

CURRICULUM VITAE

Professor Fatemeh Fotouhi

Influenza and other Respiratory Viruses

Pasteur Institute of Iran, Tehran, Iran.

Phone #: +98 (21)64112130

Fax #: +98 (21)66496517

Cell #: +912-2472391

e-mail : fotouhi@pasteur.ac.ir, fotouhi44@yahoo.com

Education:

- 2005-2006 Postdoctoral fellow in Queen's University, Department of Microbiology and Immunology, Kingston, Canada
- 2000-2006 Ph.D. in Medical Virology, Tarbiat Modarres University, Tehran, Iran.
- 1995-1997 M.Sc. in Medical Virology, Tarbiat Modarres University, Tehran, Iran.
- 1985-1989 B.Sc. in Microbiology, Tehran University, Tehran, Iran.

Honors and Awards:

- 1998 Second Prize Winner, Young Researcher, In 4th Razi Festival, Winter 1998, Tehran.

Employment History:

- 2020-2022 Professor, Head of Influenza and other Respiratory Viruses Dept, Pasteur Institute of Iran
- 2015-2020 Associate Professor, Head of Influenza and other Respiratory Viruses Dept, Pasteur Institute of Iran
- 2008-2015 Assistant Professor, Influenza and other Respiratory Viruses Dept, Pasteur Institute of Iran
- 2000-2006 Research assistant, full time.
- 1998-2000 Training in Research Department, Ministry of Health.
- 1995-1997 M.Sc. student, full time
- 1989-1995 Biology & Chemistry laboratory instructor in State High School

Teaching Experience:

Systematic Virology, Advanced virology, General Virology, Practical virology, Practical Immunology, for MS.c and PhD Students,

Research project director:

- 1) Construction of a chimerical expression vector carrying influenza virus M2 protein and HSP70 gene and protein expression in COS-7 and/or HEK 293 cells (2010)
- 2) Production of M2-HSP70 chimeric protein containing influenza virus M2 protein and Leishmania Major HSP70 in prokaryotic system (E.coli) and assessment of its immunogenicity in mice (2012)
- 3) Application of Multiplex Real Time PCR in order to detect respiratory viruses in clinical samples collected from acute respiratory infected patients
- 4) Evaluating hemagglutinin and neuraminidase genetic changes in recent H1N1 influenza viruses in comparison with 2009 pandemic vaccine strain
- 5) Production and protectivity assessment of intranasal administration of polyclonal antibodies against whole Influenza A/H1N1 virus and conserved proteins (HA2& M2) in mice against whole Influenza A virus and conserved proteins (HA2& M2) in mice
- 6) Expression of Hemagglutinin (HA) proteins in Tobacco plant for production of virus-like particles as vaccine candidate
- 7) Evaluation of the neutralizing activity of antibodies induced by H5 influenza vaccines through production of lentiviral pseudovirus particle
- 8) Designing and Production of a multi-epitopes vaccine encoding influenza A and B virus epitopes in prokaryotic system, assessment of protection and long lasting immunity in mouse model
- 9) Investigation on Coronavirus shedding duration among COVID-19 infected individuals
- 10) Design, synthesis and evaluation of protective effect of inhaled form of antiviral peptides against influenza A
- 11) Design, Cloning and expression of chimeric protein composed of the antigenic regions of hemagglutinin and conserved domains of influenza virus in *Nicotiana benthamiana* and immunogenicity assessment in mouse model.
- 12) Evaluation of the susceptibility to influenza virus in people suffering from Hypercholesterolemia and diabetes in terms of IFITM3 polymorphism rs12252

- 13) Evaluation of viral infections in patients with respiratory symptoms and negative result of COVID-19
- 14) Evaluation of Covaxin Baharat India vaccine in symptomatic and asymptomatic further infection and vaccine escape variants detection Optimizing the expression of the active form of neuraminidase in bacterial host to facilitate pharmacological studies against influenza
- 15) Immunogenicity and protectivity evaluation of vaccine candidate constructs consist of immunodominant epitopes of influenza virus surface proteins (hemagglutinin and neuraminidase) in prokaryotic system
- 16) Isolation and characterization of respiratory viruses from nasopharyngeal specimen of patients with respiratory diseases to develop a virus bank
- 17) Optimizing the expression of the active form of neuraminidase in bacterial host to facilitate pharmacological studies against influenza

Associations/Membership:

Executive Editor of Iranian Journal of virology

Associate editor of Jundishapur Journal of Microbiology

Member of Iranian Society of Virology from 1999

Journal referee for:

