# Zahra Beyzaei, PhD.

## Education

2011.09-2015.01 **Ph.D. in Cellular & Molecular Biology**

- Biophysics and Cell Engineering Institute, National academy of science of Belarus, Minsk, Belarus.
- Thesis title: Role of nitrate reductase in development of salt tolerance in barley plants induced with nitrate and 5- aminolevulinic acid; **Supervisor**: Prof. N.G. Averina

2008-2011 **M.Sc. in Cellular & Molecular Biology**

- Department of Biology, Shiraz University, Shiraz, Iran.
- Thesis title: Association between genetics polymorphisms of *XRCC7* and susceptibility to Pre-eclampsia; **Supervisor:** Prof. M. Saadat

2002-2006 **B.Sc. in Cellular & Molecular Biology**

- Department of Biology, Shiraz University, Shiraz, Iran.

## Work Experience

**Scientific careers and Short-term research stays:**

2022.09-current **Research Assistant Professor**

Transplant research center, Shiraz University of Medical Sciences, Shiraz, Iran

2021-current **Invited Assistant Professor**

Department of Biology, Shiraz University, Shiraz, Iran, Instructor: The undergraduate course of study in molecular biology

2019.07 **Visiting Researcher**

Division of Pediatric Genetic Disorders, Faculty of Pediatric Inborn Metabolic Disorders, Department of Pediatrics, Gazi University Faculty of Medicine, Ankara, Turkey, Chair of Prof. Fatih Ezgu

2018-2021 **Postdoctoral Fellowship**

Transplant research center, Shiraz University of Medical Sciences, Shiraz, Iran, Chair of Prof. Bita Geramizadeh

## Main research topics and activities

- **Member of a research project in "Genetic Basis of Inherited Metabolic Disorders in Iran" (2017-current)**

- Research Assistant

This project was performed by direct collaboration with UBC institute for molecular genetics in Vancouver and as part of Care4Rare project, a research consortium dedicated to harnessing multi-omics to deliver innovative diagnostic care for rare genetic diseases (C4R-SOLVE). We will recruit patients remaining undiagnosed after standard clinical genomic investigations. Genomic data from these RD patients will be co-located and harmonized in the Genomics4RD platform and re-analyzed. If a candidate gene is not identified after this re-analysis, these patients will enter a discovery pipeline and we will work to understand the genetic mechanisms underlying their condition using improved bioinformatics, new technologies (genomic sequencing, RNA sequencing, deep sequencing and metabolomics), global data sharing strategies, and functional studies using cell lines established from participating patients.

- Postdoctoral project: **Generation of genetic profiles of glycogen storage disease (GSDs) patients using the Next Generation Sequencing (NGS) and elucidating the role of the causative mutations in G6PC gene**

In this project, a total of the 15 pediatric patients were admitted to our hospital and referred for molecular genetic testing using TGS. Eight genes were detected to be responsible for the onset of the clinical symptoms. A total number of 15 variants were identified i.e. mostly loss-of-function (LoF) variants, of which 10 variants were novel. Notably, GSD-IX and GSD of the heart-lethal congenital (i.e. PRKAG2 deficiency) patients have been reported in Iran for the first time which shown the development of liver cirrhosis with novel variants. The Glc4 marker also analyzed by LC-MS/MS as a biomarker for GSD patients (Beyzaei et al., Scintific Rep. 2021)

➢ **Molecular diagnostic of genetically metabolic disorders**

- Research Assistant (supervisor of the metabolic team from 2019-now)

1. Research Assistant in a project focusing on mutation detection of patients with rare hereditary metabolic disorder Tyrosinemia type 1 (Beyzaei et al.,2014).

2. Research Assistant in a project focusing on mutation detection of patients with rare hereditary metabolic disorder Wilson disease (Beyzaei et al., J Hum Genet., 2014).

3. Research Assistant in a project focusing on mutation detection of patients with rare hereditary metabolic disorder, methylmalonic acidemia (Beyzaei et al., J Hum Genet., 2014).

4. Research Assistant in a project focusing on mutation detection of patients with hereditary fructose intolerance (Beyzaei et al., J Pediatr Endocrinol Metab 2022).

