

**ASSOCIATE PROFESSOR MOSSA GARDANEH**

## **BIOGRAPHY IN BRIEF**

**(+98) 919-269-3490; [mossabenis65@gmail.com](mailto:mossabenis65@gmail.com)**



### • **EDUCAION**

- Doctor of Philosophy (PhD) in Human Molecular Genetics (U OF NSW, SYNDEY):1996-2000
- Master of Science (Honours) in Biotechnology (U OF WOLLONGONG, AUSTRALIA):1993-1995
- Bachelor of Science (BSc) in Biology (U OF SHAHID BEHESHTI): 1984-1989

### • **POST-DOCTORAL FELLOWSHIP**

- Senior Research Officer, NRC Canada, Ottawa. Aug2002-Apr2005
- Post-doctoral Fellow, Dept. of Anatomy & Neurobiology, Washington University School of Medicine, St. Louis, MO, USA. Nov1999-July 2002

### • **RESEARCH INTERESTS**

- TRANSLATIONAL MEDICINE: Cancer (Breast Cancer) & Neurodegenerative Disorders (Parkinson's Disease): Cell-Molecular Basis of Disease, Biological Development, Disease Modeling, Gene Editing (CRISPR/Cas9) of Disease Models, Cell-Gene Therapy, Drug Resistance, Nano-Drug Delivery, New Drug Design.

### • **EMPLOYMENT RECORD**

- **Faculty Member (Associate Professor),**
  - National Research Institute of Genetic Engineering and Biotechnology, Tehran/Iran. Oct. 2006-present
- **Invited Senior Investigator,**
  - Neuroscience Research Center, Shahid Beheshti University of Medical Sciences, Tehran/Iran. Aug. 2005-Oct. 2013

# PERSONAL INFORMATION

Family Name ..... **Gardaneh**

Given Name ..... **Mossa**

Date of Birth ..... **Apr. 22, 1965**

Place of Birth ..... **Benis-Shabestar, East Azerbaijan Province, Iran**

Marital Status ..... **Married, have 2 daughters**

Language Fluency ..... **Azeri, Persian, English**

Corresponding Address ..... **National Institute of Genetic Engineering and Biotechnology, Tehran-Karaj HWY, Km 17, Pazhooesh Blvd,  
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# SCIENTIFIC PUBLICAITONS

## ➤ JOURNAL PAPERS SUBMITTED/IN PREPARATION

1. **Gardaneh\* M.** et al (2018) An active selenium-binding site determines anti-tumorigenic activity of glutathione peroxidase-1 in breast cancer cell lines (In prep)
2. **Gardaneh M, Tahermansouri H, Afzali A (2018)** Nano-metformin can sensitize breast cancer cell lines to curcumin. (In prep).
3. Rahimi Shamabadi A, **Gardaneh\* M**, Gharib E et al (2018) Intracellular mechanisms of dopaminergic neuro-protection by GDNF (In prep).
4. Boroujeni EM, **Gardaneh\* M** et al (2018) Pitx3-GDNF cooperation induces dopaminergic programming of NT2, a human pluripotent embryonic carcinoma cell line (In prep).
5. Afzali F, **Gardaneh\* M**, et al (2018) Xenografts as initiating platforms for personalized therapy in breast cancer (In prep).
6. **Gardaneh\* M**, et al (2018) Breast cancer stem cells and the question of drug resistance.
7. **Gardaneh\* M**, et al (2018) Reactive oxygen species in breast cancer stem cell drug resistance (In prep).

## ➤ JOURNAL PAPERS PUBLISHED

1. **Gardaneh\*, M**, Shojaei S, Rahimi Shamabadi A, Akbari P (2018) Breast cancer cell apoptosis is synergistically induced by curcumin, trastuzumab and glutathione peroxidase-1 but robustly inhibited by glial cell line-derived neurotrophic factor. ***Nutrition and Cancer***. 3:1-9. doi: 10.1080/01635581.2018.1412486.
2. Boroujeni, M.E. & **Gardaneh\*, M** (2018) The Superiority of Sucrose Cushion Centrifugation to Ultrafiltration and PEGylation in Generating High-Titer Lentivirus Particles and Transducing Stem Cells with Enhanced Efficiency. ***Mol Biotechnol***. <https://doi.org/10.1007/s12033-017-0044-5>.
3. **Gardaneh\* M**, Shojaei S, Kaviani K, Behnam K (2017) GDNF induces RET-SRC-HER2-dependent growth in trastuzumab-sensitive but SRC-independent growth in resistant breast tumor cells. ***Breast Cancer Research and Treatment***. 162(2):231-241.
4. Boroujeni ME, **Gardaneh\* M**. (2017) Umbilical cord: an unlimited source of cells differentiable towards dopaminergic neurons. ***Neural Regen Res***. 2017 Jul;12(7):1186-1192.
5. Boroujeni EM, **Gardaneh\* M**, Hasan Shahriari M, Aliaghaei A, Hasani S (2017) Synergy between choroid plexus epithelial cells-conditioned medium and knockout serum replacement converts human adipose-derived stem cells to dopamine-secreting neurons. ***Rejuvenation Research***. 20(4):309-319.

