



Curriculum Vitae

Personal Details

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Research Interests

My expertise includes the design and synthesis of novel small molecules with therapeutic potential, as well as enzymatic assessments, cell-based evaluations, structure and elucidation techniques, and data analysis.

My research group is actively engaged in the development of safe and effective anti-Alzheimer agents to inhibit AChE, BuChE, and BACE1 with neuroprotective potential. Also, we work on the design, synthesis, and biological evaluations of novel tyrosine inhibitors for the treatment of melasma and hyperpigmentation. My alternatives are antidiabetics and antimicrobial agents and evaluate their potencies. Knowledge of *in silico* evaluations especially molecular docking, molecular dynamics, virtual screening, and similarity search is also excessively used as an asset.

The development of bioactive nanomaterials, advanced materials, nanocomposites, and scaffolds is another field of interest that can be applied to biomedical applications. Also, we focus on the synthesis and characterization of nanoparticles conjugated with natural products including plant extracts, marine and essential oils for biomedical and environmental applications.

10+ years working in high-tech laboratories significantly resulted in advanced applications of High-Performance Liquid Chromatography (HPLC), Gas Chromatography (GC), Gas Chromatography-Mass Spectrometry (GC-MS), Mass Spectrometry (MS), High-Performance Thin Layer Chromatography (HPTLC), Capillary electrophoresis (CE) elemental analysis (CHNOS) and Infrared (IR).

Peer Review Journal Article

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2021

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118. **A. Iraj**, D. Afzali, A. Mostafavi, M. Fayazi, Ultrasound-assisted emulsification microextraction for separation of trace amounts of antimony prior to FAAS determination, Microchimica Acta 176(1) (2012) 185-192, <https://link.springer.com/article/10.1007/s00604-011-0706-0>, Q1.

Grants & Research Support

Principal Investigator

Grant number: IR.SUMS.REC.1401.245 2021- present

Title: Biological evaluation and molecular docking study of naphthoquinone-triazole derivatives as α -glucosidase and α -amylase inhibitors as potential anti-diabetic agents.

Grant number: IR.SUMS.REC.1401.510 2021-present

Title: Biological evaluation, and the structure-activity relationship study of isopropylquinazolinone derivatives as a tyrosinase inhibitor

Grant number: IR.SUMS.REC.1401.432 2021-present

Title: Biological evaluation, and molecular dynamics simulations of 4-hydroxyquinolinone derivatives as α -glucosidase inhibitors.

Grant number: IR.SUMS.REC.1401.450 2021-present

Title: Biological evaluation and the structure-activity relationship study of phthalimide derivatives bearing different benzamide pyridinium substitutes as effective compounds for the treatment of Alzheimer's disease.



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Grant number: IR.SUMS.REC.1401.316 2021-present

Title: Biological evaluation and the structure-activity relationship study of novel quinolin-2(1H)-one derivatives bearing different aryl pyridin-1-ium substitutes as effective compounds for the treatment of Alzheimer's disease.

Grant number: IR.SUMS.REC.1401.254 2021-present

Title: Biological activity evaluation and molecular docking studies of novel spirodiazepine indoline as acetylcholinesterase and butyrylcholinesterase inhibitors for the treatment of Alzheimer's disease.

Grant number: IR.SUMS.REC.1401.167 2021-present

Title: Synthesis, biological activity evaluation, and molecular docking studies of novel indoledione bearing different benzamide pyridin-1-ium derivatives as acetylcholinesterase and butyrylcholinesterase inhibitors for the treatment of Alzheimer's disease.

Grant number: IR.SUMS.AEC.1401.081 2021-present

Title. Evaluation of treatment of colitis in male rats using hydroalcoholic extract of Grandiflorum.

Grant number: IR.SUMS.AEC.1401.069 2021-present

Title: Evaluation of the healing effect of resveratrol with autologous chondrocytes on induced cartilage defect in the knee joint of male rat.

Grant number:: IR.SUMS.AEC.1401.089 2021-present

Title: Comparing the therapeutic effect of Rosa canina L oil with Asacol and Mesalazine on inflammatory and biochemical markers on induced ulcerative colitis in male rats.

Grant number: IR.SUMS.AEC.27130 2021-present

Title: Determination the inhibitory effects of triazole derivatives on growth and urease activity of ureolytic microorganisms

Grant number: IR.SUMS.AEC.27034 2021-present

Title: Biological evaluation and molecular dynamics simulation of novel kojic acid derivatives containing different aminopyridine substitutions as tyrosinase inhibitors.

