

Name: Zahra Aminibayat

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Present position:

Head of Medical and Pharmaceutical Biotechnology Research Group

Assistant Professor in Department of Biotechnology, Iranian Research Organization for Science and Technology, Tehran, Iran (2013-present)

Educations

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| 1994-1998 | High School student majoring in BioSciences in Farzanegan High School in tehran, Iran. This school is under the supervision of the NODET - national Organization for Development of Exceptional Talents. |
| 1998-2002 | Student of B.Sc. in Molecular Cell Biology at Department of Biology, Faculty of Science, University of Tehran. |
| 2003-2006 | Student of M.Sc. in Biochemistry at Department of Biology, Faculty of Science, TarbiatModares University, Tehran, Iran. My Thesis research was “Designing of chemiluminescence- enzyme immunoassay method for determination of aflatoxin-B1” . |
| 2006-2011 | Student of Ph.D. in Biochemistry at Department of Biology, Faculty of Science, TarbiatModares University, Tehran, Iran. My thesis research was “The study of thermostability of modified firefly luciferase due to saturation and site-directed mutagenesis” . |

Research interests:

- Protein engineering
- Recombinant protein (enzyme, vaccine, hormone) production in different host such as *E.Coli*, plant, *chlamydomonasreinhardtii*, mammalian cells, *leishmania tarentplae*.
- Protein structure and evolution
- Directed evolution of enzymes and proteins
- Biosensors
- Design, expression and evaluation of vaccines
- Engineering of endolysins to combat antibiotic resistant bacteria
- Wound healing
- Drug delivery

Teaching experiences:

Bioseparation course, PhD students

Genetic engineering course, MSc students

Protein engineering course, MSc students

Bioinformatic course, MSc students

Advanced genetic engineering, PhD students

Application of genetic engineering in microbiology, PhD students

Biochemistry lab2, BSc students

General biochemistry lab, BSc students

Ecology course, BSc students

Immunoassay workshop

Research experiences:

Previous projects:

1. Design and production of a biosensor for detection of caspase 3/7 activity. Cheraghi, R., **Aminibayat , Z.**, Hosseinkhani , S., TarbiatModares University, Tehran, Iran.
2. Protein engineering using site-directed and site-saturation mutagenesis for increasing luciferase thermostability. **Aminibayat , Z.**, Hosseinkhani , S., TarbiatModares University, Tehran, Iran.
3. Design and production of chemiluminescence ELISA kit for HCV diagnostic. **Aminibayat ,**

- Z.,**Hosseinkhani , S.,bayanolhagh,S.,DynaBioTech Company, Tehran, Iran.
4. Design and set up of chemiluminescence- enzyme immunoassay method for determination of aflatoxin-B1. **Aminibayat , Z.,**Hosseinkhani , S., bayanolhagh, S.,DynaBioTech Company, Tehran, Iran.
 5. Design and production of chemiluminescence ELISA kit for HBV diagnostic.**Aminibayat , Z.,**Hosseinkhani , S.,bayanolhagh,S.,DynaBioTech Company, Tehran, Iran.
 6. Set up of HCG assay kit.**Aminibayat , Z.,** Moghimi, S., bayanolhagh, S. samantajhiznoor company
 7. Set up of T3 and T4 assay kit.**Aminibayat, Z.,** Moghimi, S., bayanolhagh, S.
 8. Collaboration in “production of recombinant nerve growth factor (NGF) in plant” project. Ofoghi, H.,Aminibayat , Z.
 9. Collaboration in “ production of recombinant human calcitonin in *chlamydomonas reinhardtii*”project. Ofoghi, H.,Aminibayat , Z.
 10. Executive of “Cloning, expression and purification of creatinase enzyme” project.
 11. Executive of “production of recombinant Creatininase enzyme in E.Coli” project.
 12. Executive of “Cloning, expression and purification of sarcosine oxidase enzyme” project.
 13. Executive of " investigation of recombinant human Follicle-stimulating hormone (FSH) production in *leishmania tarentolae* "
 14. Collaboration in " Design, cloning and expression of recombinant pharmaceutical triparatide peptide in E.Coli" project.
 15. Collaboration in “Determination of Antibiotic Resistance Pattern of Group B Streptococcus and its Resistance Genes in Pregnant Women Referred to Sarem Hospital” project.
 16. Collaboration in “Optimization of Teriparatide recombinant fusion protein expression in *E.coli* in fermenter” project.
 - 17.Executive of “Investigating the effect of foreign helper antigen on the immune response rate against polyepitopic HPV16 E6 vaccine” founded by international scientific cooperation center of ministry of science, research and technology of Iran.