6. **Gardaneh\* M** (2017) human cancer modeling: recapitulating tumor heterogeneity towards personalized medicine. ***Multidisciplinary Cancer Investigation***. DOI: 10.20286/mci-01021.
7. Rasoolnezhad M, Gardaneh\* M, Sabouni F (2017) The co-effect of Nurr1 and GDNF on protection of dopaminergic cell line SH-SY5Y against neuroinflammation and 6-OHDA toxicity. ***Journal of Cell and Tissue-Arak*** (Persian) (In press).
8. **Gardaneh\* M**, Modirzadeh Tehrani A (2016) The effect of reactive oxygen species threshold on cancer cell fate. ***Archives of Breast Cancer***. DOI: 10.19187/abc.201634106-107.
9. Lasemi S, Gardaneh\* M, Akbari P (2016) Increased survival of dopaminergic PC12 cell survival against 6-OHDA-mediated toxicity following overexpression of DJ-1 factor. ***Journal of Cell and Tissue-Arak*** (Persian) 2(7): 141-148.
10. Aliaghaei A, **Gardaneh\* M**, Maghsoudi N\*, Salehi P (2016) Dopaminergic induction of umbilical cord matrix stem cells by choroid plexus epithelial cells reduces apomorphine-induced rotation in parkinsonian rats. ***Archives of Iranian Medicine*** 19(8): 561-570.
11. Tahermansouri H, Miroosanloo A, Heidari Keshel S, Gardaneh M (2016) Synthesis, Characterization and Toxicity Of Multi-Walled Carbon Nanotubes Functionalized With 4-Hydroxyquinazoline. ***Carbon Letters*** 17(1): 45-52.
12. Fazilaty H, **Gardaneh M**, Akbari P, Zekri A, Behnam B (2016) SLUG and SOX9 cooperatively regulate tumor initiating niche factors in breast cancer. ***Cancer Microenvironment*** 9(1):71-4. doi: 10.1007/s12307-015-0176-8.
13. **Gardaneh\* M**, Rahimi-Shamabadi A, Esmaeilzadeh E (2016) Expression of dopaminergic transcription factor Nurr1 in human cells via recombinant lentiviruses. ***Journal of Cell and Tissue-Arak*** (Persian) 7(1): 1-7.
14. Rahimi-Shamabadi A, **Gardaneh\* M**, Esmaeilzadeh E (2015) Inducible expression of exogenous genes in LMH cell line using inducible lentivirus vectors. ***Journal of Cell and Tissue-Arak*** (Persian) 6(3): 241-248.
15. Tahermansouri H, **Gardaneh M**, Islami F, Kiani F (2016) Functionalization of Multi-walled Carbon Nanotubes with Thiazole derivative and their Influence on SKBR3 and HEK293 cell lines. ***Materials Technology*** 31(7): 371-76.
16. Rasoolnezhad M, **Gardaneh\* M**, Sabouni F (2015) Induction of neuro-inflammation by activating microglial cells and its impact on survival of dopaminergic neurons. ***Journal of Cell and Tissue-Arak*** (Persian) 6(4): 481-90.
17. Esmaeilzadeh E, **Gardaneh\* M** (2014) Production of Recombinant Lentiviruses Carrying DJ-1 Gene and Their Transfer to Human Cells. ***Journal of Cell and Tissue-Arak*** (Persian) 4(4): 381-388.
18. Fazilaty H, **Gardaneh M**, Bahrami T, Salmaninejad A, Behnam B. (2013) Crosstalk between breast cancer stem cells and metastatic niche: emerging molecular metastasis pathway? ***Tumor Biology*** 34(4):2019-30.
19. Gharib E, **Gardaneh\* M**, Shojaei S. (2013) Upregulation of glutathione peroxidase-1 expression and activity by glial cell line-derived neurotrophic factor promotes high-level protection of PC12

cells against 6-hydroxydopamine and hydrogen peroxide toxicities. *Rejuvenation Research* 16(3):185-99.

