



Affiliation: Department of Medical Genetics and Molecular Medicine, School of Medicine, Zanjan University of Medical Sciences, Mahdavi Blv., Shahrak Karmandan, Zanjan, Iran. <https://zums.ac.ir/page/13301/Faculty>

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Education

2006-2011: Ph.D. in Molecular Genetics

Dept. of Genetics, Faculty of Biological Sciences, Tarbiat Modares University, Tehran/Iran

Topic: “The expression profile of key pluripotency genes in tumor and non-tumor gastric samples”. Under the supervision of Prof. Seyed Javad Mowla.

- I attained the top rank in the Ph.D. program entrance examination for Islamic Azad University and the National Institute for Genetic Engineering and Biotechnology (NIGEB).

2002-2005: M.Sc. in Cellular and Molecular Biology

Dept. of Medical Genetics, Pasteur Institute of Iran, Tehran/Iran

Topic: Gene targeting of β -globin locus in beta-thalassemia. Under the supervision of Prof. Sirous Zeinali.

1996-2000: B.Sc. in Biology

Dept. of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad/Iran

BuAli Research Institute, Mashhad University of Medical Sciences, Mashhad/Iran

Topic: “Extraction and purification of lipopolysaccharide (LPS) from E. coli and evaluation of its mitogen effects on B-lymphocytes”. Under the supervision of Prof. Jalil Tavakkol Afshari.

Scientific Career

2013-now: Assistant Professor at Zanjan University of Medical Sciences (ZUMS)

I am holding an Assistant Professor position for more than 10 years at the Department of Molecular Medicine and Medical Genetics, School of Medicine, ZUMS, Zanjan, Iran.

2022-2023: Guest Professor at University of Cologne, Cologne, Germany

I was funded during the “Guest Professorship Program 2022” at the University of Cologne, Institute of Neurophysiology, Host: Prof. Tomo Saric

Topics:

- Disease modeling of arrhythmogenic cardiomyopathy using patient-derived induced pluripotent stem cells (hiPSCs) and gene modification in TMEM43 in iPSC-derived cardiomyocytes using the CRISPR/Cas9 system.
- Identification of TMEM43 variants in cardiomyocytes and cardiac fibroblasts.
- Production of tumor organoids from esophageal tumor samples

2018-2019: Visiting Postdoc Researcher at the University of Cambridge, UK

Dept. of Hematology and Stem Cell (1 year)

Topic: Deciphering the contribution of histone acetyltransferase 2A (KAT2A) on the transcriptional heterogeneity and pre-leukemia to leukemia progression. Host: Dr. Cristina Pina

Dept. of Genetics (3 months training)

Topic: The generation of human gastruloids as a three-dimensional aggregate of human embryonic stem cells with the purpose of differentiation into hematopoietic stem cells (HSCs). Host: Prof. Alfonso Martinez Arias.

Research Supervision

I have supervised postgraduate students in Medical Genetics and Medical Biotechnology in the following projects at ZUMS:

- Evaluating the effect of rapamycin combined with novel PI3K/Akt/mTOR inhibitor microRNAs on NOTCH1-driven T-cell acute lymphoblastic leukemia (advisor).
- Evaluating the expression of circular RNAs (CircRNAs) involved in pluripotency and proliferation in the gastric and breast cancer (supervisor).
- Comparison of the effect of two and three-dimensional conditions on the expression level of metastatic long noncoding RNAs: metastasis associated lung adenocarcinoma transcript 1 (MALAT1) and HOX transcript antisense RNA (HOTAIR) in breast cancer cell lines (supervisor).
- Evaluating the expression of long non-coding RNAs involved in pluripotency, the regulator of reprogramming (ROR), Sox2 overlapping transcript (SOX2OT), lincRNA-P21, and Embryonic Stem Cell Related (ESRG) lncRNAs in tumor and non-tumor samples of patients with gastric adenocarcinoma (supervisor).
- Assessment of miR-93 and miR-155 gene expression in serum of patients with diabetic nephropathy (co-supervisor).
- The expression level of long non-coding RNAs STCAT23, STCAT11, CAT1487, and LINC00675.2 in plasma samples of patients with gastric adenocarcinoma (supervisor).
- Evaluation of the Sphingosine-1-phosphate receptor1 (S1PR1) gene expression in heart tissue of streptozotocin-and its role in diabetic mice model treated with Aminoguanidine (co-supervisor).
- Effects of different levels of decorin expressed by an adenoviral vector on the expression of dermatan sulfate epimerase 1 (DSepi1), P21, HIF1 α , and CXCR4 genes in 4T1 breast cancer cell line (co-supervisor).
- Frequency of ITPA gene polymorphisms in Iranian patients with acute lymphoblastic leukemia and prediction of its myelosuppressive effects (advisor).