Current projects:

1. Executive of “ Evaluation efficiency of immunogenic epitopes of the E6 and E7 antigens of human papillomavirus type 16 as a therapeutic vaccine in the experimental model of tumor induced by transgenic TC-1 line” that is awarded by Iranian national cancer control foundation and selected as the best candidate project of this foundation.
2. Executive of “Protein engineering to create novel chimeric endolysin to combat antibiotic resistant-*Staphylococcus aureus* “
3. Characterization and evaluation of the antimicrobial activity of chimeric endolysin CHAP_k-SH3b against methicillin-resistant *Staphylococcus aureus* in vitro and in vivo
4. Investigating the synergism between chimeric MSC endolysin and antibiotics against *staphylococcus aureus*

Publication:

Book:

Methods of Soluble protein production (Persian), Zahra Amini-Bayat, Shabnam shamriz, 2015.

Translation:

- 1) Biosimilars and interchangeable Biologics: Tactical Elements
- 2) Therapeutic Enzymes: Function and Clinical Implications

Patent:

Development of a novel multi-epitopes construct of HPV16-E7 as a therapeutic-prevention vaccine (MEVE7) for cervical cancer with long-term efficacy and inducing immunity against other HPV variants.

طراحی و ساخت یک سازه چند پلی اپی توپی نوین HPV16-E7 به عنوان واکسن درمانی-پیشگیری سرطان دهانه رحم با قابلیت اثربخشی طولانی مدت و القای ایمنی بر علیه سایر واریانتهای HPV
مالکان: زهرا امینی بیات، امیرحسن زرنانی، بهاره بهمنی، بنیاد غیر دولتی نیکوکاری پایش سرطان

Papers:

S. Momen, N. Soleimani, F. Azizmohseni, Y. Ahmadbeigi, S. Borhani and **Z. Amini-Bayat***, Characterization and bioinformatic analysis of a new chimeric endolysin against MRSA with great stability, *AMB Express* (2024) 14:143.

B. Bahmani, **Z. Amini-Bayat***, M. M.i Ranjbar, **M. Hassanzadeh Makoui**, AH. Zarnani, Development and Evaluation of a Novel E7 Multi-Epitopic Vaccine for Human Papillomavirus Type 16: Design, Expression, Purification, and Immunological Characterization, *BMC Infectious Diseases*, 2023, accepted.

B. Bahmani, **Z. Amini-bayat***, M. Mehdi Ranjbar, M. R.Masjedi, A.H. Zarnani, An immunoinformatic approach for a therapeutic epitope-based peptide vaccine design by targeting HPV16-E6: *in silico* study, *Microbial Metabolites and Technology*, 2021, 4, 49-64.

M. E. Madadi, **Z. Amini-Bayat***, B. Bahmani, N. Tafreshi, N. Mousavi Niri, M. Hashemi, Cloning and Expression of New Polytope E6 Antigen of Human Papillomavirus in *E. coli*, *Biomacromolecular Journal*. Accept Date: 24 December 2021.

B. Bahmani, **Z. Amini-Bayat***, M. M.i Ranjbar , N. Bakhtiari, AH. Zarnani, Production of recombinant polyepitopic HPV16-E6 antigen: the effect of various strains and expression

conditions, Biological Journal of Microorganism, 2022, 43, 31-44, [10.22108/bjm.2021.130943.1420](https://doi.org/10.22108/bjm.2021.130943.1420).

B. Bahmani, **Z. Amini-Bayat***, M. M.i Ranjbar , N. Bakhtiari, AH. Zarnani, HPV16-E7 Protein T Cell Epitope Prediction and Global Therapeutic Peptide Vaccine Design Based on Human Leukocyte Antigen Frequency: An In-Silico Study, international journal of peptide research and therapeutics, published online 27 june 2020, DOI: 10.1007/s10989-020-10089-5.

S. Kakhki, A. Arabgari, **Z. Amini-Bayat ***, B. Kazemi, Leishmania as an Expression System for the Human Follicle-Stimulating Hormone. Iranian Journal of Science and Technology, Transactions A: Science, 2019, Volume OnlineFirst – Aug 28

M. Zangi, **Z. Amini-Bayat**, P. Ehsani, H. Ofoghi*, Replication of pgR107 binary Ti vector without pSoup helper plasmid in disarmed *Agrobacterium tumefaciens* LBA4404. Health Biotechnology and Biopharma, 2019, 3(1): 19-28.

S. Abbaszadeh, N. Bakhtiari , **Z. Amini-Bayat**, Simple and Effective purification of Recombinant Peptide Drug, hPTH (1-34), Expressed in E. coli Host, International Journal of Peptide Research and Therapeutics, 2019, 25 (2), 419-425.