Grant number: IR.SUMS.REC.1400.529 2019-2021



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Title: Synthesis, biological evaluation and molecular docking study of novel nitrothiazolacetamide conjugated to different thioquinazolinone derivatives as urease inhibitors.

Grant number: IR.SUMS.REC.1400.613

2019-2021

Title: Synthesis, biological evaluation, and molecular docking study of novel N-thioacylated ciprofloxacin derivatives as urease inhibitors.

Grant number: IR.SUMS.REC.1400.686

2019-2021

Title: Synthesis and structure elucidation of novel aryl- ((3-phenylureido)methyl)pyridin-1-ium derivatives.

Grant number: IR.SUMS.REC.1400.711

2020-2021

Title: A review on chemotaxonomy, phytochemistry, and biological attributes of linarin, a promising bioactive flavonoid.

Grant number: IR.SUMS.REC.1400.712

2019-2021

Title: Biological evaluation and molecular docking study of novel phenylurea-pyridinium derivatives as urease inhibitors.

Grant number: IR.SUMS.REC.1401.044

2020-2021

Title: A review of the therapeutic properties of anthocyanidinsanthocyanins on prostate cancer.

Grant number: IR.SUMS.REC.1401.232

2021-2022

Title: A review of the pathophysiology of Alzheimer's disease and the therapeutic properties of fucoxanthin and astaxanthin in Alzheimer's disease.

Grant number: IR.SUMS.REC.1401.246

2020-2021

Title: Biological evaluation and molecular docking studies of novel pyrrole acetamide derivatives as acetylcholinesterase and butyrylcholinesterase inhibitors for the treatment of Alzheimer's disease.

Grant number: IR.SUMS.REC.1401.059

2019-2022

Title: Synthesis, biological evaluation, and molecular docking study of novel benzimidazole-thioquinoline derivatives as α -glucosidase inhibitors.

Grant number: IR.SUMS.AEC.1401.047

2019-2021



Title: Comparing the therapeutic effect of *Boswellia serrata* essential oil with Asacol and Mesalazine on biochemical markers and histopathological changes on the experimental chemical model of colitis in male rats.

Grant number: IR.SUMS.AEC.1400.009,

2020-2021

Title: Evaluating the protective effects glycyrrhizic acid with synovium-derived stem cells and secretome on induced osteoarthritis of the knee in male rat models.

Grant number: IR.SUMS.AEC.1400.017

2020-2022

Title: Evaluating the protective effects of flaxseed oil with synovium-derived Stem Cells and secretome on induced osteoarthritis of the knee in male rat models .

Grant number: IR.SUMS.AEC.1400.008,

2020-2022

Title: Evaluation of Bone Healing of Whartons Jelly Mesenchymal Stem Cells and Glycyrrhizic Acid Loaded on Nano-Hydroxyapatite Gelatin Scaffold on Induced Mandibular Bone Defect in Male Rat.

Grant number: IR.SUMS.REC.1399.1191,

2018-2020

Title: The effect of the marine-based granular scaffold from *Holothuria parva* loaded with MSCs on the healing process of experimental bone defect in rat

Grant number: IR.SUMS.REC.1400.037,

2017-2019

Title: Synthesis and biological evaluation of 1,2,4-triazine-hyrazinyl piperidine hybrid as novel BACE1 and ChE inhibitors for the treatment of Alzheimer's disease.

Educational Activities: Training/Mentoring

Dissertations

1. Dr. P. Bakhshizadeh, Pharm. D, Shiraz Univesity of Medical Sciences, Shiraz, Iran (Graduated 2017), Adviser.
2. Dr. M. Sadrzadeh, Pharm. D, Shiraz Univesity of Medical Sciences, Shiraz, Iran (Graduated 2017), Adviser.
3. Dr. T. Adelpour, Pharm. D, Shiraz Univesity of Medical Sciences, Shiraz, Iran (Graduated 2018)), Adviser.
4. Dr. F. Rahimi, Pharm. D, Shiraz Univesity of Medical Sciences, Shiraz, Iran (Graduated 2020)), Adviser.
5. Dr. F. Godarzi, Pharm. D, Shiraz Univesity of Medical Sciences, Shiraz, Iran (Graduated 2021), Supervisor.
6. Dr. S. Ebrahimnejad, Pharm. D, Shiraz Univesity of Medical Sciences, Shiraz, Iran (Graduated 2021), Adviser.
7. Dr. M.Helforosh, Pharm. D, Shiraz Univesity of Medical Sciences, Shiraz, Iran (Graduated 2022), Supervisor.
8. Dr.A. Naghibi, Pharm. D, Shiraz Univesity of Medical Sciences, Shiraz, Iran (Graduated 2021), Supervisor.
9. Dr. S. Amini, Pharm. D, Shiraz Univesity of Medical Sciences, Shiraz, Iran (2020-current), Supervisor.
10. Dr. Z. Razi, Pharm. D, Shiraz Univesity of Medical Sciences, Shiraz, Iran (Graduated 2022), Supervisor
11. Dr. M. N. Mazidi, Pharm. D, Shiraz Univesity of Medical Sciences, Shiraz, Iran (Graduated 2022), Supervisor.