Involvement as a Research Collaborator

During my undergraduate and postgraduate studies, I have been collaborator or research assistant in the following projects:

- **2011-2012: Dept. of Genetics, Faculty of Biology Sciences, Tarbiat Modares University, Tehran/Iran**
 - Expression of miR-302b and miR-145 in FFPE samples and OCT4, SOX2, P21, and TGF β in fresh frozen samples of esophageal squamous cell carcinoma.
- **2008: Digestive Disease Research Center, Tehran University of Medical Sciences, Tehran/ Iran**
 - Phase 2 trial of autologous mesenchymal stem cell transplantation in patients with decompensated cirrhosis
- **2002-2006: Hematology, Oncology and Stem cell Research Center, Tehran University of Medical Sciences, Tehran/ Iran**
 - Evaluation of the most suitable conditions for ex vivo expansion of cord blood derived hematopoietic stem cells for cell transplantation in adult patients with hematological malignancies.
 - The effects of macrophage inflammatory protein 1 alpha (MIP-1 alpha) on ex vivo expansion of hematopoietic progenitor cells and Gibbon-ape leukemia virus transduction.
- **2001: Bu Ali Research Institute and Faculty of Dentistry, Mashhad University of Medical Sciences (MUMS), Mashhad/ Iran**
 - Evaluation of the cytotoxic effects of root end-filling materials (Amalgam and mineral trioxide aggregate (MTA) on primary cultures of human gingival fibroblasts.

Laboratory Skills

- **Design and construction of gene targeting vectors** (CRISPR/Cas9 lentiviral vectors, and guide RNAs)
- **Gene expression-based methods:** RNA extraction, cDNA synthesis, qPCR, real-time PCR, miRNA gene expression analysis, and more.
- **Various cell culture techniques such as:**
 - ✓ Cell culture of human embryonic (hESCs), induced pluripotent (iPSCs), mesenchymal (MSCs) and hematopoietic (HSCs) stem cells on 2D, and 3D culture
 - ✓ Cell proliferation, migration, and invasion assay
 - ✓ Evaluation of cytotoxicity by MTT and Apoptosis assay
 - ✓ Long-term culture-initiating cell (LTC-IC) assay
 - ✓ Colony-forming assay (CFU assay)
 - ✓ Generation of gastruloids from human pluripotent stem cells
 - ✓ Cell separation, and differentiation of HSCs and MSCs
 - ✓ Differentiation of iPSCs to cardiomyocytes (iPSC-CMs)
 - ✓ Gene modification of cells using viral systems (lentivirus) or chemical, liposome transfection, and electroporation
- **Cytogenetic (karyotyping):** Peripheral blood cell culturing, metaphasic cells spreading, and Giemsa banding
- **Immunohistochemistry and immunocytochemistry**
- **Chromatin immunoprecipitation**
- **Flow cytometry**
- **SDS PAGE and Western Blot**
- **Imaging with Zeiss fluorescence microscope (Apotome)**
- **Bioinformatics:**
 - Software programs: GeneX, Primer3, DNASTAR, Chromas, plasmid, SnapGene viewer, Benchling, AlleleID, Primer Express, Oligo, REST, MultiAlignment, online genome browsers, guide RNA designing, miRNAs, and circRNAs-based software programs and more.
- **Statistical analysis:** SPSS and GraphPad Prism
- **Familiar with animal models**
- **Broadening my perspective: a selected record of workshops I've taken part in:**
 - *Light-sheet microscopy and spatial proteomics with Miltenyi Biotec*, April 2023, CECAD, University of Cologne, Germany.
 - *Computational methods in biomedicine for wet lab scientists*, March 2023, CMMC, University of Cologne, Germany.
 - *Integration and analysis of multiplex imaging technologies*, March 2023, CMMC, University of Cologne, Germany.
 - *International Patent Searching, Filing and Revising* (Five courses), 2021, Iran Patent Center, Tehran, Iran.
 - *An Introduction to Programming with R and its Application to GWAS*, Jan. 2020, Iranian Genome Project, Tehran, Iran.
 - *Next Generation Sequencing (NGS): RNA-Seq Data Analysis*, Jan 2018, Iranian Molecular and OMICS Research Group at Pasteur Institute of Iran, Tehran, Iran.
 - *Microfluidic systems*, July 2017, the 2nd national festival & international congress on stem cells and regenerative medicine, Tehran, Iran.
 - *Advanced Methodologies for Statistical Analysis*, Sep. 2017, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
 - *Working with animal models*, 2017, ZUMS, Zanjan, Iran.
 - *Stereotactic Neuro Microsurgery and Cannulation*, Sep 2016, 2nd Iranian Nano medicine Congress, Zanjan, Iran.
 - *An Introduction to Whole Exome and Transcriptome Sequencing Data Analysis*, Sep 2016, 2nd Iranian Nanomedicine Congress, Zanjan, Iran.

