Assistant Professor:

Sharif Moradi, Ph.D.

About:

Sharif Moradi got his B.Sc. in Plant Biology from Khwarizmi University of Tehran in 2008 and his M.Sc. in Cell & Molecular Biology from The University of Tehran in 2010. He then joined Royan Institute as a PhD student of Developmental Biology and worked in Prof. Hossein Baharvand's lab to analyze the expression and functional significance of microRNAs in ES and iPS cells. In 2014, he moved to Germany and worked for one year in Prof. Thomas Braun's lab at Max-Planck Institute (Bad Nauheim) to do microRNA functional analyses in ES cells along with microRNA expression profiling during ES cell derivation from murine blastocysts. He got his PhD in 2017 and now he is an assistant professor at the Royan Institute, focusing on pluripotent stem cells (ES and iPS cells) and non-coding RNAs especially microRNAs. He is also interested in developing diagnostic tools and therapeutic strategies against cancer using oligonucleotides.

Research interests:

Our focus is on two research areas that are somewhat related to each other: **pluripotency** and **tumorigenicity**. The interface of these two phenomena is immortality: pluripotency represents normal immortality *in vitro* (pluripotency exists only transiently *in vivo*), whereas tumorigenesis is the abnormal, uncontrolled proliferation of cancer cells both *in vitro* and *in vivo*.

- Pluripotency

We are interested to figure out the mechanisms underlying the immortality of pluripotent stem cells (PSCs), *i.e.* embryonic stem cells (ESCs) and induced pluripotent stem cells (iPSCs) in order to exploit the obtained knowledge for efficient and safe generation of PSCs for potential regenerative medicine applications in future. Our mechanistic studies are focused on microRNA and lncRNA biology as well as small-molecule-based alterations in

gene expression. Therefore, we aim to derive safe PSCs using small molecules and microRNAs to eliminate the need to use viruses and/or genomic integration. We also aim at generating safe iPSCs with high efficiency, since safe approaches to iPSC reprogramming usually suffer from extremely low efficiencies. We are also working on pre-implantation embryogenesis, as PSCs are present in embryos only during this time window. Notably, although PSCs hold great promise in regenerative medicine, the residual PSCs within the PSC-derived differentiated cell population might lead to tumor formation in patient in long term. We are currently developing strategies to remove tumorigenic PSCs from the differentiated cell populations in order to ensure the safety of PSC-based cell-replacement therapies.

- **Tumorigenicity**

Our research on PSCs and their tumorigenic potential along with the fact that we all are witnessing how a large number of people and especially our dearest and nearest people die of cancer, encouraged us to start focusing on tumors and cancers as a top priority. In Iran, cancer has had an increasing incidence and mortality rate in recent years. In Iranian men, stomach cancer, and in Iranian women, breast cancer constitutes the most prevalent cancers. We are starting to focus on these cancer types as they are also highly prevalent and deadly in other ethnicities and societies as well. Since cancers related to digestive tract are more common in Iran, we have put more focus on these types of cancers, particularly gastric and esophageal cancers. We want to fight cancers using two main approaches:

- *Early cancer diagnosis*

The majority of cancers, including digestive tract cancers, are diagnosed only when the tumor has grown into a large size and metastasized to other parts of the patient's body. In such situations, it is often too late for the clinicians to be able to effectively help cancer patients. Patients with esophageal cancer, for example, mostly die within 1 year of diagnosis, because the cancer is usually not detected in an early stage. The benefit of early detection of cancer is that it remarkably enhances the chances for successful treatments in an early stage, thereby saving many lives. One of our important missions is to try to detect cancers in an early stage through finding early biomarkers, such as circulating microRNAs, in body fluids. To this end, we are trying to develop biosensors for fast, sensitive, and specific biomarker detection. Our plan is to bring biosensors to the bedside for potential point-of-care testing. Effective point-of-care testing will lead to more successful cancer therapy.

