the molecular basis of metastasis, or the mechanisms behind cancer predisposition. One of his current main research interests is the loss of the Y chromosome (LOY) in male leukocytes and contributing to the development of many diseases, including cancer and Alzheimer's disease.

Prof. Arkadiusz Piotrowski – graduate of the Intercollegiate Faculty of Biotechnology, University of Gdańsk, and the Medical University of Gdańsk (GUMed). He earned his PhD in Pharmacy from the Faculty of Pharmacy and Department of Laboratory Medicine at GUMed. Following his doctorate, he worked at the Department of Immunology, Genetics and Pathology, Uppsala University, Sweden, and at the Department of Genetics, University of Alabama, Birmingham, USA. He continues to be affiliated with UAB as Adjunct Professor, and also carries out international research projects (including a grant from the US Department of Defense). His principal field of research is somatic mosaicism and structural rearrangements of the genome in the context of cancers and rare genetic diseases.



Interesting facts

Post-zygotic mutations are changes in the genome occurring during the course of one's lifetime and can be caused, e.g., by smoking, poor diet, viral infections, or simply cellular ageing. These mutations are so frequent that probably in an entire organism there are no two cells that are genetically identical. Such mutations make even identical twins, who develop from a single zygote, differ genetically. These mutations are also responsible for many diseases. Their identification and functional assessment are the main research focus for the researchers at the 3P Medicine Laboratory.

7-9 years is the difference between the average lifespan for men and women in Poland (Statistics Poland data for 2018). Perhaps this higher mortality among men is due to the loss of chromosome Y, as found over age in men and contributing to the development of many diseases, including cancer, Alzheimer's and atherosclerosis. This mechanism is being studied by the 3P Medicine Laboratory team, and in 2019 their findings were published in *Nature*.



Foreign partners:
Uppsala University (Sweden)



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