PLoS ONE

Vaccine

African Journal of Microbiology Research

Brazilian Journal of Microbiology

African Journal of Biotechnology

Jundishapur Journal of Microbiology

Cell Journal (yakhte)

Iranian Biomedical Journal

Iranian Journal of virology

Daneshvar Journal

Iranian Journal of Biotechnology

Iranian Journal of Immunology
Modares Journal of medical sciences

Workshops:

Annually Summer School Course, Pasteur Institute of Iran, Influenza & other Respiratory Viruses, from 2010 to 2023

Books:

"Baculoviruses and Insect cells as powerful tools for gene expression" published by Tehran Jahad, Tehran. I.R, 2009

"Molecular cloning & Expression of recombinant protein" published by Tarbiat Modares University, School of Medical Sciences. Tehran I. R. IRAN. 2003.

Publications (Articles):

1. Najafi, Niloofar; Soleimanjahi, Hoorieh; Shahali, Shadab; Pourkarim, Mahmoud Reza ; Thijssen, Marijn; Fotouhi, Fatemeh; Bamdad, Taravat; Azadmanesh, Kayhan; Nasiri, Zeynab; Afzali, Neda; Jabbari, Mohammad Reza; Yari, Atefeh, Genomic and serological assessment of asymptomatic severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections in child labor, Pathogens and Global Health Open Access Volume 116, Issue 7, Pages 455 - 461
2. Torabi, Ali; Farahmand, Behrokh; Zolfaghari, Mohammadrez; Fotouhi, Fatemeh; Zargar, Mohsen, Evaluation of immunogenicity of recombinant influenza nucleoprotein (NP) for universal vaccine, Tehran University Medical Journal Volume 79, Issue 11, Pages 880 - 891
3. Yazdi, Seyedeh Mahsa Bagheri; Shahsavandi, Shahla; Fotouhi, Fatemeh; Tebianian, Majid; Ebrahimi, Mohammad Majid, Modulation of Immune Responses against HA1 Influenza Vaccine Candidate by B-lymphocyte Stimulator Cytokine in Mice, Iranian Journal of Allergy, Asthma and Immunology Open Access Volume 21, Issue 2, Pages 207 - 214

4. Shahsavandi, Shahla; Ebrahimi, Mohammad Majid; Fotouhi, Fatemeh; Tebianian, Majid, A Combination of Recombinant HA1-and Nucleoprotein-Based Chitosan Nanoparticles Induces Early and Potent Immune Responses Against the H9N2 Influenza Virus, *Viral Immunology* Volume 35, Issue 5, Pages 365 - 374
5. Esmailpour, Mahboubea; Mohammadimasoudi; Shemirani, Mohammadreza; Goudarzi, Ali; Heidari Beni, Mohammad-Hosseini; Shahsavarani, Hosein; Aghajan, Hamid; Mehrbod, Parvanehd; Salehi-Vaziri, Mostafae; Fotouhi, Fatemeh. Rapid, label-free and low-cost diagnostic kit for COVID-19 based on liquid crystals and machine learning, *Biosensors and Bioelectronics: XOpen Access* Volume 12 December 2022
6. Maleki, Mahnoosh; Hosseini, Seyed Masoud; Farahmand, Behrokh; Saleh, Maryam; Shokouhi, Hadiseh; Torabi, Ali; Fotouhi, Fatemeh. Induction of Homosubtypic and Heterosubtypic Immunity to Influenza Viruses Using a Conserved Internal and External Proteins. *Current Microbiology* Volume 80, Issue 6 June 2023 Article number 212
7. Maleki, M., Hosseini, S.M., Farahmand, B., ...Torabi, A., Fotouhi, F. Induction of Homosubtypic and Heterosubtypic Immunity to Influenza Viruses Using a Conserved Internal and External Proteins, *Current Microbiology*, 2023, 80(6), 212
8. Hadiseh Shokouhi Targhi, Parvaneh Mehrbod, Fatemeh Fotouhi & Mehriar Amininasab. In vitro anti-influenza assessment of anionic compounds ascorbate, acetate and citrate. *Virology Journal* volume 19, Article number: 88 (2022)
9. Fatemeh Fotouhi , Mostafa Salehi-Vaziri, Behrokh Farahmand , Ehsan Mostafavi, Mohammad Hassan Pouriayevali, et al. Prolonged viral shedding and antibody persistence in patients with COVID-19. *Microbes Infect.* May-Jun 2021; 23(4-5):104810. doi:10.1016/j.micinf.2021.104810
10. Mostafa Salehi-Vaziri, Mir Davood Omrani, Mohammad Hassan Pouriayevali, Fatemeh Fotouhi, Mohammad Banifazl, et al. SARS-CoV-2 presented moderately during two episodes of the infection with lack of antibody responses. *Case Reports. Virus Res.* 2021 Jul 2; 299:198421. doi: 10.1016/j.virusres.2021.198421
11. Mostafa Salehi-Vaziri, Mohammad Hassan Pouriayevali, Fatemeh Fotouhi, Tahmineh Jalali, Mohammad Banifazl, Behrokh Farahmand, et al. SARS-CoV-2 re-infection rate in Iranian COVID-19 cases within one-year follow-up. *Microb Pathog.* 2021 Dec; 161(Pt B):105296. doi: 10.1016/j.micpath.2021.105296

