

Biomedical Technologies and Innovation Doctoral Programme (BIOTIN)



Title of the PhD Project	Organoid-on-chip models for precision medicine
Acronym	OROCPM
Research Fields of the Project	Life Sciences, Biomedical Engineering, Data Science
Keywords	Organoid, organ-on-chip, microscopy, image analysis
Host Institution, Department and Campus Location	Izmir Institute of Technology (IZTECH), Department of Molecular Biology and Genetics, Urla-İzmir
PhD Awarding Institution and Graduate Programme	Izmir Institute of Technology, Graduate School, PhD in Molecular Biology and Genetics
Name and Affiliation of Main Supervisor	Prof. Devrim Pesen Okvur (IZTECH)
Name and Affiliation of Co-supervisors	Assoc. Prof. Mustafa Ozuysal (IZTECH) Prof. Esra Erdal (IBG)
Research Environment and Infrastructure	Cell culture laboratory, confocal microscopy, organ-on-chip laboratory
Scientific Context of the Project	Organoids (OR) are self-organizing organ-like structures that harbor multiple cell types and that show the structural and functional features of the organ they mimic. Organ-on-chip (OOC) platforms provide micro-scale structures that enable multiple cell types to mimic the functional features of desired organs. In addition, organ-on-chip platforms provide microscopy data that can require extensive analysis.
Brief Workplan (Timeline)	Design and fabricate organ-on-chip - 2 years Optimize organoid generation from patient material - 2 years Assess drug response - 2 years
Innovative Aspects of the Project	The combination of OR and OOC technologies are bound to open new frontiers in precision medicine using patient material. Artificial intelligence (AI) is being used for image analysis in various fields. Therefore, AI-based image analysis can expedite the post-experimental process. In this project, we will combine these three innovative technologies. We will develop new OOC platforms that use OR derived from cancer

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	patient material. We will determine the response of OR to a selection of anti-cancer drugs. Then we will develop and employ AI-based image analysis for investigation of drug responses.
Training Opportunities of the Project	Imaging, Image analysis, Microfabrication, 3D cell culture
Interdisciplinary Aspects	Life Sciences, Biomedical Engineering, Data Science
Intersectoral Mobility <input type="checkbox"/> Short Visit <input checked="" type="checkbox"/> Secondment	<i>Host: Siemens Healthineers (Türkiye or Germany)</i> <i>Context of Mobility: Research and Innovation Program</i>
Intersectoral Mobility <input checked="" type="checkbox"/> Short Visit <input type="checkbox"/> Secondment	<i>Host: Istanbul Health Industry Cluster (ISEK)</i> <i>Context of Mobility: Entrepreneurship Training, Thematic Pre-incubation Program</i>
International Academic Secondment	<i>Host Supervisor: Dr. Bojana Gligorijevic</i> <i>Host Institution: Temple University, Philadelphia, USA</i> <i>Host Department: Department of Bioengineering</i> <i>Duration: 6 months</i> <i>Estimated Time of Mobility: 2nd Year</i> OR <i>Host Supervisor: Dr. Matthew Merski</i> <i>Host Institution: University of Warsaw, Warsaw, Polan</i> <i>Host Department: Department of Chemistry</i> <i>Duration: 6 months</i> <i>Estimated Time of Mobility: 2nd Year</i>

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Main Supervisor													
Brief CV	<p>Prof. Devrim Pesen Okvur</p> <p>Email: devrimpesen@iyte.edu.tr</p> <p>ACADEMIC DEGREES</p> <table><tr><td>Ph.D.</td><td>Immunology</td><td>Johns Hopkins University, USA</td><td>2005</td></tr><tr><td>B.Sc.</td><td>Biology</td><td>Bilkent University, Turkey</td><td>1999</td></tr></table> <p>Google Scholar: https://scholar.google.com/citations?hl=en&user=89-PUpQAAAAJ https://orcid.org/0000-0001-8333-4193</p>	Ph.D.	Immunology	Johns Hopkins University, USA	2005	B.Sc.	Biology	Bilkent University, Turkey	1999				
Ph.D.	Immunology	Johns Hopkins University, USA	2005										
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Co-supervisors													
Brief CV	<p>Assoc. Prof. Mustafa Özuysal</p> <p>E-mail: mustafaozuysal@iyte.edu.tr</p> <p>ACADEMIC DEGREES</p> <table><tr><td>Ph.D.</td><td>Computer, Comm., and Info. Sciences</td><td>Ecole Polytechnique Fédérale de Lausanne</td><td>2010</td></tr><tr><td>M.Sc.</td><td>Electrical and Electronics Engineering</td><td>Middle East Technical University</td><td>2004</td></tr><tr><td>B.Sc.</td><td>Electrical and Electronics Engineering</td><td>Middle East Technical University</td><td>2002</td></tr></table> <p>Google Scholar: https://scholar.google.com.tr/citations?hl=tr&user=CfT5AZyAAAAJ https://orcid.org/0000-0003-0257-6882</p>	Ph.D.	Computer, Comm., and Info. Sciences	Ecole Polytechnique Fédérale de Lausanne	2010	M.Sc.	Electrical and Electronics Engineering	Middle East Technical University	2004	B.Sc.	Electrical and Electronics Engineering	Middle East Technical University	2002
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Brief CV	<p>Prof. Esra Erdal</p> <p>E-mail: esra.erdal@ibg.edu.tr</p> <p>ACADEMIC DEGREES</p> <table><tr><td>Ph.D.</td><td>Molecular Biology and Genetics</td><td>Bilkent University, Turkiye</td><td>2002</td></tr><tr><td>M.Sc.</td><td>Biotechnology</td><td>Middle East Technical University, Turkey</td><td>1994</td></tr><tr><td>B.Sc.</td><td>Biology</td><td>Middle East Technical University, Turkey</td><td>1991</td></tr></table> <p>Google Scholar: https://scholar.google.com.tr/citations?user=d-T8dvAAAAAJ&hl ORCID: http://orcid.org/0000-0001-7264-0574</p>	Ph.D.	Molecular Biology and Genetics	Bilkent University, Turkiye	2002	M.Sc.	Biotechnology	Middle East Technical University, Turkey	1994	B.Sc.	Biology	Middle East Technical University, Turkey	1991
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