Research Interests

My research interests are centered on the intersection of embryogenesis and tumorigenesis, which have a multitude of shared pathways, leading to a focus on cancer genetics and cancer stem cells. The fields of interest are shortly summarized below:

- Cancer-Based Research: Non-coding RNAs (ncRNAs) in cancer, cancer stem cells, cancer epigenetics, tumor-microenvironment interactions, drug resistance in cancer, tumor organoids, cancer gene therapy and immunotherapy, organoid based model, stem cell-based gene therapy.
- Stem Cell Based Research: iPSC differentiation, making gastroluids, gene modification in stem cells.

Academic & Teaching Experiences

- As a university professor, I have been teaching numerous courses to students pursuing Ph.D., MSc, and MD. degrees at ZUMS since 2013. These courses have been taught by me as a primary coordinator or co-teacher.

Ph.D. Students in Medical Biotechnology and Molecular Medicine: In topics including cell cycle control, cell tracking, control of gene expression, genetic engineering, cancer genetics, molecular targeted therapy, analysis of gene expression, molecular & medical genetics, cell signaling, genetic engineering and molecular laboratory methods.

MSc Students in Medical Genetics and Medical Biotechnology: The whole courses in cancer genetics, genetic engineering, population genetics, medical genetics, novels in medical genetics, cellular and molecular biology, cell culture, molecular genetics, and molecular laboratory methods.

Medical and Dental Doctorate Students: part of the medical genetics course.

Pharmacy students: The whole course in cellular and molecular biology

BSc students in Genetics: The whole course in medical genetics, general genetics, advanced geneticist's laboratory skills, specialized English language, molecular genetics, and population genetics

Professional Membership

- I held the position of Deputy of Education at the international branch of ZUMS (2019-2022), where I managed the educational affairs for international students from abroad. Additionally, I served as Manager of Intellectual Properties (2020-2022).
- Member of Stem Cell Network North Rhine-Westphalia (since 2023)
- Member of the University Internationalization Council at ZUMS (2020-2022)
- Member of Medical Education Development Council at ZUMS (2021-2022)
- Associate Member of Cancer Gene Therapy Center of ZUMS (since 2016)
- Associate Member of Stem Cell Research Society in Zanjan Province (since 2018)
- Associate Member of the American Association for Cancer Research (AACR) (since 2012)
- Associate Member of the International Society for Stem Cell Research (ISSCR) (since 2014)
- Reviewer of 1st international congress on Cancer Genomics, May 2023, Tehran, Iran

Reviewer of the Journals

As a reviewer, I have collaborated with several national and international journals

Cancer Research Journal (CRJ)

