

Scientific supervisor	
Name	Martyna Durak-Kozica
E-mail	martyna.durak@uj.edu.pl
Department	Department of Medical Physics
Laboratory	Theranostics Center
Group webpage	https://zfm.if.uj.edu.pl/en_GB/grupy-badawcze/laboratorium-cytometrii-i-spektroskopii-nanoobiektow
Proposed research topic	
<i>Isolation and characterization of exosomes and cell microvesicles</i>	
<p>The practice anticipates conducting cell culture practices involving tumor cell lines or endothelial cells, as well as isolating exosomes and microvesicles from the culture medium. Additionally, it is planned to characterize exosomes and microvesicles using flow cytometry, fluorescence-based methods, and pulsed conductometry, along with cryo-electron microscopy.</p> <p>The practice plan includes the following steps:</p> <ol style="list-style-type: none"> 1. Familiarization with the theoretical basics of performing cytometric measurements and flow resistance. 2. Understanding the principles of working with cell cultures. 3. Learning techniques for exosome preparation using filtration and ultracentrifugation methods. 4. Exploring cryo-electron microscopy techniques for visualizing microvesicles and exosomes. 5. Conducting experiments and measurements based on the specific project: <ul style="list-style-type: none"> - Concentrating cell culture medium samples using filtration. - Performing differential centrifugation. - Ultracentrifugation. - Quantifying exosomes in the sample. - Optional: Imaging exosomes using cryo-electron microscopy. - Characterizing specific markers for exosomes. - Evaluating the size distribution of microvesicles. <p>At the end of the practice, students will compile a report summarizing their measurements.</p>	
Main research tool	
<p>In the laboratory, we have the following equipment:</p> <ul style="list-style-type: none"> • Spectral Flow Cytometer ID7000 SONY, the only one in Poland. • Sorvall Ultracentrifuge with an angled rotor; Micro-Ultracentrifuge Sorvall mX150+ from Thermo Scientific. • Particle Size Analyzer (qNano) by Izon. <p>As far as possible, during the practice, access to the cryo-electron microscopy laboratory will be provided.</p>	
Additional requirements to the candidate	
<ul style="list-style-type: none"> - Students of biophysics, biotechnology, medical chemistry, biology, pharmacy, and medical analytics 	
Possibility to continue student internship in the form of:	
Diploma thesis (master's or bachelor's degree)	X
PhD study	X