20. Esmaeilzadeh E, **Gardaneh\* M**, Gharib E, Sabouni F (2013) Shikonin protects dopaminergic cell line PC12 against 6-hydroxydopamine-mediated neurotoxicity via both glutathione-dependent and independent pathways and by inhibiting apoptosis. *Neurochemical Research* 38(8):1590-604.
21. Haddad-Mashadrizeh A, Bahrami AR, Matin MM, Edalatmanesh MA, Zomorodipour A, Fallah A, **Gardaneh M**, Farshchian M, Momeni-Moghaddam M (2013) Human adipose-derived mesenchymal stem cells can survive and integrate into the adult rat eye following xenotransplantation. *Xenotransplantation* 20:165-76.
22. Haddad-Mashadrizeh A, Bahrami AR, Matin MM, Edalatmanesh MA, Zomorodipour A, Fallah A, **Gardaneh M**, Ahmadian Kia N, Sanjarmoosavi N. (2013) Evidence for crossing the blood barrier of adult rat brain by human adipose-derived mesenchymal stromal cells during a 6-month period of post-transplantation. *Cytotherapy* 15: 951-60.
23. Haddad-Mashadrizeh A, Matin MM, Bahrami AR, Edalatmanesh MA, Naderi-Meskin H, Mousavi S, **Gardaneh M** (2013) Cytotoxicity and biocompatibility evaluation of chitosan-beta glycerol phosphate-hydroxyethyl cellulose hydrogel on adult rat liver for cell-based therapeutic applications. *International Journal of Biomedical Engineering and Technology* 12 (3), 228-239.
24. Fattahi E, Jorsaraei SGA, **Gardaneh M** (2013) The effect of Carbaryl on the pituitary-gonad axis in male rats. *Iranian journal of reproductive medicine* 10 (5), 419.
25. Fattahi E, Jorsaraei SGA, **Gardaneh M**, Marzony ET (2013) The Effect of 8-Methoxypsoralen on Pituitary-Gonad Axis and Ovarian Function in Mice Cell Journal (Yakhteh) 15 (3), 206.
26. Shojaei S, **Gardaneh\* M** (2012) Maximum inhibition of breast cancer/stem cell growth by concomitant blockage of key receptors. *Journal of Medical Hypotheses and Ideas* 6:44-49.
27. Shojaei S, **Gardaneh\* M**, Rahimi Shamabadi A (2012) Target points in trastuzumab resistance. *International Journal of Breast Cancer* Article ID: 761917, 9 pages, DOI:10.1155/2012/761917.
28. Rafatian G, Khodaghali F, Farimani MM, Abraki SB, **Gardaneh\* M**. (2012) Increase of autophagy and attenuation of apoptosis by Salvigenin promote survival of SH-SY5Y cells following treatment with H<sub>2</sub>O<sub>2</sub>. *Molecular and Cellular Biochemistry* 371(1-2):9-22.
29. Esmaeilzadeh E, **Gardaneh\* M**, Vaziri HR (2012) The Concomitant Effect of Shikonin and Glutathione Peroxidase-1 on Enhanced Survival of Dopaminergic Neurons against Parkinsonian Toxicity. *Journal of Cell and Tissue-Arak* (Persian) 3(2): 153-160 (Persian).
30. Shojaei S, **Gardaneh\* M** (2011) Expression of monoclonal antibody herceptin in human cell lines and analysis of Her2 reduction in breast cancer cell lines. *Iranian Journal of Breast Disease* 4:12-18.
31. Deheshkar Farahani N, **Gardaneh\* M**, Rahimi Shamabadi A (2011) Generation of r-lentivirus vectors carrying neurotrophic factor GDNF with high titer and their transfer to human astrocytes. *Molecular Biology Journal*, 2:12-17 (Persian).
32. Safi R, **Gardaneh\* M**, Maghsoudi N, Zaefizadeh M, Panahi Y, Gharib E (2011) Optimized quantities of GDNF overexpressed by engineered astrocytes are critical for protection of neuroblastoma cells against 6-OHDA toxicity. *Journal of Molecular Neuroscience*, 46:654-65.