12. Dr. A. Ramezani, Pharm. D, Shiraz University of Medical Sciences, Shiraz, Iran (Graduated 2022), Supervisor.
13. Dr. M. Kochakzadeh, Pharm. D, Shiraz University of Medical Sciences, Shiraz, Iran (2020-current), Supervisor.
14. Dr. M. Davarian, M. D, Shiraz University of Medical Sciences, Shiraz, Iran (Graduated 2022), Supervisor.
15. Dr. H. Kazemi M M. D, Shiraz University of Medical Sciences, Shiraz, Iran (Graduated 2022), Supervisor.
16. Dr. D. Baghban, M. D, Shiraz University of Medical Sciences, Shiraz, Iran (2020-current), Supervisor.
17. Dr. M.T.Sobh, M. D, Shiraz University of Medical Sciences, Shiraz, Iran (2020-current), Supervisor.
18. Dr. M.Zandavi, M. D, Shiraz University of Medical Sciences, Shiraz, Iran (2020-current), Supervisor.
19. Dr. F. Saatarinejad, M. D, Shiraz University of Medical Sciences, Shiraz, Iran (2020-current), Supervisor.
20. Dr. S. Parizad, M. D, Shiraz University of Medical Sciences, Shiraz, Iran (2021-current), Supervisor.
21. Dr. M. Heydari, M. D, Shiraz University of Medical Sciences, Shiraz, Iran (2021-current), Supervisor.
22. Dr. A. Askari, M. D, Shiraz University of Medical Sciences, Shiraz, Iran (2021-current), Supervisor.
23. Dr. Akbari, M. D, Shiraz University of Medical Sciences, Shiraz, Iran (2020-current), Supervisor.
24. A. M. Noori, M. D, Shiraz University of Medical Sciences, Shiraz, Iran (2021-current), Supervisor.
25. N. Garmciri, M.Sc, Payame Noor University(PNU), Tehran, Iran (2018-current), Supervisor.
26. F. Garmciri, M.Sc, Payame Noor University(PNU), Tehran, Iran (2018-current), Supervisor.
27. M. Mehdizadeh, M.Sc, Payame Noor University(PNU), Tehran, Iran (2018-current)
28. Dr. M. Saleh Bahreii, Ph.D., Shiraz University of Medical Sciences, Shiraz, Iran (Graduated 2022), Consultant.
29. Dr. M. Hatam Fayaz, Ph.D., Islamic Azad University North Tehran, Tehran, Iran (2021-current), Consultant.
30. Dr. A.Khosronejad, Ph.D., Shiraz University of Medical Sciences, Shiraz, Iran (2021-current), Consultant.
31. Dr. M.Ekrampour, Ph.D., Shiraz University of Medical Sciences, Shiraz, Iran (2021-current), Consultant.

Teaching Experiences

Lecturer and lab demonstrator for more than 100 undergraduate and postgraduate students.

Instrumental Analysis (B. Sc.) / Department of Chemistry Shahid Bahonar, University of Kerman.

Analytical Chemistry (B. Sc.) / Department of the Chemistry Shahid Bahonar, University of Kerman.

General Chemistry (B. Sc.) / Department of the Chemistry, Shahid Bahonar University of Kerman.

Tutoring in Chemistry and English for diploma students (September 2005 – Present).

Gas Chromatography workshop, Shiraz University of Medical Sciences, Shiraz, Iran.

Mass spectrometry workshop, Shiraz University of Medical Sciences, Shiraz, Iran.

Laboratory animal models, Shiraz University of Medical Sciences, Shiraz, Iran.

NMR workshop, Shiraz University of Medical Sciences, Shiraz, Iran.

