

# NATIONAL TUMOR BIOLOGY LABORATORY

## SCIENCE AGAINST CANCER

The overall aim of the National Tumor Biology Laboratory program is to develop more efficient procedures in oncology for the benefit of cancer patients. This comprehensive R&D program tries to achieve this goal by advancing cancer-specific diagnostic and therapeutic methodologies and introducing new procedures into daily clinical practice with the final output of reducing cancer-related mortality.



## MAIN RESEARCH AREAS

- Development of a national, complex oncology database
- Innovative therapies based on interference with redox systems
- Preclinical and clinical application of new therapeutic procedures



### IMPLEMENTER:

National Institute of Oncology

### PLACE OF IMPLEMENTATION: Budapest



## BENEFITS TO BE EXPECTED FROM LABORATORY RESEARCH

- Development of innovative cancer therapeutic approaches, early diagnostic methods as well as non-invasive and sensitive screening procedures.
- Implementation of more effective therapeutic, early diagnostic, screening and prevention procedures of malignant diseases.
- An increase in the number of cured cancer patients and in the number of years gained in good health.

## THE PROFESSIONAL TEAM

### **Prof. Péter Nagy, PI**

He is the scientific director of NIO, professor at the University of Veterinary Medicine, visiting professor at Semmelweis University and honorary professor at the University of Debrecen. He is a senior official in several European organizations including: Elected Full Member of the European Academy of Cancer Research, Hungarian Delegate to the Scientific Council of the WHO International Agency for Research on Cancer (IARC), Member of the OECD Accreditation Directors Board and EURACAN Management Board. He has received several scientific awards including: Doctor of Science of the Hungarian Academy of Sciences (Dsc), Marie Curie Reintegration Fellow and the Bolyai Plaque. Secretary General of the Hungarian Cancer Society. Secretary of the Tissue- and Cell Bank and Regenerative Medicine Section of the College of Medical Profession. As an invited speaker, he is a permanent invited participant in international conferences and a member of several scientific committees. Among others: Gordon Research Conference, FEBS Redox Biology Section, organizer of the 6th World Congress on Hydrogen Sulfide Biology and Medicine. Editorial member in leading professional journals: Antioxidants and Redox Signaling, Journal of Biological Chemistry, British Journal of Pharmacology. He publishes the results of his scientific work in major international journals such as PNAS, Science Advances, Nature Chemical Biology, etc. There are a large number of references to his published scientific publications, with a number of intertextual named references.

Number of publications: 82 of which single, first / last or correspondent author: 44. Total IF: 494,292. The number of citations to scientific publications exceeds 5,000. He is the Head of MITO.

**Prof. Csaba Polgár** is a leading researcher in the project. He has been working in the Department of Radiation Therapy of the NIO since 1993, has been an assistant professor since 1999, Chief Physician since 2000. From 2002 he has been in the position of Deputy Head of Department, from 2009 in the position of Head of Department, from 2012 in the position of Center Director. Since 2013 he has been the General Deputy Director, and since 2018 he has been the Acting Chief Physician of the Institute. Since 2009 he has been a professor in the Department of Medical Training of the University of Medicine and Pharmacy of Târgu Mureş. Since 2015, he has been the acting head of the Department of Oncology at the Faculty of General Medicine of Semmelweis University, and since 2016 he has been appointed Head. 1997 Radiation Therapy, 2000 Clinical Oncology Exam. 2001. Ph.D. diploma. He habilitated at Semmelweis University in 2007 and has been a professor at Semmelweis since 2015. From 2017 he is a doctor of the Hungarian Academy of Sciences. Total IF: 385,157, h-index: 34.

**Dr. Zsolt Jurányi PhD** 2002. clinical pharmacology exam, 2015 head of department. (Department of Clinical Radiobiology and Oncocytogenetics). Total IF: 60,283.



