

Department of Virology and Immunology Institute of Biological Sciences, UMCS

Head of the Department: dr hab. Roman Paduch, prof. UMCS

Department staff: Prof. dr hab. Agnieszka Szuster-Ciesielska
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Dr. Katarzyna Sawa-Wejksza
Dr. Magdalena Mizerska-Kowalska
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Renata Obara

Department of Virology and Immunology specializes in::

- in vitro studies of the natural and synthetic origin compounds activity, both at the cellular and molecular level,
- in vitro studies on the interaction of neoplastic cells with normal ones and the host organism, including non-specific (innate) immunity.

For this purpose, commercially available cell lines derived from normal and neoplastic tissues are used.

The laboratory also independently obtain cultures of normal and neoplastic cells from clinical tissues collected from humans and animals.

Thesis supervisors carried out in the Department of Virology and Immunology

- **dr hab. Roman Paduch, prof. UMCS** (*bachelor's and master's theses*)
- **prof. dr hab. Agnieszka Szuster-Ciesielska** (*bachelor's and master's theses*)
- **dr hab. Barbara Zdzisińska, prof. UMCS** (*bachelor's and master's theses*)
- **dr Katarzyna Sawa-Wejksza** (*bachelor's theses*)
- **dr Magdalena Mizerska-Kowalska** (*bachelor's theses*)
- **dr Mateusz Pięt** (*bachelor's theses*)

Research topics carried out at the Department of Virology and Immunology

Dr. hab. Roman Paduch, prof. UMCS

- The anti-cancer activity of the new compounds of natural and synthetic origin

Prof. dr hab. Agnieszka Szuster-Ciesielska

- The mechanisms of development and regression of liver diseases and obesity
- The anti-cancer activity of the new compounds of natural and synthetic origin
- Potential allergenic properties of phytopathogenic microscopic fungi

Dr. hab. Barbara Zdzisińska, prof. UMCS

- The anti-cancer activity of new synthetic compounds

Research topics carried out at the Department of Virology and Immunology

Dr. Magdalena Mizerska-Kowalska

- Antitumor, antiviral and immunomodulatory activity of the new compounds of natural and synthetic origin
- Molecular mechanisms (signaling pathways) related to antitumor activity of various substances
- *In vitro* biological evaluation (cytotoxicity, anticancer activity) of medical devices and biomaterials

Dr. Katarzyna Sawa-Wejksza

- The anti-cancer activity of the new compounds of natural and synthetic origin

Dr. Mateusz Pięt

- The anti-cancer activity of the new compounds of natural and synthetic origin
- The regulatory mechanisms of tumor metastasis
- Methods of tissue engineering in the development of new and modified biomedical materials

Research topics are carried out thanks to the equipment of the Department of Virology and Immunology

- laminar chambers with vertical air flow
- CO₂ flow incubators



tissue bank stored in liquid nitrogen



inverted field microscopes



multifunction (colorimetric reactions,
luminescence and fluorescence) 96-well
plate readers, microplate washer



system for the
electrophoretic gels and
Western Blot membranes
documentation



real-time PCR analysis
device with software and
workstation



flow cytometer
FACSCalibur



centrifuges



low temperature freezer



system for ultrapure water production



Completing the master's thesis at the Department of Virology and Immunology enables:

- gaining practical skills in conducting in vitro tests with the use of cell cultures,
- getting acquainted with commonly used research methods defining:
 - ✓ cytotoxicity of tested substances (cell viability and proliferation) - NR, LDH, MTT, BrdU tests;
 - ✓ cell migration activity - light microscopy;
 - ✓ invasiveness of neoplastic cells - colorimetric tests; protein expression level - immunofluorescence, Western Blot, flow cytometry, ELISA test, qRT-PCR;
 - ✓ apoptosis and necrosis of cells - flow cytometry;
 - ✓ cell distribution at particular phases of the cell cycle - flow cytometry;
 - ✓ co-authorship of congress reports and scientific publications in renowned journals

Sample topics of bachelor's theses carried out at the Department of Virology and Immunology

Temat pracy	Promotor
<ul style="list-style-type: none"> • HTLV-1 virus as leukemias etiological factor - a modern therapeutic approach • Viruses as an etiological factor in the development of selected neoplasms - importance in oncological prophylaxis • Therapeutic methods used in the treatment of lymphomas 	Dr. hab. Roman Paduch, prof. UMCS
<ul style="list-style-type: none"> • SARS-CoV-2 - the virus that caused the pandemic • Apoptosis and autophagy as goals of cancer therapy • COVID-19 vaccines 	Prof. dr hab. Agnieszka Szuster-Ciesielska
<ul style="list-style-type: none"> • BRCA1 gene as a target in the prevention of breast cancer development and therapy • Dendritic cells - role in the body and use in immunotherapy • Cytokines - role in the body and use in cancer immunotherapy 	Dr. hab. Barbara Zdzisińska, prof. UMCS
<ul style="list-style-type: none"> • Prophylactic and therapeutic cancer vaccines • Congenital cytomegalovirus infections 	Dr. Magdalena Mizerska - Kowalska
<ul style="list-style-type: none"> • The role of angiogenesis in the development of neoplastic diseases • The immunomodulatory effect of vitamin D. • The role of regulatory T lymphocytes in the development and course of respiratory system allergic diseases 	Dr. Katarzyna Sawa-Wejksza
<ul style="list-style-type: none"> • Innovative CAR-T anti-cancer therapy in the treatment of acute lymphoblastic leukemia and comparison to traditional therapies • Modern therapies in the treatment of small cell lung cancer 	Dr. Mateusz Pięt

Sample topics of master's theses carried out at the Department of Virology and Immunology

Temat pracy	Promotor
<ul style="list-style-type: none">• Myrtenol pelargonate as an agent with potential antitumor activity• α-glucans isolated from the fruiting bodies of selected Pleurotus genus fungi as substances with anticancer potential• Assessment of the activity of α-glucans isolated from Pleurotus pulmonarius and Pleurotus citrinopileatus fruiting bodies against normal and neoplastic cells of the human colon	Dr. hab. Roman Paduch, prof. UMCS
<ul style="list-style-type: none">• Potential allergenic properties of Podosphaera xanthii - in vitro cytotoxic activity• Potentially allergenic properties of microscopic phytopathogenic fungi of the order Puccinales• Potential allergenic properties of Peronospora ficariae - in vitro cytotoxic activity study	Prof. dr hab. Agnieszka Szuster-Ciesielska
<ul style="list-style-type: none">• A new tropinone derivative as a potential apoptosis inducer in human osteosarcoma cells - in vitro studies• Antitumor activity of an iodinated tropinone derivative in a human osteosarcoma cell model• Evaluation of the anti-metastatic potential of the modified tropinone in a human osteosarcoma cell model	Dr. hab. Barbara Zdzisińska, prof. UMCS

We cordially invite students to the Department of
Virology and Immunology!