33. **Gardaneh\* M**, Gholami M, Maghsoudi N (2011) Synergy between glutathione peroxidase-1 and astrocytic growth factors suppresses free radical generation and protects dopaminergic neurons against 6-OHDA toxicity. *Rejuvenation Research*, 14:195-204.
34. **Gardaneh\* M**, Panahi Y, Shojaei S, Mazaheri-Tehrani E, Maghsudi N (2010) Neuroprotection in Parkinson's Disease: a multi-directional genetic strategy for maximum protection of dopaminergic neurons against parkinsonian toxicity. *Iranian Journal of Medical Hypotheses and Ideas*, 4: 7-19.
35. **Gardaneh\* M** (2010) Dopamine-synthesizing neurons: an overview of their development and function. *Iranian Journal of Biotechnology*, 8: 213-28.
36. Rahimi Shamabadi A, **Gardaneh\* M** (2010) Gene transfer to liver cell line LMH using recombinant lentivirus vectors, *Modares Biology Journal*, 1:43-48 (Persian).
37. Rahimi Shamabadi A, **Gardaneh\* M**, Alipanah M, Gharib E (2010) Transfectability and Transducibility of chicken liver cell line LMH compared to human cell line HEK-293T. *Journal of Cell and Tissue-Arak* (Persian) 1(2): 47-56 (Persian).
38. Nouri Inanlou D, Yakhchali B, Khanahmad H, **Gardaneh\* M**, Movassagh R, Ahangari Cohan R, Shafiee Ardestani M, Mahdian R, Zeinali S (2010) Towards b-globin gene-targeting with integrase-defective lentiviral vectors. *Biotechnology Letters*, 32:1615–1621.
39. Nouri Inanlou D, Yakhchali B, Khanahmad H, **Gardaneh M**, Movassagh H, Farazmandfar T, Feiz Barazandeh A, Zeinali S (2009) design and construction of integrase deficient lentiviral vector for gene therapy. *Modern Genetics* 4(4): 61-69.
40. Ayatollahi M, Kabir Salmani M, Soleimani M, Geramizadeh B, Sanati MH, **Gardaneh\* M**, Tabei SZ (2010) Expansion of human marrow derived mesenchymal stem cells and their transdifferentiation potential. *Iranian Red Crescent Medical Journal* 2(4):446-452.
41. Nouri Inanlou D, Yakhchali B, Khanahmad H, **Gardaneh\* M**, Movassagh R, Farazmandfar T, Feiz Barazandeh A, and Zeinali S (2009) Integrase minus lentiviral vector: A suitable vector for  $\beta$ -thalassemia gene targeting *Iranian Journal of Hypotheses and Ideas*, 3:30.
42. Sandhu JK, **Gardaneh\* M** (Co-first author), Iwasiew R, Lanthier P, Gangaraju S, Ribocco-Lutkiewicz M, Tremblay R, Kiuchi K, Sikorska M. (2009) Astrocyte-secreted GDNF and glutathione antioxidant system protect neurons against 6OHDA cytotoxicity. *Neurobiology of Disease*, 33: 405-14.
43. **Gardaneh\* M**, O'Malley KL (2004) Rat tyrosine hydroxylase promoter directs tetracycline-inducible foreign gene expression in dopaminergic cell types. *Molecular Brain Research* 126(2):173-80.
44. Peaston AE, **Gardaneh\* M** (Co-first author), Hocker JE, Farnsworth ML, Lock RB, Haber M, Norris MD, and Marshall GM (2001) MRP1 gene expression level regulates the death and differentiation response of neuroblastoma cells. *British Journal of Cancer*, 85(10):1564-71.
45. **Gardaneh\* M**, Gilbert J, Haber M, Norris MD, Cohn SL, Schmidt ML, Marshall GM (2000) Synergy between 5' and 3' flanking regions of the human tyrosine hydroxylase gene ensures specific, high-level expression in neuroblastoma cells. *Neuroscience Letters*, 292:147-150.
46. Kavallaris M, **Gardaneh\* M**, Cheung B, Camacho M, Hocker J, Norris M, Haber M, Marshall G (1998) In vitro effects of MYCN-amplified human neuroblastoma cells. *Anticancer Research*, 18: 1793-1798.

## ➤ **INTERNATIONAL CONFERENCE PROCEEDINGS**

1. **Gardaneh\* M** (2016) Genome Editing and Stem Cells. **First International Symposium on Genetics and Stem Cells. National Institute of Genetic Engineering and Biotechnology, Tehran, IRAN.** Feb 2016.
2. **Gardaneh\* M** (2016). Stem cells for Parkinson's disease therapy. **1<sup>st</sup> ISCA International Symposium on Research and Applications of Stem Cells. Omid Hospital, Tehran, IRAN.** Jul 2016.
3. **Nayeri Z, Sabouni F, Gardaneh\* M** (2016) Study of Astaxanthin effect on survival rate of dopaminergic neurons. **2<sup>nd</sup> International Genetics Congress, Tehran, IRAN.** May 2016.
4. **Nayeri Z, Sabouni F, Gardaneh\* M, Afzali F** (2016) Examination of Metformin effect on survival of dopaminergic neurons. **5<sup>th</sup> Neuroscience Congress, Tehran, IRAN,** Dec 2016.
5. **Nayeri Z, Sabouni F, Gardaneh\* M, Afzali F** (2016) The evaluation of Astaxanthin and GDNF co-effect on survival of dopaminergic neurons. **5<sup>th</sup> Neuroscience Congress, Tehran, IRAN,** Dec 2016.
6. **Afzali F, Gardaneh\* M** (2016) The evaluation of sulforaphane effect on breast cancer cell line. **West Asia Cancer Conference. Tehran, IRAN,** Nov 2016.
7. **Gardaneh\* M** (2015) Xenograft Models of Herceptin Resistance in Breast Cancer. Proceeding of **1<sup>st</sup> International Nastaran Cancer Symposium-2015. Ferdowsi University, Mashad, IRAN,** Oct. 2015.
8. **Gardaneh\* M, Shojaei S** (2014) GDNF-RET signaling inhibits trastuzumab-induced apoptosis and induces cell growth in breast cancer, **Fourth International Symposium on Molecular Technology, Shahid Beheshti University of Medical Sciences, Tehran, Iran,** Oct. 2014.
9. **Gardaneh\* M, Shojaei S** (2014) Glutathione peroxidase-1 polymorphisms in silico and their impact on breast cancer cell survival. **Ninth International Cancer Congress, Shahid Beheshti University of Medical Sciences, Tehran, Iran,** 2014.
10. **Gardaneh\* M, Shojaei S** (2013) The anti-apoptotic impact of neurotrophic factor GDNF on breast cancer cells pre-treated with trastuzumab. **American Association for Cancer Research (AACR) Annual Meeting. Washington DC,** Apr. 2013.
11. **Shojaei S., Gardaneh\* M** (2013) Breast Cancer cell line treatment with curcumin and herceptin versus GDNF. **Fifth International Congress in Breast Diseases, Imam Khomeini Hospital, Tehran, Iran,** Sept. 2013,
12. **Maghsoudi N, Gardaneh\* M, Aghaei A, Gharib E** (2013) Conditioned media of choroid plexus epithelial cells can differentiate human umbilical cord matrix stem cells into dopaminergic neurons. **Society for Neuroscience, 40th Annual Meeting, San Diego, CA, USA.** Nov 9-13, 2013.
13. **Gardaneh\* M, Aghaei A, Shojaei S, Panahi Y, Garib E, Maghsoudi N** (2011) Nurr1 and GDNF gene products synergistically induce dopaminergic differentiation of human umbilical cord matrix