12. Mostafa Salehi-Vaziri, Tahmineh Jalali, Behrokh Farahmand, Fatemeh Fotouhi, Mohammad Banifazl, Mohammad Hassan Pouriayevali, et al. Clinical characteristics of SARS-CoV-2 by re-infection vs. reactivation: a case series from Iran. *Case Reports. Eur J Clin Microbiol Infect Dis.* 2021 Aug; 40(8):1713-1719. doi: 10.1007/s10096-021-04221-6
13. Masoomah Sofian, Ali Akbar Velayati, Mohammad Banifazl, Fatemeh Fotouhi, Mona Sadat Larijani, Neda Afzali, Amitis Ramezani. SARS-CoV 2, a virus with many faces: a series of cases with prolonged persistence of COVID-19 symptoms. *Wien Med Wochenschr.* 2021 Feb;171(1-2):3-6. doi: 10.1007/s10354-020-00793-8.
14. Salehi-Vaziri M, Arashkia A, Mostafavi E, Jalali T, Pouriayevali MH, Fazlalipour M, Shoja Z, Rohani M, Esmaeili S, Fotouhi F, Baesi K, Maleki A, Nasab SDM, Ahmadi Z, Mohammadi T, Azad-Manjiri S, Nosrati MSS, Tavakoli M, Fereydouni Z, Khakifirouz S, Samiee SM, Biglari A, Azadmanesh K. Corrigendum to 'How Iran responded to expanding need for laboratory services for COVID-19?' *Health Policy Technol.* 2021 Oct 27;100570. doi: 10.1016/j.hlpt.2021.100570.
15. Mehrbod P, Safari H, Mollai Z, Fotouhi F, Mirfakhraei Y, Entezari H, Goodarzi S, Tofighi Z. Potential antiviral effects of some native Iranian medicinal plants extracts and fractions against influenza A virus. *BMC Complement Med Ther.* 2021 Oct 1;21(1):246. doi: 10.1186/s12906-021-03423-x.
16. Mozaffari Nejad AS, Fotouhi F, Mehrbod P, Alikhani MY. Antitumor immunity enhancement through Newcastle viral oncolysate in mice model: A promising method to treat tumors. *Saudi J Biol Sci.* 2021 Oct;28(10):5833-5840. doi:10.1016/j.sjbs.2021.06.043. Epub 2021 Jun 18.
17. Forqani M, Hosseini SM, Farahmand B, Saleh M, Shokouhi H, Torabi A, Fotouhi F. Combination of conserved recombinant proteins (NP & 3M2e) formulated with Alum protected BALB/c mice against influenza A/PR8/H1N1 virus challenge. *Biotechnol Lett.* 2021 Nov;43(11):2137-2147. doi: 10.1007/s10529-021-03174-2. Epub 2021 Sep 7.
18. Fotouhi F, Salehi-Vaziri M, Farahmand B, Mostafavi E, Pouriayevali MH, Jalali T, Mazaheri V, Larijani MS, Tavakoli M, AzitaEshratkha Mohammadnejad, Afzali N, Zokaei A, Hosseini S, Mortazavipour MM, Oskouei F, Ramezani A. Prolonged Viral Shedding and Antibody Persistence in Patients with COVID-19, *Microbes Infect.* 2021 Mar 16:104810. doi: 10.1016/j.micinf.2021.104810.