➢ **Member of a research project focused on "Liver transplantation"**

- Research Assistant in Investigation of liver transplant outcome in the metabolic disorders patients (Wilson, Glycogen Storage Disease, Tyrosinemia, etc.) and mutation analysis (Beyzaei et al., Orphanet J Rare Dis 2022)

## Grant

➢ Grant Holder, National Institute for Medical Research Development, NIMAD (2019-2022)

1. **Research Title:** The diagnostic yield of whole exome sequencing data analysis in 10 genetically undiagnosed patients presenting metabolic disorders

## Academic activities

**2018-2023 Mentoring students**

Transplant Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

- Supervision activities- 5 graduated M.Sc. students
- Consulting activities- 2 graduated M.Sc. students

**2021-2023 Teaching Experience**

Transplant Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

- Molecular Genetics (Ph.D. Students)

Department of Biology, Shiraz University, Shiraz, Iran (Invited lecturer)

- Molecular Genetics (BSc. Students)
- Genetics (BSc. Students)
- Genetic Laboratory (BSc. Students)

**2009.09-2010.12**

Department of Biology, Shiraz University, Shiraz, Iran

- Cell Lab (Teaching Assistant)

## Skills

- Molecular laboratory techniques

- DNA, RNA, protein extraction, PCR, gel electrophoresis, microsatellite genotyping, conventional Sanger sequencing (ABI), SDS-PAGE, Western blotting, Real time PCR (qPCR).
- HPLC and LC-MS/MS
- Cloning, Transformation, Transfection, Sire Directed Mutagenesis.
- Immunofluorescence staining technique, Fluorescence Microscopy, ImageJ analysis.
- High throughput sequencing: Whole Exome Sequencing
- Cell Culture: Experience in all types of commercial cell lines such as HEK293, HELA, MCF7
- Animal models: Experience with *mice*.

- Data Analysis

    - Linkage analysis and Homozygosity Mapping using whole genome SNP arrays data
    - Proficient in Linux operating system (but not an expert)
    - Familiar with R Language
    - Expert in Whole Exome sequencing (WES) data analysis
    - Meta-analysis software: Comprehensive Meta-analysis, MedCal

## Awards

**2014.12**

- Prize for best Ph.D. student in 2014 among all Iranian students in Ukraine and Belarus.

**2014.09**

- Poster prize awarded at Canadian international conference of science and technology, 2014, Toronto, Canada.

**2011.06**

- First rank of MSc. Student in 1987-1989, Shiraz University of Sciences.

## Publications

1. **Beyzaei Z,** Moravej H, Imanieh MH, Inaloo S, Geramizadeh B. Identification of two Iranian siblings with cerebrotendinous xanthomatosis: A case report. *Egyptian Journal of Medical Human Genetics*. 2023;24:34-39.
2. **Beyzaei Z,** Ezgu F, Geramizadeh B, Imanieh MH, et al. Identification of a Novel Mutation in the ALDOB Gene in Hereditary Fructose Intolerance. *Journal of Pediatric Endocrinology and Metabolism.* 2023;1:145-149.
3. **Beyzaei Z,** Geramizadeh B, Karimzadeh S. The mutation spectrum and ethnic distribution of non-hepatorenal tyrosinemia (types II, III). *Orphanet Journal of Rare Diseases.* 2022; 17:424.
4. **Beyzaei Z,** Geramizadeh B, Bagheri Z, Karimzadeh S. Outcome of liver transplantation in hepatic glycogen storage disease: A systematic review and meta-analysis. *Clinical Transplantation.* 2022; e14867.
5. **Beyzaei Z,** Shamsaeefar A, Kazemi K, Nikeghbalian S, Bahador A, Dehghani M, Malekhosseini SA, Geramizadeh B. Liver transplantation in glycogen storage disease: a single-center experience. *Orphanet Journal of Rare Diseases.* 2022; 17:127.
6. **Beyzaei Z,** Ezgu F, Geramizadeh B, Imanieh MH, et al. Clinical and genetic spectrum of glycogen storage disease and disorders in Iranian population by Targeted panel sequencing. *Scientific Reports*. 2021;11:7040.
7. **Beyzaei Z,** Ezgu F, Geramizadeh B. Novel mutations in the *PHKB* gene in an Iranian girl with severe liver involvement and Glycogen Storage disease type IX: A case report and review of literature. *BMC Pediatrics*. 2021; 21:175-180.
8. **Beyzaei Z,** Ezgu F, Geramizadeh B**.** Novel *PRKAG2* variant presenting as liver cirrhosis: Report of a family with 2 cases and review of literature. *BMC Medical Genomics*. 2021; 14:33-38.
9. **Beyzaei Z,** Ezgu F, Imanieh MH, Geramizadeh B. Identification of a novel mutation in the PHKA2 gene in a child with liver cirrhosis. *Journal of Pediatric Endocrinology and Metabolism.* 2021: DOI:10.1515/jpem-2021-0385
10. **Beyzaei Z,** Geramizadeh B. The Role of Regulatory T cells in liver transplantation. *Transplant Immunology*. 2021: DOI: 10.1016/j.trim.2021. 101512.