stem cells. **9th Annual Meeting of International Society for Stem Cell Research, Toronto, Canada.** June 15-18, 2011.

14. Momen Dizghandi M, **Gardaneh\* M**, Safi M, Abasi M, Massumi M (2011) Synergistic effect of Pitx3 overexpression and GDNF induction in dopaminergic programming of NT2, a human pluripotent embryonic carcinoma cell line. **9th Annual Meeting of International Society for Stem Cell Research, Toronto, Canada.** June 15-18, 2011.

15. **Gardaneh\* M**, Gharib E, Panahi Y (2011) Accelerated protection of dopaminergic neurons against 6-OHDA cytotoxicity by enhanced activity of neurotrophic factor GDNF and anti-oxidant enzyme GPX-1. **8th International Brain Research Organization IBRO) Congress, Florence, Italy.** July 14-18, 2011.

16. **Gardaneh\* M** (2011) Molecular cell growth: promotion for parkinson's disease, inhibition for breast cancer. **Istanbul Technical University and Dept. of Molecular Biology, Fatih University, Istanbul, Turkey.** July 2011.

17. **Gardaneh\* M**, Shojaei S, Saafi R, Panahi Y, Gholami M (2010) Synergy between glial cell line-derived neurotrophic factor and glutathione peroxidase-1 maximizes protection of dopaminergic neurons against parkinsonian toxicity. **Society for Neuroscience, 40th Annual Meeting, San Diego, CA, USA.** Nov 14-17, 2010.

18. **Gardaneh\* M** (2009) Cell therapy options for Parkinson Disease. **NESCI International Stem Cells Conference. Newcastle, UK.** June 2009.

19. **Gardaneh M** (2006) Gene therapy for human childhood cancer neuroblastoma. **Neuroscience Research Center, Sh. Beheshti University of Medical Sciences, Tehran, Iran.** June 2006.

20. **Gardaneh\* M** (2006) Anti-apoptotic approaches for Parkinson disease therapy. International symposium of molecular Technology, **Shahid Beheshti University of Medical Sciences, Tehran, Iran.** May 2006.

21. Sandhu JK, **Gardaneh\* M** and Sikorska M (2006) GDNF secreted from astrocytes Protects co-cultured N2A neuroblastoma cells against 6-OHDA toxicity. **National Research Council (NRC), Ottawa, Canada.** July 2005.

22. Sikorska, M, **Gardaneh\* M.**, Sandhu J.K., Iwaszow R. (2005) Neuroprotective strategies for Parkinson's disease. **First International Conference on Molecular Technology, Sh. Beheshti University of Medical Sciences, Tehran, Iran.** Jul 27-Aug 01, 2005.

23. Sandhu J.K., **Gardaneh\* M.**, Byrd, A., Haqqani, A., and. Sikorska, M. (2004) Overexpression of glutathione-dependent formaldehyde dehydrogenase protects PC12 cells from parkinsonian neurotoxins. **Annual Meeting, Society for Neuroscience, San Diego, CA, USA.** Nov 16-19, 2004.