## THE PROFESSIONAL TEAM

**Dr. Zoltán Takácsi-Nagy** is a leading researcher in the project. He has been an assistant physician in the Department of Radiotherapy of the OOI since 1993, an intern since 1997. Junior Resident since 2001, Senior Resident since 2005. Department Chief Physician since 2007. Since 2009 he has been the Deputy Center Director of Education. From 2018, he has been the Deputy Director General of the Institute. 1997 Radiation Therapy, 2000 Clinical Oncology Exam. 2005. Ph.D. diploma. In 2011, he habilitated at Semmelweis University. Since 2015, he has been an associate professor in the Department of Oncology at Semmelweis University. Total IF: 131,845.

**Prof. Attila Patócs** is a leading researcher in the project. Head of the Department of Molecular Genetics, Specialist in Medical Laboratory and Molecular Genetic Diagnostics, former Head of the Momentum Research Group responsible for the complex diagnostic care of patients with hereditary cancer syndrome at the Institute. As a member of the National Molecular Multi-disciplinary Team and the Professional Council of Clinical Genetics, he also professionally coordinates molecular diagnostic testing for Hungarian patients. He is a member of the European Organization of Rare Hereditary Endocrine Patients (ENDOERN) and the leader of the Hereditary Endocrine Tumor Syndrome Group (MTG4). Total IF: 795, number of articles 214, number of references exceed 5000, h-index: 36.

**Prof. Gabriella Liskay** is a lead researcher in the project. Dermatologist, Clinical Oncologist, Head of the Department of Dermato-Oncology. She is a lead investigator in several international multicenter studies, the leader of the Dermatology Multidisciplinary Team, and the secretary of the College of Dermatology. She has been a leader in researching and introducing innovative therapies for melanoma in the clinic. Since 2019, she has been a member of the advisory board of the Central and Eastern European Academy of Oncology. She has been a member of ETT-TUKEB since 2020. Total IF: 760.62, with nearly 2000 references.

**Dr. József Tóvári** is a leading researcher in the project. Head of the Department of Experimental Pharmacology, graduated in Biology in 1994 from Eötvös Loránd University and in 1999 defended his PhD dissertation at the Semmelweis University (SOTE). His research group specializes in tumor progression and new therapies, for which he has won several national and international basic research and R&D grant applications as a supervisor. As a result of his research, 95 publications were published internationally and 17 in Hungarian to which the number of independent citations is more than 1800. Total IF: 414.525.

**Prof. Elias Arnér** is a senior researcher in the project, the Head of the Department of Selenoprotein Research. He is an internationally recognized researcher in the field of selenoprotein functions, redox regulation of cellular signaling pathways, and anti-cancer therapies based on targeting these pathways. In 2009, he was appointed Professor of Biochemistry at the Karolinska Institute in Stockholm, Sweden, and Head of the Department of Biochemistry, Department of Medical Biochemistry and Biophysics at Karolinska Institute. He holds a PhD (1993) and an MD (1997) degree from the Karolinska Institute. From 2020, he is the head of the newly established Department in the NIO. Number of articles: 155, number of references to scientific publications (based on google scientist) nearly 18,000. Total IF: 1093.18. He holds several international patents in selenoprotein research and anti-cancer therapies.

**Dr. Orsolya Csuka PhD**, Strategic Director, the main activity of her department is to search for and test new biomarkers for the early detection of various tumors, and to identify circulating DNA and circulating tumor cells by genomic methods.

**Dr. Zoltán Novák PhD**, Chief Physician of the Department of Gynecology, Obstetrician-Gynecologist and Gynecological Tumor Surgeon. His department is also involved in surgery and medication with further significant diagnostic activity.



## THE PROFESSIONAL TEAM

**Dr. József Lövey PhD**, Medical Director, Deputy Head of Center. His research activities include the study of radiosensitivity and radiosensitization of tumors in vitro, in vivo and clinical trials, as well as the complex treatment of neurological tumors at the center.

**Dr. Zoltán Mátrai PhD, Med. Habil.** Chief Physician of the Center for Tumor Surgery. He is a founding member of BRESO, whose main goal is to create a theoretical and practical curriculum for European breast oncology surgery. He is the President of the Central and Eastern European Academy of Oncology.