Selected Conference Publication and Presentation

1. K. Zomorodian, AA. Monfared, S. Mousavi, **A. Iraj**, Mehrabani D, Moein M, editors. Determining the chemical composition and antifungal activities of aromatic water of *Trachyspermum ammi*: OXFORD UNIV PRESS GREAT CLARENDON ST, OXFORD OX2 6DP, ENGLAND. . MEDICAL MYCOLOGY; UK, 2018
2. **A. Iraj**, Mehdi. Khoshnevis zadeh, Omid.R. firuzi, Ramin. Miri, Sara Ranjbar, Ommolbanin Shahraki, Small molecule inhibitors of BACE-1 as novel Anti- Alzheimer agents Molecule modification of Acylguanidine, Conference on organic synthesis and pharmaceutical chemistry, 2016.
3. **A. Iraj**, N. Edraki, O. Firuzi, Y. Fattahi, M. Mahdavi, A. Foroumadi, M. Khoshneviszadeh, R. Miri. "2-Imino 2H-Chromene and 2-(Phenylimino) 2H-Chromene 3-aryl carboxamide Derivatives as Novel Cytotoxic



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- Agents: Synthesis, Biological Assay and Molecular Docking Study” Conference on the Pharmaceutical sciences, 2015.
4. M. Mohammadabadi, **A. Iraj**, N. Edraki, A. Sakhteman, M. Khoshneviszadeh. “Discovery of Novel Natural-Product-Derived Inhibitors of Dipeptidyl peptidase-IV (DPP-IV) using Virtual Screening” Conference on Iranian Pharmacy Students Seminar, 2015.
 5. **A. Iraj**, N. Edraki, O. Firuzi, Y. Fattahi, M. Mahdavi, A. Foroumadi, M. Khoshneviszadeh, R. Miri (2015). “2-Imino 2H-Chromene and 2-(Phenylimino) 2H-Chromene 3-aryl carboxamide Derivatives as Novel Cytotoxic Agents: Synthesis, Biological Assay and Molecular Docking Study” Conference on the Pharmaceutical sciences, 2015.
 6. A. Nakhkesh, M. Khoshneviszadeh, N. Edraki, R. Miri, O. Firuzi, **A. Iraj**, M. Kashefzadeh. "Synthesis and anticancer activity potential of 8-aryl-7H-acenaphtho[1,2-d]imidazole" 19th Iranian Pharmacy Students Seminar 6-9 October, 2015
 7. O. Shahraki, M. Khoshnevis Zadeh, R. Miri, S. Ranjbar, **A. Iraj**, Nanomedical solutions to overcome Multi-Drug Resistance (MDR), Conference on organic synthesis and pharmaceutical chemistry, 2014.
 8. **A. Iraj**, R. Miri, N. Edraki, A. Foroumadi, M. Khoshneviszadeh, O. Shahraki, and A. Shafiee. "Ugi Four-Component Reaction Directed Towards The Synthesis of Cyclohexyl Arylacetamide Derivatives of N-(5-bromo-2-(4-phenylpiperazine-1-yl)phenyl) Aryl carboxamide Scaffold as Novel Alzheimer's β -secretase inhibitors." Conference on the Pharmaceutical sciences, 2014.
 9. O. Shahraki, M. Khoshneviszadeh, R. Miri, N. Edraki, A. Foroumadi, **A. Iraj**, A. Shafiee. "Design, synthesis, biological evaluation and comparative Cox1 and Cox2 molecular docking study of novel 1,2,4-triazine derivatives." Conference on the Pharmaceutical sciences, 2014.
 10. **A. Iraj**, A., N. Edraki, M. Khoshneviszadeh, O. Firuzi, R. Miri, S. Ranjbar, and O. Shahraki "Small Molecule inhibitors of BACE-1 as novel Anti-Alzheimer agents Molecule modification of Acylguanidine." Conference on the Organic Synthesis and Pharmaceutical Chemistry, 2014.
 11. **A. Iraj**, N. Edraki, M. Khoshneviszadeh, O. Firuzi, R. Miri, and O. Shahraki (2015). "5-Aryl-1,3,4-thiadiazole Derivatives Bearing Different Amine substituted moieties as Novel BACE1 Inhibitors: Synthesis, BACE1 Inhibitory Assay, and Molecular Docking Study." Conference on the IPSC, 2015.
 12. S. Ranjbar, N. Edraki, M. Khoshneviszadeh, O. Firuzi, R. Miri, O. Shahraki, **A. Iraj** " Multi-Drug Resistant Reversal Agents: An Overview of Structure-Activity Relationship" Conference on the organic synthesis and pharmaceutical chemistry, 3, May 2014.
 13. **A. Iraj**, A. Mostafavi, D. Afzali, “Ultrasound-assisted solidification floating organic drop microextraction trace amounts of antimony prior to flame atomic absorption spectrometry”. 18th Iranian Seminar of Analytical Chemistry, University of Sistan and Baluchestan, Iran, 18-20, Mar 2011.
 14. **A. Iraj**, A. Mostafavi, D. Afzali, “Ligandless-dispersive liquid-liquid microextraction after ion pair formation trace amount of gold in water sample”. 17th Iranian Seminar of Analytical Chemistry, University of Kashan, Iran, 12-14, September 2010.