24. **Gardaneh\* M**, Peaston AE, Hocker, J.E., Farnsworth, M.L., Lock, R.B., Haber, M., Norris, M.D., Marshall, G.M. (1999) Inhibition of multidrug resistance-associated protein (MRP) expression in neuroblastoma cells induces spontaneous differentiation, apoptosis and reduced Bcl-2 expression.



**25. Gardaneh\* M.**, Peaston, A., Tee, E., Mechetner, J., Hocker, J., Cheung, B., Smith, S., Haber, M., Norris, M., Marshall, G. (1997) Neuroblastoma cell differentiation is dependant on MRP expression level. **Lorne Cancer Conference, Lorne, Australia.** Oct 12-15, 1997.

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## **EDUCATION**

- **DOCTOR OF PHILOSOPHY (PHD) IN HUMAN MOLECULAR GENETICS**

1996-2000, Children’s Cancer Institute Australia, Sydney Children’s Hospital, and Faculty of Medicine, The University of New South Wales, Sydney/ Australia. Thesis title: “*Molecular genetic strategies for novel therapy in childhood neuroblastoma*”.

- **MASTER OF SCIENCE (HONOURS) IN BIOTECHNOLOGY**

1993-1995, Commonwealth Scientific and Industrial Research Organization (CSIRO), Sydney, & Biology Department, University of Wollongong, Wollongong/ Australia. Thesis title: “*Recombinant adenovirus-mediated transfer of human rotavirus capsid protein gene into the human embryonic kidney cell line 293*”.

- **BACHELOR OF SCIENCE (BSs) IN BIOLOGY (ANIMAL SCIENCES)**

1984-1989, Shahid Beheshti University, Tehran/ Iran.

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# RESEARCH INTERESTS

## • CELL-GENE THERAPY IN CANCER

1. Multi-drug resistance (MDR): Creation of resistant cell line and xenograft models, CRISPR/Cas9 editing of models, role of cancer stem cells and receptor tyrosine kinases, tumor suppressors and intracellular signaling pathways in MDR.

2. Nano-drug design against MDR: combined drug and nano-drug design and delivery to cancer cells, co-inhibition of tumor growth pathways by RTK inhibitors, PKM2 inhibitors, herbal agents,

**Disease Candidates:** Breast Cancer, Gastric/ colorectal Cancer, Neuroblastoma, Brain Tumors, Leukemia.

## • CELL-GENE THERAPY IN NEUROSCIENCE

1. Neuroprotection: Inhibition of oxidative stress and neuroinflammation,

2. Neurogenesis: neuronal differentiation of potential cell types (ES cells, iPS cells)

3. Gene detection and neuroimaging: use of fluorescent reporters etc to detect transgene expression in brain tissues and cell types.

4. Animal models: creation of toxin-based and transgenic models for neurodegenerative disorders.

5. Application of gene editing CRISPR/Cas9 for modeling, detection and gene therapy

**Disease Candidates:** Parkinson's disease, Alzheimer's disease, Multiple Sclerosis.

## • TRANSLATIONAL MEDICINE

1. Molecular basis of diseases: functional studies of candidate genes/molecules,

2. Disease models of animal/cellular basis: generation and functional studies,

3. Technology development: targeted antibodies, nano-carrier platforms, diagnostics,

4. Application of gene editing CRISPR/Cas9 for disease modeling, diagnosis and therapy,

**Disease Candidates:** Cancer, Genetic and Metabolic Diseases.

# EMPLOYMENT RECORD

- **October 2006-present**

**Faculty Member (Associate Professor)**, National Research Institute of Genetic Engineering and Biotechnology, Tehran/Iran.

**Research Subjects**

1. Cell-gene therapy for breast cancer, projects include: Intracellular mechanisms of breast cancer cell growth and growth inhibition by genetic manipulation of signaling pathways, Intracellular mechanisms of herceptin resistance in breast cancer cells.
2. Cell-gene therapy for Parkinson's disease, Projects include: 1) Neurogenesis: differentiation of stem cells to dopaminergic neurons, 2) neuroprotection studies using neurotrophic factors, anti-oxidant enzyme and safe nutrients.

**Technological Subjects**

- 2) Development of antibodies for cancer therapy, 2) Development of nano-biotechnology-based diagnostic kits for rapid detection of diseases, 3) design and generation of novel lentivirus vectors for shRNA and therapeutic cDNA clones.

**Teaching Subjects**

Genetics, Molecular Biology, Biotechnology, Applied Genetic Engineering, Advanced Genetic Engineering.

- **August 2005-October 2013**

**Invited Senior Investigator**, Neuroscience Research Center, Shahid Beheshti University of Medical Sciences, Tehran/Iran.

**Research Subjects** Parkinson's disease. Projects involved in include: 1) Replacement cell therapy for PD in animal models of the disease, 2) Molecular analysis of dopamine signalling in cells expressing tyrosine hydroxylase.