**Prof. Ferenc Rényi-Vámos PhD, Med.Habil.** Chief Physician of the Thoracic Center. Head of the Hungarian Lung Transplant Program. Professor of Semmelweis University, Head of the Department of Thoracic Surgery at Semmelweis University.

**Dr. Lajos Géczy, PhD**, Head of the Pharmacotherapy Center, Head of the Department of Urogenital Tumors and Clinical Pharmacology. In addition to clinical pharmacology studies, the main profile of his department is the treatment of uro-oncological tumors.

**Dr. Gábor Rubovszky, PhD**, Chief Physician of the Department of Pharmacotherapy, Department of Thoracic and Visceral Tumors and Clinical Pharmacology. The department performs complex drug oncology treatment of patients with solid tumors. Their collaboration in pharmacological oncology science programs is significant.

**Dr. Ferenc Oberna PhD**, Chief Physician of the Head and Neck Tumors Multidisciplinary Center, specializes in surgical rehabilitation of head and neck cancer patients with microvascular free lobes, oral rehabilitation, aesthetic facial surgery and orthognatic surgery.

**Dr. Péter Ágoston PhD**, an associate of the Radiation Therapy Center, the Chief Physician of the Department of the Brachytherapy operating room and one of the inpatient departments of the Radiotherapy Department.

**Dr. Tamás Mersich PhD**, Chief Physician of the Department of Visceral Surgery of the Center for Tumor Surgery. His department is the leading center for the removal and treatment of gastrointestinal tumors in Hungary.

**Dr. István Kenessey PhD** pathologist, Head of the National Cancer Registry, associate, András Wéber Ph.D., IARC postdoctoral fellow.

**Dr. János Szőke PhD**, Chief Physician of the Center of Tumor Pathology. His main area of interest is the pathology of lung tumors.

**Dr. Erika Tóth PhD**, head of the department, who is involved with the pathology of head and neck tumors and lymphomas, and the molecular pathology diagnosis of solid tumors.

**Dr. János Fillinger PhD**, Chief Physician of the Department of Cytopathology.

**Dr. József Pozsár**, Department of Surgical Oncology, Chief Physician of the Department of Invasive Gastroenterology. His scientific work focuses on new pancreato-biliary endoscopic methods.

The collaboration of **Dr. Richard Szmola PhD**, Chief Physician, covers research in the field of pancreatic tumors.

**Dr. Dávid Tárnoki and Dr. Ádám Tárnoki, PhD, Med.Habil.** Head of Center and Head of Department of the Oncology Imaging and Invasive Diagnostics Center. They are responsible for radiogenomic research.



## POSSIBLE PARTNERSHIPS

Among the cooperation and partnership agreements, our formalized system of close relations with the key centers of the V4 countries, and the wider Central and Eastern European Region, maintained through the **Central and Eastern European Academy of Oncology (CEEAO)** and the Institute's bilateral relations, is of great importance.

The Institute's researchers work closely with outstanding research groups on 4 continents to expand scientific collaborations, to exchange staffs and for a joint training of young students and researchers.

Among others:

- Twinning institutional agreement with the Karolinska Institutet and Karolinska Institutet University Hospital (Karolinska Comprehensive Cancer Center)
- MD Anderson Cancer Center (ongoing)
- Subaward agreement with Montana State University, Bozeman, MT
- International Prevention Research Institute, Lyon
- Cooperation Agreement with the German Cancer Research Center (Deutsches Krebsforschungszentrum), Heidelberg
- Cooperation agreement between Prof. Elias Arnér (Karolinska Institutet, Stockholm) and the NIO, in the framework of which parties agreed to establish a research laboratory and advise the international outreach program on translational research activities
- Cooperation Agreement with The State Budgetary Healthcare Institution "St. Petersburg Clinical Research and Practical Center for Specialized Types of Medical Care (Oncology), Saint Petersburg
- Cooperation Agreement with the State budgetary educational institution of higher professional education „Voronezh State Medical Academy Named After N.N. BURDENKO“ under the Russian Federation Ministry of Health, Voronezh
- Cooperation Agreement with FSBI National Medical Research Radiology Center of the Ministry of Health of the Russian Federation, Obninsk
- Strategic Partnership Agreement with the Inter-regional clinic of early detection and treatment of oncological diseases LLC, Voronezh
- Cooperation Agreement with George Emil Palade University of Medicine, Pharmacy, Science and Technology of Targu Mures, Targu Mures
- Agreement of the non-profit scientific study collaboration with the Grigoriev Institute for Medical Radiology (NAMS), Kharkiv
- Cooperation Agreement with the Can Tho Oncology Hospital, Can Tho