Award

- The prize as the best lab expert of High-Tech Laboratory Network, Iran, December 2018.
- The prize as the best laboratory member of Shiraz University of Medical Sciences, Shiraz, Iran, 2017.
- 19th Seminar of Iranian Pharmacy Students awarded the prize for the best oral presentation, Shiraz, Iran, 2015.
- 18th Seminar of Iranian Pharmacy Students, Awarded prize for the best presentation, Tabriz, Iran, 2014
- The prize for the best oral presentation at the conference on organic synthesis and pharmaceutical chemistry, Khuzestan, Iran 2013.



Advanced Biomolecular/Pharmaceutical/Analytical Expertise

- Nuclear Magnetic Resonance (NMR 1-Dimension, 2-Dimension)
- Gas chromatography-mass spectrometry- mass spectrometry (GC-Mass-Mass)
- Gas chromatography (GC)
- Mass spectrometry (Mass)
- Capillary Electrophoresis (CE)
- High-performance thin-layer chromatography (HPTLC)
- High-performance liquid chromatography (HPLC)
- Elemental analysis (CNHO-S)
- FT-IR spectroscopy
- Ultraviolet (UV) spectroscopy
- Atomic absorption spectroscopy (AAS)

Professional Experience and Interest

- Design and synthesis of biologically active molecules.
- Design, synthesis, and characterization of nanomaterials and, nanocomposites, used in biomedical applications to improve drug delivery systems.
- Development of polymer-based scaffolds to facilitate cellular growth and proliferation and subsequently regenerate the tissues/organs.
- Cell-based cytotoxicity evaluation using MTT reduction assay.
- Enzymatic activity investigation of Tyrosinase enzyme.
- Enzymatic activity investigation of the α -Glucosidase enzyme.
- Enzymatic activity evaluation of BACE1 enzyme using FRET assay.
- Cellular protection assay of beta-amyloid peptides on neuronal cell line (using cell-based assay).
- Enzymatic evaluation of acetylcholinesterase (AChE) and butyrylcholinesterase (BuChE) using modified Ellman assay.
- Bio-metal chelating effect using mole/ ration and job methods.
- Antioxidant activity assay.
- Determination of total phenolic content.
- Determination of total flavonoid content.
- Determination of pollutants and toxic materials.
- Isolation and identification of organic compounds.
- Different methods of extraction techniques including SPE, DLLME, and USAEME.
- Determination and preconcentration of trace amounts of metal ions in natural waters and standard biological samples.
- Determine the composition of essential oils and fatty acids using the GC-Mass instrument.
- Analyze the purity of samples with HPTLC and HPLC.
- Determination of heavy metal contents by atomic absorption and plasma.
- GC-MS based metabolite profiling of plant tissues.
- GC-MS based metabolite profiling of blood plasma.
- Evaluate the anti-fungal and anti-bacterial properties of compounds using standard CLSI methods.



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***In silico* Deep Learning and Machine Intelligence Skill**

- Virtual screening (ligand and structure-based)
- Molecular dynamic simulations
- Pharmacophore modeling
- Sub-structure search
- Target prediction and similarity search
- Docking of ligands on target proteins, using Autodock, Vina, GOLD, and Schrödinger softwares.
- Chemometrics and statistical methods e.g. MVC, MCR, and multivariate analysis
- Advanced SPSS
- Chem office including ChemDraw, and chem 3D

Research Skills of Laboratory Animal

- Ulcerative colitis.
- Mandible bone defect.
- Osteoarthritis.
- Cartilage damage in the knee.
- Different kinds of wounds in rats and evaluating different treatments.