- **Aug 2002-March 2005**

**Senior Research Officer**, Institute for Biological Sciences, NRC Canada, Ottawa.

## Research Subjects

Novel cell/gene therapy approaches for neurodegenerative diseases with specific focus on PD. Projects involved in include: 1) Application of cell and gene therapy to PD, 2) Differentiation of ES and teratocarcinoma cells into dopaminergic (DAergic) neurons, 3) Development of a laboratory for lentivirus-mediated gene transfer.

- **Nov 1999-July 2002**

**Post-doctoral Research Associate**, Dept. of Anatomy & Neurobiology, Washington University School of Medicine, St. Louis, MO, USA.

## Research Subjects

Parkinson's disease and animal models. Projects involved in included: 1) Inducible systems of gene expression to target midbrain DAergic neurons, 2) Development of mouse models of PD. Treatment of animals with parkinsonian toxins, evaluation of DAergic neurons for increased free radicals.

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# GRANTS AWARDED

## • BREAST CANCER

1. Development of nano-carriers to target breast cancer cell growth and breast cancer stem cell differentiation. NIGEB and Tarbiat Modares University, Tehran/IRAN, 2014-. Budget: 300,000,000.
2. Design and construction of viral and nonviral vectors for expression of Herceptin monoclonal antibody (Trastuzumab) and evaluation of expression in mammalian cell lines, NIGEB, 2009-2013. Budget: 100,000,000.

## • PARKINSON'S DISEASE

1. The effect of sulforaphane, an extract of broccoli, on survival of breast cancer cells, Kavosh Institute, 2015-. Budget: 120,000,000.
2. Evaluation of neuroprotection potential of GDNF and its supportive role in dopaminergic differentiation induced by transcription factor Pitx3, National Institute of Genetic Engineering and Biotechnology (NIGEB), 2010-2014. Budget: Rials 280,000,000.
3. Induction of neuroinflammation in glial cells and evaluation of its effect on dopaminergic neurons, NIGEB, 2011-2014. Budget: Rials 70,000,000.
4. Transplantation of dopaminergic neurons to the striatum in 6OHDA-lesioned rats. Neuroscience Research Center (NRC), Shahid Beheshti University of Medical Sciences, 2009-2013. Budget: Rials 395,000,000.
5. Differentiation of embryonic stem cells to dopaminergic neurons resistant to oxidative stress. NRC, Shahid Beheshti University of Medical Sciences, 2007-2010. Budget: Rials 63,600,000.
6. Molecular development of dopaminergic neurons: the role of transcription and neurotrophic factors, NRC, Shahid Beheshti University of Medical Sciences, 2008-2012. Budget: Rials 60,000,000.

## • RECOMBINANT LENTIVIRUS DEVELOPMENT

1. Generation of recombinant lentiviruses carrying dopaminergic transcription factors. Islamic Azad University, Ayatollah Amoli Branch, Amol. 2015-. Budget: Rials 49,800,000.
2. Development of lentivirus vectors for transduction of dividing cells and non-dividing neurons: development of technology. NIGEB. 2007-2009. Budget: Rials 30,000,000.
3. Combination of lentiviral gene transfer systems with tetracycline inducible (Tet-ON) systems for controlled transgene expression. Islamic Azad University, Ayatollah Amoli Branch, Amol. 2010-2012. Budget: Rials 49,800,000.

# TECHNOLOGY DEVELOPMENT

- **MASS PRODUCTION OF THERAPEUTIC MOLECULES**

1. Monoclonal antibodies, recombinant proteins: engineering, expression and purification.
2. Green chicken as bioreactor: Creation of transgenic chicken for mass production of therapeutic proteins in egg white.

- **DISEASE MODELING**

1. Generation of xenograft models for breast cancer and drug resistance
2. Creation of animal models for Parkinson's disease

- **DEVELOPMENT OF DISEASE DETECTION KITS**

1. Development of disease detection kits using monoclonal antibodies,
2. Detection kits with enhanced specificity and sensitivity: fusion of antibodies with quantum dots.

- **CELL-GENE DELIVERY TOOLS**

1. Generation of cell/tissue-targeted lentivirus vectors for gene induction (fused with tetracycline-inducible system), gene inhibition (shRNA),
2. CRISPR: Development of next-generation gene editor

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# SUPERVISION OF THESES

- **SUPERVISION OF PHD STUDENTS, THESIS TITLE**

1. **M. Eskandarian**; Exploring the capacity of various cell sources to differentiate to dopaminergic neurons.
2. **S. Shojaei**; Inhibition of tyrosine kinases and their molecular switches in breast cancer cell lines.
3. **D. Inanloo**, Beta-globin gene targeting in COS-7 cell line by homologous recombination using lentivirus vectors.
4. **M. Ayatollahi**; Differentiation of human bone marrow stem cells to hepatocytes.
5. **A. Haddad-Mashadrizeh**; Evaluation of survivability and differentiation potential of human mesenchymal stem cells xenotransplanted to various organs in a rat model.