19. Salehi-Vaziri M, Jalali T, Farahmand B, Fotouhi F, Banifazl M, Pouriayevali MH, Sadat Larijani M, Afzali N, Ramezani A. Clinical characteristics of SARS-CoV-2 by re-infection vs. reactivation: a case series from Iran. *Eur J Clin Microbiol Infect Dis*. 2021 Mar 18;1-7. doi: 10.1007/s10096-021-04221-6.
20. Saleh M, Nowroozi M, Farahmand B, Fotouhi F *An approach to the influenza chimeric subunit vaccine (3M2e-HA2-NP) provides efficient protection against lethal virus challenge. *Biotechnology Letters* 2020; (DOI: 10.1007/s10529-020-02822-3)
21. Mehrbod P, Eybpoosh S, Farahmand B, Fotouhi F, Khanzadeh Alishahi M. Association of the host genetic factors, hypercholesterolemia and diabetes with mild influenza in an Iranian population, *Virology*. 2021 Mar 25;18(1):64. doi: 10.1186/s12985-021-01486-3.
22. Mehrbod P, Ebrahimi SN, Fotouhi F, Eskandari F, Eloff JN, McGaw LJ, Fasina FO. Experimental validation and computational modeling of anti-influenza effects of quercetin-3-O- α -L-rhamnopyranoside from indigenous south African medicinal plant *Rapanea melanophloeos*. *BMC Complement Altern Med*. 2019 Dec 2;19(1):346. doi: 10.1186/s12906-019-2774-3.
23. Salehi-Vaziri M, Omrani MD, Pouriayevali MH, Fotouhi F, Banifazl M, Farahmand B, Sadat Larijani M, Ahmadi Z, Fereydouni Z, Tavakoli M, Jalali T, Ramezani A. SARS-CoV-2 presented moderately during two episodes of the infection with lack of antibody responses, *Virus Res*. 2021 Apr 6;299:198421. doi: 10.1016/j.virusres.2021.198421
24. Katlego E Motlhatlego, Parvaneh Mehrbod, Fatemeh Fotouhi, Muna Ali Abdalla, Jacobus N Eloff, Lyndy J McGaw. Anti-influenza activity of two *Newtonia* species and the antibacterial compound myricetin-3-O-rhamnoside. *BMC Complementary and Alternative Medicine*. 2021 Mar 16;21(1):92. doi: 10.1186/s12906-021-03250-0.
25. Mehrbod P, Fotouhi F, Farahmand B. COVID-19 Case Report from an Asymptomatic Patient. *Iran J Virol*. 2019; 13 (2) :39-41,URL: <http://journal.isv.org.ir/article-1-397-fa.html>
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27. Elahe Nazeri, Behrokh Farahmand, Fatemeh Fotouhi, Mehrdad Hashemi, Najme Taheri,1 Hadis Shokohi, and Shekoofe Hatami. In Silico Analysis and Expression of

- Influenza Virus 3M2e-HA2 Chimer Protein Fused to C-Terminal Domain of Leishmania major HSP70. Jundishapur J Microbiol. 2018 August; 11(8):e13777.
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 29. Amir Sasan Mozaffari Nejad, Fatemeh Fotouhi, Parvaneh Mehrbod, Mohsen Keshavarz, Mohammad Yousef Alikhani, Amir Ghaemi. Oncolytic effects of Hitchner B1 strain of newcastle disease virus against cervical cancer cell proliferation is mediated by the increased expression of cytochrome C, autophagy and apoptotic pathways. Microbial Pathogenesis, Volume 147, OCT 2020
 30. Saleh M, Nowroozi M, Fotouhi F, Farahmand B*. Physicochemical study of the influenza A virus M2 protein and alum adjuvant interaction as a vaccine candidate model. Future virology 2019; 14(8) 17 Sep 2019 <https://doi.org/10.2217/fvl-2019-0019>.
 31. Farahmand B, Taheri N, Shokouhi H, Soleimanjahi H, Fotouhi F*. Chimeric protein consisting of 3M2e and HSP as a universal influenza vaccine candidate: from in silico analysis to preliminary evaluation. Virus Genes. 2019 Feb; 55(1):22-32.
 32. Atefeh Mohebbi, Fatemeh Fotouhi*, Abbas jamali, Ramin Yaghoobi, Behrokh Farahmand, Reza Mohebbi. Molecular Epidemiology of the Hemagglutinin gene of prevalent influenza virus A/H1N1/pdm09 among patient in Iran. Virus Research. Virus Res. 2019 Jan 2; 259:38-45.
 33. Moasser E, Behzadian F, Moattari A*, Fotouhi F, Rahimi A, Zaraket H, Hosseini SY. Molecular characterization and phylogenetic analysis of human influenza A viruses isolated in Iran during the 2014-2015 season. Arch Virol. 2017 Jul; 162(7):1975-1984.
 34. Moasser E, Behzadian F*, Moattari A, Fotouhi F, Zaraket H. Characterization of the neuraminidase genes from human influenza A viruses circulating in Iran from 2010 to 2015. Arch Virol. 2018 Feb;163(2):391-400.
 35. Feizi N, Mehrbod P, Romani B, Soleimanjahi H, Bamdad T, Feizi A, Jazaeri EO, Targhi HS, Saleh M, Jamali A, Fotouhi F, Nargesabad RN, Abdoli A*. Autophagy induction regulates influenza virus replication in a time-dependent manner. J Med Microbiol. 2017 Apr;66(4):536-541.