Z. Amini-Bayat*, N. Bakhtiari, Cloning, Expression and Purification of Creatininase From *Pseudomonas Pseudoalkaligene KF707* in *E. coli*. Biomacromolecular journal, 2017, 3(1), 75-82.

S. Abbaszadeh, N. bakhtiari*, **Z. Amini Bayat**, Effective solubilization and purification of recombinant teriparatide fusion protein expressed in *E. coli*, Modares Journal of Biotechnology, 2019 , 10 (1), 1-7.

H. Naghoosi, H. Ofoghi*, N. Moazami and **Z. Amini-bayat**, A Modified Colony PCR Method for Screening Recombinant Chlamydomonas reinhardtii, International Journal of Advanced Biotechnology and Research, 2017, 8, 992-995.

H. Naghoosi, H. Ofoghi*, N. Moazami and **Z. Amini-bayat**, Secretary expression of recombinant human calcitonin in microalgae *Chlamydomonas reinhardtii*, modares journal of biotechnology, 2019, 10(1): 29-35.

E. Afshari, **Z. Amini-bayat***, S. hosseinkhani, N. Bakhtiari: Cloning, expression and purification of *pseudomonas putida ATCC12633* Creatinase. Avicenna Journal of Medical Biotechnology. 2017, 9, 169-175.

M. Ghanbari Motlagh, **Z. Amini-Bayat***, H. Ofoghi*, Investigation of an optimized context for expression of GFP as a model protein in Chlamydomonas Reinhardtii, Biomacromolecular journal, 2016, 2, 135-142.

M. Zangi, H. Ofoghi*, **Z. Amini-Bayat** and P. Ehsani. Utility of P19 Gene-Silencing Suppressor for High Level Expression of Recombinant Human Therapeutic Proteins in Plant Cells. *Research in Molecular Medicine*. 2016, 4 (3), 35-40.

S. Shamriz; H. Ofoghi; **Z. Amini-Bayat**, Soluble Expression of Recombinant Nerve Growth Factor in Cytoplasm of E. coli, *Iranian journal of biotechnology*. 14 (1), 2016, 16-22 . DOI: [10.15171/ijb.1331](https://doi.org/10.15171/ijb.1331).

N. Bakhtiari *, **Z. Amini-Bayat**, S. sagharidouz, and M. Vaez. Overexpression of Recombinant Human Teriparatide, rhPTH (1-34) in Escherichia coli (E. coli) : an Innovative Gene Fusion Approach, *Avicenna Journal of Medical Biotechnology*. 9(1), 2017, 19-22.

Z. Amini-Bayat, S. Hosseinkhani*, R. Jafari, K. Khajeh, Relationship between stability and flexibility in the most flexible region of *Photinus pyralis* luciferase, *Biochimica et Biophysica Acta, proteins and proteomics* 1824 (2012) 350–358.

R. Cheraghi, S. Hosseinkhani*, J. Davoodi, M. Nazari, **Z. Amini-Bayat**, H. Karimi, M. Shamseddin, F. Gheidari, Structural and functional effects of circular permutation on firefly luciferase: Invitro assay of caspase3/7, *International Journal of Biological Macromolecules*, 2013, 58, 336– 342.

Z. Aminibayat*, M. Nazari, S. Hosseinkhani, The effect of amino acid substitution of pro 473 on thermostability and structural properties of firefly luciferase, *JICS, 10th Iranian Congress of Biochemistry & 3rd International Congress of Biochemistry and Molecular Biology proceeding*, S93.

M. Nazari*, S. Hosseinkhani, **Z. Aminibayat**, Random mutagenesis for protein breeding of firefly luciferase, *JICS, 10th Iranian Congress of Biochemistry & 3rd International Congress of Biochemistry and Molecular Biology proceeding*, S168.

R. Cheraghi, S. Hosseinkhani*, J. Davoodi, **Z. Aminibayat**, Circular permuted luciferase, *JICS, 9th Iran Biophysical Chemistry Conference*, A44-45.

International workshops:

International Training Course on industrial synthetic biotechnology, Tianjin Institute of Industrial Biotechnology (TIB), Chinese Academy of Science (CAS), Tianjin, China, 2019, October14-November2.

Metabolic Engineering Summit, International Metabolic Engineering Society, Tianjin Institute of Industrial Biotechnology (CAS), Tianjin, China, 2019, 20-22 October.

Selected Conference presentation and posters:

“The effect of E6 toxic protein expression in the growth rate of three strains of *E.coli*”, The 2th international congress of biomedicine, Iran, Tehran, 2018.