- **SUPERVISION OF POST-GRAD STUDENTS, THESIS TITLE**

1. **R. Safi**; Construction of recombinant lentiviruses carrying GDNF gene cassette and its expression in human cells.
2. **M. Gholami**; Lentivirus vector-mediated transfer of glutathione peroxidase-1 gene to human neuroblastoma cells and examination of its anti-oxidant effects.
3. **A. Rahimi**; Recombinant lentivirus-mediated expression of GFP in chicken liver cell line LMH.
4. **S. Shojaei**; Design and construction of lentiviral vectors for expression of trastuzumab monoclonal antibody and evaluation of its expression in mammalian cells
5. **N. Farahani**, Construction of recombinant lentivectors carrying dopaminergic transcription factors
6. **E. Gharib**; Evaluation of GDNF and glutathione peroxidase-1 effects on protection of dopaminergic neurons
7. **H. Momen**; Synergistic effect of Pitx3 overexpression and GDNF induction in dopaminergic programming of NT2, a human pluripotent embryonic carcinoma cell line.
8. **S. Mashjoor**; Construction of recombinant lentiviruses carrying GH gene cassette from Beluga Sturgeon (*Huso huso*) and evaluation of its gene expression in mammalian cell lines

- 9. E. Esmaeilzadeh;** Generation of recombinant lentiviruses carrying GPX-1 gene and their application in increased survival of dopaminergic neurons.
- 10. S. Lasemi;** Transfer of DJ-1 gene into dopaminergic neurons and examination of its effect on protection of the neurons
- 11. H. Fazilaty;** Overexpression of Slug and Sox9 genes in breast cancer cell line MCF7 and evaluation of their effect on Tenecin and Periostin.
- 12. P. Akbari;** Generation of recombinant lentiviruses using tetracycline inducible system (Tet-ON).
- 13. F. Rasoolnezhad;** Neuroprotection from microglial-mediated neuroinflammation by DJ-1 gene activity in dopaminergic cell line PC12.
- 14. Z. Norollahzadeh;** Transfer of GPX-1 gene to breast cancer cell lines using recombinant lentivirus vectors and assessment of its effect on cell survival.
- 15. G. Shabak;** The impact of glutathione peroxidase-1 overexpression on the response of various breast cancer cell lines to GDNF treatment.
- 16. H. Taherian;** Breast cancer cells co-treated with GDNF and curcumine: dose determination and final fate of the cells.

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# TEACHING EXPERTISE

- **BASIC GENETICS**

- Mendelian/ Classic Genetics, Non-mendelian Genetics, Reproduction and Chromosome Transmission, Gene Inheritance and Interactions, Linkage and Crossingover, Recombination and Genetic Mapping, Mutations, ...

- **GENETICS OF PROKARYOTES**

- Bacterial chromosome, Bacterial Gene Transfer, Bacterial Gene Regulation and Operons, Non-chromosomal DNA (plasmids, insertion sequences, transposons), Bacteriophage Genetics, Genetic Analysis of Bacterial Traits/Metabolic Pathways.

- **HUMAN GENETICS**

- Molecular Basis of Human Genetics, Gene Mapping, Human Genome Project, Genetic Basis of Human Diseases, Gene Therapy, Developmental Genetics.

- **APPLIED GENETICS AND BIOTECHNOLOGY**

- Genetic Engineering (rDNA Technology, DNA Amplification, Sequencing, Mutagenesis etc), Advanced Genetic Engineering (Protein/Antibody Engineering, Gene Delivery Systems, Transgenesis, Genome Analysis (Genomics, Genome Mapping, Proteomics etc).

- **MOLECULAR BIOLOGY**

- Chemical Bonds in Biology, Biological Macromolecules, Cellular Energetics, Genetic Flow of Information (DNA Replication, Transcription, Translation), Cell Membrane, Cell Organelles.

- **CYTOCHEMISTRY**

- Cell Staining, Detection of Cellular Organelles and Membranes, Detection of Gene Expression, Distinction of Apoptosis and Necrosis.

- **BIOLOGY TEXTS**

- Biology Nomenclature, Description of Biological Phrases and Phenomena, Biology Textbooks, References and Citations, Biology in Wikipedia.

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# SCIENTIFIC COMMUNITY-MEMBERSHIP

- 1. International Brain Research Organization (IBRO)
- 2. Society for Neuroscience (SFN)
- 3. American Association for Cancer Research (AACR)
- 4. Parkinson Consortium, Ottawa, Canada
- 5. Australia-New Zealand Pediatric Hematology and Oncology (ANCHOG)
- 6. Iranian Cell Death Association (Member of Board)
- 7. Iranian Society of Biology
- 8. Biology

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# HOBBIES

Travel

BBQ

Bushwalk

Swimming

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