- *Cancer therapy*

The majority of cancers are currently not diagnosed in an early stage or are too difficult to be effectively targeted, and therefore kill many patients. Current strategies appear to be ineffective or less efficient, since there is currently a high rate of cancer mortality worldwide. To kill cancer cells, we are interested in using targeted therapies and combinatorial therapeutic approaches exploiting the potential of microRNAs and siRNAs along with small molecules modulating RNAi and other pathways. We are also interested to use natural compounds along with other regimens to increase the chances for successful therapy. Cancers

are too complicated and we need to understand the biology of cancer cells more accurately. We are also highly interested to investigate the mechanisms of cancer development and metastasis. We hope that our collective efforts contribute to making a world with less pain and more happiness in future.

Group members:

Mohammad Ali Vaziri, M.Sc. student

Project: Developing a siRNA design approach for targeting genes in stem cells

Mehdi Abdolazimi, M.Sc. student

Project: The mechanisms of miRNA regulation during mouse embryonic stem cell formation

Shayan Aghajani Liasi, M.Sc. student

Project: Colorimetric biosensors for detection of miRNAs in cancer cells

Morvarid Ghattan, M.Sc. student

Project: Targeting esophageal cancer in mouse by modulating miRNAs

Melika Zamanian, PhD student

Project: Reprogramming of human somatic cells to induced pluripotent stem (iPS) cells

Niloofar Bajool, PhD student

Project: Developing a cancer vaccine using pluripotent stem cells

Mina Pahlavanneshan, M.Sc. student

Project: The mechanisms of miRNAs during indued pluripotent stem (iPS) cell generation

Kimia Hasanian Bataghva, M.Sc. student

Project: qRT-PCR analysis of prostate cancer biomarkers

Zeinab Mousavi, M.Sc. student

Project: Utilizing anti-VEGF siRNAs for treatment of diabetic retinopathy

Zeinab Zakerian, M.Sc. student

Project: Gene activation in somatic cells using small activating RNAs (saRNAs)

Alumni:

Hanieh Sadeghi, M.Sc. student

Project: suppressing lung cancer cells using the secretome of cardiomyocytes differentiated from human pluripotent stem cells

Sara Rahbar, M.Sc. student

Project: Effect of SIN1 suppression on the growth and migration of cancer cells

Hanieh Torkian, M.Sc. student

Project: Targeting of esophageal cancer in mouse models utilizing microRNA pathway

Fatemeh Azadedel, M.Sc. student

Project: Discovery of key microRNAs for treating gastric cancer

Saeed Mohebbi, M.Sc. researcher

Project: Early detection of cancer using protein and nucleic acid biomarkers

Zahra Abdi, M.Sc. student

Project: In silico analysis of the contribution of microRNA biogenesis deregulations to carcinogenesis

Afsaneh Yazdani Movahed, M.Sc. student

Project: Potential of RNAi-modulating compounds in eliminating tumorigenic pluripotent stem cells

Fahimeh Shirzadeh, M.Sc. student

Project: MicroRNA-assisted transdifferentiation of fibroblasts into renal epithelial cells

Parisa Torabi, M.Sc. student

Project: Effective targeting of esophageal cancer using a combinatorial approach

Samira Soori, M.Sc. student

Project: Functional analysis of microRNAs during embryonic stem cell derivation

Rana Bagheri, M.Sc. student

Project: Elimination of residual pluripotent cells from differentiated cell populations using small molecules

Selected publications:

1. Moradi S*, Nouri M, Moradi MT, Khodarahmi R, Zarrabi M, Khazaie H*. **The mutual impacts of stem cells and sleep: opportunities for improved stem cell therapy**. Stem Cell Research & Therapy. 2025 Mar 29;16(1):157.
   *** Co-corresponding authors**
2. Masoudi M, Torabi P, Judson-Torres RL, Khodarahmi R, Moradi S*. **Natural resistance to cancer: A window of hope**. International Journal of Cancer. 2024 Apr 1;154(7):1131-42.
   *** Corresponding author**
3. Mohebbi S, Zoughi S, Faridbod F, Moradi S. **Early fetal sex determination using a fluorescent DNA nanosensing platform capable of simultaneous detection of SRY and DYS14 sequences in cell-free fetal DNA**. Heliyon. 2024 Jun 30;10(12).
   *** Corresponding author**
4. Zoughi S, Faridbod F, Moradi S. **Rapid enzyme-free detection of miRNA-21 in human ovarian cancerous cells using a fluorescent nanobiosensor designed based on hairpin DNA-templated silver nanoclusters**. Analytica Chimica Acta. 2024 Sep 1;1320:342968.
5. Amjadian S, Fatemi MJ, Moradi S, Hesaraki M, Mohammadi P. **mir-182-5p regulates all three phases of inflammation, proliferation, and remodeling during cutaneous wound healing**. Archives of Dermatological Research. 2024 May 25;316(6):274.

6. Ghattan M, Bajool N, Pahlavanneshan M, Zamanian M, Moradi S*. **Latest developments in early detection and effective treatment of cancer: a meeting report**. Cell Journal (Yakhteh). 2024 May 1;26(5):329-33.
   *** Corresponding author**
7. Moradi S, Guenther S, Soori S, Sharifi-Zarchi A, Kuenne C, Khoddami V, Tavakol P, Kreutzer S, Braun T, Baharvand H. **Time-resolved small-RNA Sequencing identifies microRNAs critical for formation of embryonic stem cells from the inner cell mass of mouse embryos**. Stem Cell Reviews and Reports. 2023 Oct;19(7):2361-77.
8. Sadeghi H, Masoudi M, Torabi P, Rezaeiani S, Movahedi F, Pahlavan S*, Moradi S*. **Conditioned media from human pluripotent stem cell-derived cardiomyocytes inhibit the growth and migration of lung cancer cells**. Journal of Cellular Biochemistry. 2023 Mar;124(3):446-58.
   *** Co-corresponding authors**
9. Karami Z, Moradi S, Eidi A, Soleimani M, Jafarian A. **Induced pluripotent stem cells: generation methods and a new perspective in COVID-19 research**. Frontiers in Cell and Developmental Biology. 2023 Jan 17;10:1050856.
10. Amjadian S, Moradi S, Mohammadi P. **The emerging therapeutic targets for scar management: genetic and epigenetic landscapes**. Skin Pharmacology and Physiology. 2022 Sep 20;35(5):247-65.
11. Moradi S, Kamal A, Aboulkheyr Es H, Farhadi F, Ebrahimi M, Chitsaz H, Sharifi-Zarchi A, Baharvand H. **Pan-cancer analysis of microRNA expression profiles highlights microRNAs enriched in normal body cells as effective suppressors of multiple tumor types: A study based on TCGA database**. PloS one. 2022 Apr 27;17(4):e0267291.
12. Bereimipour A, Najafi H, Mirsane ES, Moradi S*, Satarian L*. **Roles of miR-204 in Retinal Development and Maintenance**. *Experimental Cell Research*, 2021
    *** Co-corresponding authors**
13. Ahmadi A, Moradi S*. **In silico analysis suggests the RNAi-enhancing antibiotic enoxacin as a potential inhibitor of SARS-CoV-2 infection**. *Scientific Reports*. 2021
    *** Corresponding author**
14. Radmanesh F, Abandansari HS, Ghanian MH, Pahlavan S, Varzideh F, Yakhkeshi S, Alikhani M, Moradi S, Braun T, Baharvand H. **Hydrogel-mediated delivery of microRNA-92a inhibitor polyplex nanoparticles induces localized angiogenesis**. *Angiogenesis*. 2021.
15. Mohammadi P, Nilforoushzadeh MA, Youssef KK, Sharifi-Zarchi A, Moradi S, Khosravani P, Aghdami R, Taheri P, Hosseini Salekdeh G, Baharvand H, Aghdami N. **Defining microRNA signatures of hair follicular stem and progenitor cells in healthy and androgenic alopecia patients**. *Journal of Dermatological Sciences*, 2021
16. Taee A[§], Tahereh K[§], Taghizadeh Z[§], Moradi S*, *et al*., **Temporal activation of LRH-1 and RAR-γ in human pluripotent stem cells induces a functional naïve-like state**. *EMBO Reports*, 2020.