“Optimization of Recombinant HPV 16-E6 Protein Expression in *E. coli*”, The 4th international biotechnology congress, Iran, Tehran, 2019.

"Development of Aflatoxin B1 measurement by Chemiluminescence enzyme immunoassay"
The 4th national biotechnology congress, Islamic Republic of Iran , Kerman, Aug 2005.

"Development of a chemiluminescence-ELISA assay for the detection of antibodies against HCV antigens", The 5th national biotechnology congress, Islamic Republic of Iran,Tehran , 2007.

“The effect of amino acid substitution of proline473 on thermostability and structural properties of firefly luciferase”, The 10th national biochemistry congress and 3th international biochemistry and molecular biology congress, Islamic Republic of Iran, Tehran university , 2009

“Random mutagenesis for protein breeding of firefly luciferase”,The 10th national biochemistry congress and 3th international biochemistry and molecular biology congress, Islamic Republic of Iran , Tehran university , 2009.

“Circular permuted luciferase“, The 9th biochemistry and biophysics congress, Islamic Republic of Iran, Tehran, TarbiatModares University.

“ The effect of mutagenesis of amino acids with different B-factor on luciferase thermostability”
The 16th national and 4th international biology conference, Islamic Republic of Iran, Mashhad, 2010.

Participation in The 1th international molecular thechnology conference with collaboration of the international cell death society, Iran, Tehran,shahid beheshti university.

“*In-silico* modification of *clamydomonas reinhardtii* signal peptide for optimized heterologous expression/ secretion”, The 5th bioinformatic congress, Iran, Tehran university, IBB.

"Cloning of recombinant nerve growth factor in PVX viral vector", First International and 13th Iranian Genetics Congress, Iran, Tehran, Shahid Beheshti University.

"Cloning and expression of nerve growth factor in *E.Coli*", First International and 13th Iranian Genetics Congress, Iran, Tehran, Shahid Beheshti University.

"Design and synthesis of recombinant human calcitonin expression construct in *chlamydomonas reinhardtii microalgae*", First International and 13th Iranian Genetics Congress, Iran, Tehran, Shahid Beheshti University.

"Cloning and transformation of GFP gene into nucleos of *chlamydomonas reinhardtii*", First International and 13th Iranian Genetics Congress, Iran, Tehran, Shahid Beheshti University.

Honors and Awards

1998	Ranked 368th in the Iranian National Universities Entrance Exam among almost 400,000 participants in Biosciences Major.
2020	Winner of the fund of Belt & Road Fellowship Program (250.000 RMB/year) as visiting scientist.
2022	Winner of TWAS- UNESCO associateship award

SKILLS

Basic computer skills: Windows, Microsoft Word, Powerpoint , excel, Photoshop,

Biochemistry techniques: chromatography, Gel filtration, Ion exchange chromatography, affinity chromatography, chromatofocusing, two dimensional electrophoresis, conjugation processes, protein electrophoresis, protein stabilization, protein determination with different approach of coomassie blue, silver nitrate staining and other approach, determination of enzyme kinetic parameters (Km, Vmax,...), protein structure analysis (fluorescence, circular dichroism,...), protein refolding, protein interaction analysis, western blot.

Sequence Analysis Softwares: Vector NTI software, DNASTar package, primer design, gene optimization for increasing protein expression (LETO,...)

Molecular biology techniques: different types of PCR techniques (SOE PCR...), Gel electrophoresis of DNA, DNA extraction from different cell types, cloning, transformation, protein expression(all step needed for recombinant protein production), Site-directed and site-saturation mutagenesis, library screening.

Bioinformaticsoftwares: Different databases of protein and nucleic acid, spdbv (swisspdb viewer), DS visualiser ,homology modeling,protein stability prediction, protein flexibility investigation , BLAST,....

Immunology techniques: set up ELISA and Chemiluminescence ELISA tests (optimizing all condition (Ab and Antigen concentration, blocking, standard solution preparation ,...), Immunoprecipitation, Dot blotting, western blotting.

Microbiology techniques: TRA, Plate lysis, MIC, MBC, Antimicrobial assays

Supervisor and advisor of Seven MSc and six PhD students in biotechnology, biochemistry and microbiology fields.

Professional Services

Scientific committees member of International khawarizmi award.

Scientific reports (nature) Guest Reviewer.

Revista Mexicana de Ingeniería Química Guest Reviewer.

Biologia Pakistan Reviewer.

Advances in environmental technology Guest Reviewer.

Biomacromolecular Journal Reviewer.

Iranian patents Referee.

Other Activities:

Submit of different genes to genbank database.

Set up of biochemistry lab in Islamic Azad University of pharmaceutical sciences.