11. Pourkhosravani M, **Beyzaei Z,** Mokhatri MJ, Geramizadeh B**.** Association between polymorphism of *XRCC7* and susceptibility to Varicocele risk. *Gene Reports.* 2021; 23:101046. **(Corresponding author)**
12. Esteghlal M, Mokhtari MJ, **Beyzaei Z.** Quercetin can inhibit angiogenesis via the downregulation of LncRNA MALAT1 in human umbilical vein endothelial cells. *International Journal of Preventive Medicine*. 2021; 12(1):59-64.
13. **Beyzaei Z,** Geramizadeh B, Karimzadeh S. Diagnosis of hepatic Glycogen Storage Disease patients with overlapping clinical symptoms by massively parallel sequencing: a systematic review of literature. *Orphanet Journal of Rare Diseases.* 2020; 15:286.
14. **Beyzaei Z,** Geramizadeh B, Bagheri Z, Karimzadeh S. De novo Donor Specific Antibody and Long Term Outcome after Liver Transplantation: A Systematic Review and Meta-analysis. *Frontiers in immunology*. 2020; 11:613128.
15. Farokhian F, Ramzi M, Geramizadeh B, **Beyzaei Z.** Association between genetic polymorphism of *XRCC7* (G6721T) and acute lymphoblastic leukemia risk. *Egyptian Journal of Medical Human Genetics.* 2020; 21:19-23. **(Corresponding author)**
16. Namvaran MR, **Beyzaei Z,** Mokhatri MJ, Geramizadeh B**.** Association between polymorphism of *XRCC6* and Varicocele risk. *Egyptian Journal of Medical Human Genetics*. 2020;21:71-76. **(Corresponding author)**
17. **Beyzaei Z,** Somaghi Z, Geramizadeh B. Association between VNTR polymorphism in the promoter region of XRCC5 and susceptibility to acute lymphoblastic leukemia risk. *Gene reports.* 2019;16:125-127. **(Corresponding author)**
18. **Beyzaei Z,** Geramizadeh B. Molecular Diagnosis of Glycogen storage disease type I: A review. *EXCL Journal.* 2019;18:30-46.
19. **Beyzaei Z,** Sherbakov RV, Averina NG. Involvement of nitrate reductase in the ameliorating effect of 5-aminolevulinic acid on NaCl-stressed barley seedlings. *Acta Physiologiae Plantarum*. 2015;37:11-20.
20. **Beyzaei Z,** Sherbakov RA, Averina NG. Response of nitrate reductase to exogenous application of 5-aminolevulinic acid in barley plants. *Journal of Plant Growth Regulation.* 2014;33(4):745-750 .
21. Averina NG, **Beyzaei Z**, Sherbakov RV, Usatov AA. Role of nitrogen metabolism in the development of salt tolerance in barley plants. *Russian Journal of Plant Physiology*. 2014;61(1):97–104.
22. Saadat I, **Beyzaei Z**, Aghaei F, Kamrani S, Saadat M. Association between polymorphisms in DNA repair genes (*XRCC1* and *XRCC7*) and risk of preeclampsia. *Archives of Gynecology and Obstetrics.* 2012;286(6):1459-62.

## Books

- Imanieh MH., Geramizadeh B., **Beyzaei Z.,** et al. (2022) Guideline for Hereditary Fructose Intolerance patients.
- Imanieh MH., Geramizadeh B., **Beyzaei Z.,** et al. (2021) Guideline for Galactosemia patients.

- Imanieh MH., Geramizadeh B., **Beyzaei Z.,** et al. (2021) Guideline for Tyrosinemia Type I patients.
- Imanieh MH., Geramizadeh B., **Beyzaei Z.,** et al. (2021) Guideline for Glycogen storage disease type I and III patients.
- **Beyzaei Z**., Bazrafshan SH., Sholehvar F. (2018) Introduction to Biology, First edition, Zand Institute of Higher Education.
- **Beyzaei Z.,** Bazrafshan SH. (2019) Laboratory of Cell Biology, First edition, Zand Institute of Higher Education.
- **Beyzaei Z.,** Homayoon M. (2021) Laboratory of Molecular Biology, First edition, Zand Institute of Higher Education.