§ **co-first authors**

*** second author**

17. Taei A, Samadian A, Ghezel-Ayagh Z, Mollamohammadi S, Moradi S, et al., **Suppression of p38-MAPK endows endoderm propensity to human embryonic stem cells**. *Biochemical and Biophysical Research Communications (BBRC)*, 2020.

18. Shahriari, F, Satarian, L, Moradi S, et al., **MicroRNA profiling reveals important functions of miR-125b and let-7a during human retinal pigment epithelial cell differentiation**. *Experimental Eye Research*, 2020.

19. Fawaz M, Scharifker BR, Moraes RM, Ibrahim ME, Moradi S* *et al*, **Dispatches from a world in turmoil – Iran: Homegrown science can rise above sanctions"**. *Nature*, 2019.
*** Corresponding author**

20. Moradi S*, **Publication should not be a prerequisite to obtaining a PhD**. *Nature Human Behaviour*, 2019.
*** Corresponding author**

21. Moradi S*, Mahdizadeh H, Saric T, Kim J, *et al*., **Research and therapy with induced pluripotent stem cells (iPSCs): social, legal, and ethical considerations**. *Stem Cell Res Ther*, 2019.
*** Corresponding author**

22. Hassani SN*, Moradi S*, Taleahmad S, Braun T, and Baharvand H. **Transition of inner cells mass to embryonic stem cells: facts, mechanisms, and hypotheses**. *Cell Mol Life Sci*, 2019.
*** co-first authors**

23. Moradi S, Braun T, Baharvand H. **miR-302b-3p promotes self-renewal properites in LIF-withdrawn embryonic stem cells**. *Cell J (Yakhteh)*, 2018. 20 (1), 61-72

24. Moradi S, Sharifi-Zarchi A, Mollamohammadi S, *et al*. **Small RNA sequencing reveals *Dlk1-Dio3* locus-embedded microRNAs as major drivers of ground state pluripotency**. *Stem Cell Rep*, 2017. 9 (6), 1–16

25. Shahbazi E, Moradi S, Nemati S *et al*. **Conversion of Human Fibroblasts to Stably Self-Renewing Neural Stem Cells with a Single Zinc-Finger Transcription Factor**. *Stem Cell Rep*, 2016. 6 (4), 539-551

26. Moradi S, Asgari S, Baharvand H. **Harmonies Played by MicroRNAs in Cell Fate Reprogramming**. *Stem Cells,* 2014. 32 (1), 3-15

27. Hassani SN, Totonchi M, Sharifi-Zarchi A, Mollamohammadi S, Pakzad M, Moradi S, Samadian A, Masoudi N, Mirshahvaladi S, Farrokhi A *et al*. **Inhibition of TGF-β Signaling Promotes Ground State Pluripotency**. *Stem Cell Rev Rep,* 2014. 10 (1), 16-30

Miscellaneous:

Dr. Moradi's lab is focused on pluripotent stem cells and the expression and functional roles of non-coding RNAs in these cells as well as on developing diagnostic tools and therapeutic strategies using oligonucleotides (*e.g.* miRNAs, siRNAs, and lncRNAs). Our group is accepting PhD and M.Sc. students interested in these areas of research.

Interested and talented PhD students are invited to send their requests along with their CV to sharif.moradi@gmail.com. Phone: +98 21 23562512

Open position;
Dr. Moradi's lab is focused on the expression and functional roles of non-coding RNAs in immortal cells (*i.e.* pluripotent and cancer cells) as well as on developing diagnostic tools and therapeutic strategies using oligonucleotides. Our groups is accepting PhD and M.Sc. students interested in these areas of research.
Interested and talented students are invited to send their requests along with their CV to sharif.moradi@gmail.com.