Histology and Histopathology

Heliyon

Mediators of Inflammation

Cell Physiol Biochem

Journal of Mazandaran University of Medical

Journal of Advances in Medical and Biomedical Research

Journal of Diabetes & Metabolic Disorders

Cellular and Molecular Biology

Cancer Biomarkers

Publications

1. Fateme Arjmand, Samaneh Shojaei, **Mitra Khalili**, Hossein Dinmohammadi, Behzad Poopak, Samira Mohammadi-Yeganeh, and Yousef Mortazavi. *Integrating rapamycin with novel PI3K/Akt/mTOR inhibitor microRNAs on NOTCH1-driven T-cell acute lymphoblastic leukemia (T-ALL)*. Bioimpacts. 2024;14(4): 28870.
2. Mahbobeh Jafari and **Mitra Khalili**. *Evaluating the expression of circular non-coding RNAs involved in pluripotency and proliferation (circBIRC6 & circFOXP1) in gastric cancer cell lines and stem cells*. The manuscript is under preparation, (correspond author).
3. Ramin Abolfath, **Mitra Khalili**, Alireza G. Senejani, Balachandran Kodrey, Robert Ivker. *The Dependence of Compensation Dose on Systematic and Random Interruption Treatment Time in Radiation Therapy*. Onco 2022, 2(3), 264-281.
4. Ana Filipa Domingues, Rashmi Kulkarni, George Giotopoulos, Shikha Gupta, Laura Vinnenberg, Liliana Arede, Elena Foerner, **Mitra Khalili**, Rita Romano, Adao, Shengjiang Tan, Ket Zeka, Brian J. Huntly, Sudhakaran Prabakaran, Cristina Pina. *Loss of KAT2A enhances transcriptional noise and depletes acute myeloid leukemia stem-like cells*. Elife. 2020 Jan 27;9: e51754. doi:10.7554/eLife.51754.
5. Masoume Akhbari, **Mitra Khalili**, Maryam Shahrabi-Farahani, Fatemeh Bandarian, Alireza Biglari. *Circulating Cell-Free MiR-155 Gene Expression Levels in Serum of Patients with Diabetic Nephropathy*. Clin Lab. 2019 Aug 1; 65 (8) (Co-first authorship).
6. Pourandokht Farhangiyan, Somayeh Jahandoust, Seyed Javad Mowla, **Mitra Khalili***. *Decreased expression of LncRNA SOX2OT in gastric adenocarcinoma*, Cancer Biomarkers. 2018; 23 (2): 221-225 (correspond author).
7. Masoume Akhbari, Maryam Shahrabi-Farahani, Alireza Biglari, **Mitra Khalili***, Fatemeh Bandarian. *The expression level of circulating miR-93 in serum of patients with diabetic nephropathy*. Turk J Endocrinol Metab. 2018; 22:78-84 (Co-correspond author).
8. **Khalili M**, Vasei M, Khalili D, Alimoghaddam K, Sadeghizadeh M, Mowla SJ. *Downregulation of the Genes Involved in Reprogramming (SOX2, c-MYC, miR-302, miR-145, and P21) in Gastric Adenocarcinoma*. J Gastrointest Cancer. 2015 Sep; 46 (3): 251-8.
9. Azimi F, Mortazavi Y, Alavi S, **Khalili M**, Ramazani A. *Frequency of ITPA gene polymorphisms in Iranian patients with acute lymphoblastic leukemia and prediction of its myelosuppressive effects*. Leuk Res. 2015 Oct; 39 (10):1048-54.
10. Tabrizi M, **Khalili M**, Vasei M, Nouraei N, Mansour Samaei N, Mowla SJ. *Altered expression of miR-302b and miR-145 in FFPE samples of esophageal squamous cell carcinoma*. Arch Iran Med. 2015 Mar; 18(3):173-8 (Co-first authorship).
11. **Khalili M**, Sadeghizadeh M, Alimoghaddam K, Malekzadeh R, Mowla SJ. *Down-regulation of miR-302b, an ESC-specific MicroRNA, in Gastric Adenocarcinoma*. Cell Journal (Yakhteh). 2011; 13(4): 251-8.
12. Khanahmad H, Noori Dalooi MR, Shokrgozar MA, Azadmanesh K, Niavarani AR, Karimi M, Rabbani B, **Khalili M**, Bagheri R, Maryami F, Zeinali S. *A novel single step double positive double negative selection strategy for beta-globin gene replacement*. Biochem Biophys Res Commun. 2006 Jun 23; 345(1): 14-20.
13. **Khalili M**, Alimoghaddam K, Soleimani M., Ghodsi P., Hayat P., Mohyedin M., Moezi L., Arjmand A., Ghavamzadeh A. *Evaluation of the Best Condition for ex vivo Expansion of Hematopoietic Stem Cells for the Propose of Cord Blood Transplantation*. Yakhteh medical journal (in Persian). 2006; 8 (1): 39- 44.
14. Khanahmad H, Noori Dalooi MR, Shokrgozar MA, Azadmanesh K, Niavarani AR, Karimi M, Rabbani B, **Khalili M**, Bagheri R, Maryami F, Zeinali S. *Designing and constructing pBGG plasmid as a carrier for gene targeting for the beta-globin gene*. Iranian Journal of Pediatrics. 2006; 16 (1): 63-71.