## Conferences

- **Beyzaei Z.,** Imanieh MH., …, Geramizadeh B. "Mutational analysis of PHKB gene reveals two novel variants in an Iranian patients with severe liver involvement and Glycogen Storage disease type IX" **accepted for poster presentation at** American society of human genetics congress, October 25-29, 2022, Los Angeles, CA, USA.
- **Beyzaei Z.,** Imanieh MH., …, Geramizadeh B. Identification of novel variations in Iranian GSD patients **accepted for poster presentation at** European Conference of Human Genetics June 15–18, 2019, Gothenburg, Sweden.
- **Beyzaei Z.,** Averina N.G. Nitrate reductase enhances salt tolerance in response to exogenous application of 5-aminolevulinic acid in barley plants**, accepted for oral presentation** at FEBS-EMBO Conference. 30 August 4September 2014, Paris, France.
- **Beyzaei Z.,** Sherbakov R.A., Averina N.G. Exogenous application of 5-aminolevulinic acid promotes salt tolerance by stimulation of Nar1 gene expression and nitrate reductase protein accumulation in barley leaves, **accepted for oral presentation at** BSP&B conferences, 17-20 June 2014 Minsk, Belarus.
- **Beyzaei Z.,** Sherbakov R.A., Averina N.G. Exogenous 5-aminolevulinic acid increases salt tolerance by enhancing the expression of Nar1 gene, nitrate reductase activity and enzyme content in barley leaves, **accepted for poster presentation at** Canadian international conference of science and technology, 10-11 June 2014, Toronto, Canada.
- **Beyzaei Z.,** Sherbakov R.A., Averina N.G. Exogenous 5-aminolevulinic acid increases the expression of Nar1 gene and nitrate reductase protein accumulation in barley leaves, **accepted for oral presentation at** International Conference on Biochemistry and Molecular Biology.17-19 April 2014, Vienna, Austria.
- **Beyzaei Z.,** Averina N.G. ALA increases the expression of Nar1 gene and NR protein accumulation in barley leaves, **accepted for oral presentation at** Fundamental and applied research in biology, the 3rd international conference of young scientists. 24-27 February 2014, Dontesk, Ukrain.
- **Beyzaei Z.,** Sherbakov R.A., Vershilovskaya I.V., Obuchovskaya L.V., Averina N.G. Nitrate reductase gene expression promote tolerance to salinity in barley plants, **accepted for poster presentation at** Annual meeting of the Canadian society of plant biologists. 25-28 June 2013, Quebec City, Canada.

- **Beyzaei Z.,** Sherbakov R.A., Vershilovskaya I.V., Obuchovskaya L.V., Averina N.G. Influence of KNO3 on activity and gene expression of nitrate reductase, content of proline and photosynthetic pigments, photosynthesis and respiration in barley plants under salinity, **accepted for poster presentation at** Innovation Trends in Current Plant physiology. 2-6 June 2013, Moscow, Russian.
- **Beyzaei, Z.** Nitrate reductase activity, metabolism of 5-aminolevulinic acid and proline content in barley seedlings under salinity. Material XII conference of young scientists, **accepted for poster presentation at** Applied science and educational aspects of physiology, genetics, plant biotechnology and microorganisms. 15-16 November 2012, Kiev, Ukraine.
- Averina, N.G., Sherbakov, R.A., **Beyzaei, Z.** Role of nitrogen metabolism in plant salt tolerance, **accepted for poster presentation at** International conferences "CSPP-2012", P. 65-66., 25-27 June 2012, Edmonton, Canada.
- **Beyzaei, Z.** Proteomic identification of microRNAs target proteins in cancer, **accepted for oral presentation at** in proceeding of the national Proteomics conferences, October 2010, Shiraz, Iran.
- **Beyzaei, Z.,** Mohabatkar, H. Application of Nano technology in modern technology, **accepted for oral presentation at** the Proceeding of the regional Nano technology conferences, June 2009, Shiraz, Iran.

## REVIEWER OF JOURNALS

- Frontiers in Endocrinology
- Frontiers in Pediatrics
- Biochemical Genetics
- Molecular Biology Research Communications
- Egyptian Journal of Medical Human Genetics
- MDPI journals