The NIO's extensive international relations include the world's leading organizations (e.g. WHO, IARC, IPRI, OECD, ECCO, ESTRO, ESMO, EACS, EACR, etc.) and the Institute is the sole representative of the Central and Eastern European region in several international consortium projects. The most significant of these is the **EurocanPlatform**, in which, in addition to the 28 participating centers, our Institute was included from the region. One of the results of the project was the establishment of the **Cancer Core Europe (CCE)** Cancer Research Consortium with the participation of the 7 largest centers in the EU, which could be a pillar of the "Cancer Mission" of the Horizon Europe Framework Program. The NIO played a key role in this program and its development. Representing the Central and Eastern European region in the pre-mission lobbying, we participated in Vatican Conference and the Gago meetings—organized to develop and declare the mission—with presentations and round table moderation.

The **quality assurance of the Mission** will most likely to be carried out by OECD (Nagy, Lövey et al., Lancet Oncol 2020), in the preparation of which the PI of this project will play a key role as an official advisor to EUHealthSupport. The European Academy of Cancer Research, with the participation of the PI (as a member), proposed the implementation of the mission on behalf of European cancer organizations (Nagy et al. Mol Oncol 2020). One of the NIO's primary objectives and long-term plan is to actively participate in the mission's programs, which guarantees sustainability and development.



## POSSIBLE PARTNERSHIPS

Additionally, we participate in the work of several other scientific networks, the most prominent are:

- A 'Using guidelines and benchmarking to Trigger social entrepreneurship solutions towards better patient-centered cancer care in central Europe - INTENT' project;
- A 'CHRODIS-PLUS: Implementing good practices for chronic diseases (CHRODIS-PLUS);
- ERN EURACAN European Reference Networks for Solid Tumors;
- The 'Innovative Partnership for Action Against Cancer - iPAAC';
- H2020, MSCA-ITN-2014-ETN 642004 Peptide-Drug Conjugates for Targeted Delivery in Tumor Therapy "MAGICBULLET";
- Central-Eastern European Breast Cancer Surgical Consortium;
- ENDOERN (European Network of Rare Diseases of Endocrinology);
- Beyond 1 Million Genome project;
- A number of "COST actions" and national oncogenomics programs.

In addition to the work of various international organizations, 14 employees of our Institute work as members of national **colleges of medical professions** and are also responsible for the quality of patient care in Hungary. The Institute's leading researchers regularly organize world congresses and give invited lectures at prestigious conferences (e.g., at several Gordon, EACR, ESTRO, ESSO, etc. conferences).

The NTL's mission is to **develop a centralized research center** among the research departments of the NIO, maintaining an extensive network of contacts within the Institute and internationally. An important step in advancing these goals is the establishment of a **Molecular Diagnostic Center** within the NIO, which will include two research departments (MITO and Pathogenetics), a telemedicine center and a PET/MRI device under procurement. Construction and relocation of the affected departments are expected to take place simultaneously with the National Laboratory Project. In addition to scientific activity, our Institute takes an active role in the **training of doctors and specialists**. In addition to chairing two Medical University Departments, it also participates in specialist and PhD training as one of the centers of Hungarian specialist medical training. Cross border students regularly complete their internship in our Institute. The development and maintenance of international joint postgraduate training programs is a long-term goal, but the organization of study trips for university students and researchers between our Institute and the Karolinska Institute is currently underway.

## TARGET GROUP

- Medical professionals and health care providers involved in care of cancer patients
- Researchers interested in tumor biology

### PROFESSIONAL CONTACT

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