36. Moradi MT, Karimi A*, Rafieian-Kopaei M, Fotouhi F. In vitro antiviral effects of Peganum harmala seed extract and its total alkaloids against Influenza virus. *Microb Pathog.* 2017 Sep;110:42-49.
37. Soleimanjahi H*, Razavinikoo H, Fotouhi F, Ardebili A. Antitumor Response to a Codon-Optimized HPV-16 E7/HSP70 Fusion Antigen DNA Vaccine. *Iran J Immunol.* 2017 Sep;14(3):180-191.
38. Mehrbod P, Eybpoosh S, Fotouhi F, Shokouhi Targhi H, Mazaheri V, Farahmand B*. Association of IFITM3 rs12252 polymorphisms, BMI, diabetes, and hypercholesterolemia with mild flu in an Iranian population. *Virol J.* 2017 Nov 9;14(1):218.
39. Moradi MT, Karimi A*, Fotouhi F, Kheiri S, Torabi A. In vitro and in vivo effects of Peganum harmala L. seeds extract against influenza A virus. *Avicenna J Phytomed.* 2017 Nov-Dec;7(6):519-530.
40. GhelichKhan M, Hosseini SM, Khansarinejad B, Fotouhi F*. Establishment of reverse transcription polymerase chain reaction assay for simultaneous detection of human parainfluenza virus types 1 to 4 in children with influenza like illnesses. *Bratisl Lek Listy.* 2017;118(12):772-776.
41. Khateri M, Abdoli A, Motevalli F, Fotouhi F, Bolhassani A, Arashkia A, Jazaeri EO, Shahbazi S, Mehrbod P, Naziri H, Aghasadeghi MR*. Evaluation of autophagy induction on HEV 239 vaccine immune response in a mouse model. *IUBMB Life.* 2018 Mar;70(3):207-214.
42. Maryam Bidram, Farida Behzadian, Fatemeh Fotouhi, Maryam Fazeli. Cloning and prokaryotic expression of the globular head domain of hemagglutinin antigen (HA1) of influenza A (H3N2) virus in *Escherichia coli* and *Bacillus subtilis*. *Archives of Medical Laboratory Sciences*, 2017, 3 (1), 1-6.
43. Mehrbod P, Abdalla MA, Njoya EM, Ahmed AS, Fotouhi F, Farahmand B, Gado DA, Tabatabaian M, Fasanmi OG, Eloff JN, McGaw LJ, Fasina FO*. South African medicinal plant extracts active against influenza A virus. *BMC Complement Altern Med.* 2018 Mar 27;18(1):112.

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45. Hashemzadeh MS, Mousavy SJ*, Dorostkar R, Fotouhi F, Ebrahimi F. Designing Two Individual AcMNPV Polyhedrin-Plus Bac-to-Bac Expression System in order to Express GFP and CPV-VP2 in Insect Cells. *Iran J Biotechnol.* 2017 Sep 27; 15(3):172-178.
46. Mehrbod P, Abdalla MA, Fotouhi F, Heidarzadeh M, Aro AO, Eloff JN, McGaw LJ, Fasina FO*. Immunomodulatory properties of quercetin-3-O- α -L-rhamnopyranoside from *Rapanea melanophloeos* against influenza a virus. *BMC Complement Altern Med.* 2018 Jun 15;18(1):184
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- recombination of VP2 gene of canine parvovirus into baculoviral shuttle vector enabling its expression in insect cells, *Der Pharmacia Lettre*, 2016, 8 (5):119-127
61. Hadiseh Shokouhi, Mohammad Reza Zolfaghari, Behrokh Farahmand, Mansooreh Tabatabaeian, Najmeh Taheri, Fatemeh Fotouhi*. Immunological Assessment of Three Tandem Repeat of Influenza Virus M2 Extracellular Domain with Adjuvant in Balb/c Mice Model, *Arak Medical University Journal (AMUJ)* 2016; 19(106): 32-43
 62. Nahid Borhani Dizaji ,Irene Ricci ,Guido Favia, Claudia Damiani ,Hamid Reza Basseri , Mansour Heidari, Saied Reza Naddaf and Fatemeh Fotouhi*, Identification and molecular analysis of mid-gut mucin gene in *Anopheles stephensi* (Diptera: Culicidae), *International Journal of Tropical Insect Science*, 2016, Vol. 36 (2): 60–69
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