15. Tavakol Afshari J., Ghoddusi J., Behforuzi E., **Khalili M.** *Evaluation of the Cytotoxic effect of amalgam and mineral trioxide aggregate on L929 cell line culture.* Journal of Mashhad Dental School (in Persian). 2006; 29: 177-186.
16. Alimoghaddam K., **Khalili M.***, Soleimani M., Ghodsi P., Hayat P., Mohyedin M., Moezi L., Arjmand A., Ghavamzadeh A., *Evaluation of the effects of MIP1- α on ex vivo expansion of hematopoietic progenitor cells in different culture media for the purpose of cord blood transplantation.* Blood (in Persian). 2006; 3 (2): 145-152 (correspond author).
17. Tavakkol Afshari J., Sadeghi A. and **Khalili M.** *Extraction of Lipopolysaccharide from E. coli and evaluation of its mitogenic effect on B lymphocyte.* Modares Journal of Medical Sciences (in Persian). 2004; 7 (1): 39-42.

Selected Conferences

1. **Khalili M.** Epigenetic Modifications in Cancer: a short story for AML, **Universal Scientific Education and Research Network (USERN) Post Congress Program Interdisciplinary Satellite Event**, Nov. 2021, Tehran, Iran.
2. **Khalili M.**, Kulkarni R., Arede L., Domingues A.F., Gupta S., Zeka K., Pina C. The effect of Kat2a depletion on CTCF and MYC binding proteins in MLL-AF9 model of AML, **the fourth International and 16th National Genetics Congress**, Sep 2020, Tehran, Iran.
1. **Khalili M.**, Jahandoust R., Farhangiyani P. **AACR Annual Meeting 2017**, The expression of two key long non-coding RNAs involved in reprogramming, lincROR, and lin-P21, in gastric cancer. April 1- 5, 2017, Washington, USA.
2. **Khalili M.**, Sadeghizadeh M, Vasei M, Alimoghaddam K, Malekzadeh R, Edalat R, Khalili D, Mowla SJ. *Down-regulation of the Genes Involved in Reprogramming in Gastric Adenocarcinoma Reveals New Insight into Gastric Cancer*, **ISSCR 12th annual meeting**, June 18 - 21, 2014, Vancouver, BC, Canada.
3. **Khalili M.**, Sadeghizadeh M, Vasei M, Alimoghaddam K, Malekzadeh R, Edalat R, Khalili D, Mowla SJ. *Differential expression of miR-302b and c-MYC in gastric adenocarcinoma.* **EACR-Sponsored 2nd Anticancer Agents Congress**, April 23 – 25, 2014, Bodrum, Turkey.
4. **Khalili M.**, Sadeghizadeh M, Alimoghaddam K, Malekzadeh R, Edalat R, Khalili D, Mowla SJ. *MiR-145 and P21, two direct targets of P53 are downregulated in gastric cancer.* **American Association for Cancer Research (AACR) congress on New Horizons in Cancer Research: Biology to Prevention to Therapy**, 13 December 16, 2011, India.
5. Alimoghaddam K, Moezzi L, **Khalili M.**, Bashtar M, Ghodsi P, Ghaffari SH, Arjmand A, Ghavamzadeh A. *Evaluation of MIP-1 α Effect on Transduction Rate of Gal-v Oncovirus on Cord Blood Stem Cell.* **American Society of Gene Therapy (ASGT). 10 Annual Meeting**, May 30-June, 2007. Washington State Convention & Trade Center Seattle, WA. The USA.
6. Alimoghaddam K, **Khalili M.**, Soleimani M, Moezi L, Ghodsi P, Ghaffari SH, Arjmand A, Ghavamzadeh A. *Evaluation the Effects of MIP-1 α on Ex Vivo Expansion of Cord Blood Hematopoietic Progenitor Cells in Different Culture Media.* **Molecular Therapy**, (2006) 13, S138, DOI:10.1016/j.ymthe.2006.08.420