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Areas of expertise

- **Electronic interpretation of cancer cell metabolism and electrical analysis of cancer biology**
- **Electro–Onco–Surgery**
- **Design and development of cancer diagnosis and treatment devices**

Work experience and executive activities

- **Director, Nano Bio-Electronic Devices Laboratory, University of Tehran**
- **Dean, Cancer Electrotechnics Research Center (a joint center of the University of Tehran and Tehran University of Medical Sciences)**
- **Director, Scientific Pole for Silicon Nano-Device Fabrication**
- **Full member, Health Commission of the Supreme Council of the Cultural Revolution**
- **Full member, Academy of Sciences**
- **Member, Examination Design Committee for the Surgical Fellowship Program, Shahid Beheshti University of Medical Sciences**

Activities within and beyond the academic community

- Recipient of the Mustafa Prize (PBUH) in 2019 for the electronic translation of cancer cell metabolism
- Holder of 49 U.S. patents, including 21 granted patents and 28 published patents

- Adjunct faculty member at Tehran University of Medical Sciences since 2015 (2015–2020, Faculty of Pharmacy, Pharmaceutics Department; 2020–2024, Research Center for Advanced Medical Technologies; 2024–2028, Cancer Institute)
- Author of numerous publications in leading journals, including Nature Communications, Nano Energy, Cancer Medicine, International Journal of Surgery, Biosensors and Bioelectronics, Advanced Healthcare Materials, and others
- Developer of the CDP system for the first time in the world as an Iranian technology in cancer surgery, which—according to reports—has improved the intraoperative detection of positive margins in breast cancer surgery by 30% over three years
- Founder of the field of Cancer Electronics research in Iran
- Founder of the first Cancer Electrotechnics Research Center jointly between the University of Tehran and Tehran University of Medical Sciences
- Principal Investigator of 21 clinical trial research projects based on technologies developed by myself at Tehran University of Medical Sciences and Shahid Beheshti University of Medical Sciences since 2015
- Responsible for establishing technology-enhanced surgical operating rooms for cancer surgery at the Cancer Institute of Imam Hospital
- Published the first fully Iranian paper in Nature Communications in 2017
- Published the first wholly Iranian research article (not a clinical trial) in the International Journal of Surgery, the world's second-ranked surgery journal, in 2022
- Reviewer for SNSF (Swiss National Science Foundation)
- Guest editor of special issues for the journals Diagnostics and Technology in Cancer Research & Treatment
- Recipient of multiple awards, including: IEEE Prize (2016), WIPO Top Inventor Award (2016), Best PhD Dissertation (2017), Razi Festival Laureate (2024), Khwarizmi International Award Laureate (2024), Avicenna Award (2014), Top Nanotechnology Researcher (2019), National Outstanding Researcher (2020), National Distinguished Technologist (2022), Outstanding Young Electrical Engineer, Academy of Sciences (2018), Special Research Achievement Award, University of Tehran (2018), International Achievement Award for Faculty Members (2018, 2022), Distinguished Researcher of the Cancer Research Center, Shahid Beheshti University of Medical Sciences (2021), and others
- Supervision of students whose dissertations were selected as the Best PhD Dissertation of the University of Tehran (2022 and 2023) and Best Master's Thesis (2023)
- Founder and instructor of the Nano Bioelectronics course—the first of its kind in Iran—taught since 2014 with four subsequent updates
- Designer and developer of the first Iranian medical technology holding an IMED license (Permit No. 23212882, Tariff Code 100747, Letter No. 7576/ه ۶۲۴۵۳ ن) in the field of cancer surgery
- Additional developed systems include:
    - ITDS (Impedimetric Tumor Detection System) for detecting breast borderline tumors during radiology
    - PECT (Positive Electrostatic Therapy) for treating solid tumors using positive electrostatic charge
    - TN-IMS for intraoperative thyroid cancer diagnostics using electrical impedance spectroscopy
    - ELS, a diagnostic device for detecting metastatic lymph nodes

- Developer of the RDSS system for assessing pulmonary inflammation during the COVID-19 pandemic, licensed under IMED Code 40970506
- Provided services to more than 1,000 patients using the CDP system for intraoperative detection of positive surgical margins in breast cancer operations
- Provided clinical services to cancer patients using the ECT system, implemented nationwide for the first time in 2022
- Founder of three knowledge-based (deep-tech) companies, employing more than 50 graduates and students from the University of Tehran over the past 8 years (since 2016)

Scientific activities

- **Papers**

- Vacuum-assisted Electrochemotherapy: A Promising Secure Method for Intraoperative Cavity Site Margin Therapy. Abadijoo Hamed, Rostami Pouria Farshid, Manoochehri Navid, Hasanloo Majid, Khayamian Mohammad Ali, Simaee Hossein, Bashiri Mostafa, Yazdan Parast Seyed Mojtaba, Miri Seyed Rouhollah, Mahmoodzadeh Habibollah, Abdolahad Mohammad (2025)., SENSORS AND ACTUATORS A-PHYSICAL, 395(-), 117016.

- Tumor-Draining Lymph Node-Targeted Electrochemotherapy: A Hypothesis for In Situ Cancer Vaccination. Mahdavi Reihane, Ataie Husain, Abdollahian Dehkordi Amirparsa, Shabani Mahdi, Hemati Azam, Abdolahad Mohammad (2025)., Biomedicines, 13(11), 2746.

- Wearable silicon nanowire biosensor for real-time detection of cancerous tumor margins based on electro metabolomics. Ghelichli Alireza, Mousaviarya Zahra Sadat, Ghorbani Mohammad Ehsan, Manoochehri Navid, Abadijoo Hamed, Yazdan Parast Seyed Mojtaba, Mousavi-Kiasari Seyyed Mohammad Ghasem, Fakheri Mohammad Saleh, Moharamipour Shima, Abdolahad Mohammad (2025)., SENSORS AND ACTUATORS B-CHEMICAL, 443(-), 138218.

- Design and fabrication of core satellite self-assembled magneto hybrid nanostructure based on IONP/GNP/antiHER-2 for targeted breast Cancer treatment. Tavakolikia Fatemeh, Mirzapoor Aboulfazl, Abdolahad Mohammad (2025)., Results in Chemistry, 17(-), 102541.

- Probability of Tumor Lysis Syndrome in Electrochemotherapy of Large Solid Tumors: A Pilot Study. Larijani Amiradel, Yazdan Parast Seyed Mojtaba, Rostami Pouria Farshid, Manoochehri Navid,

Bayat Mahdis, Mansouri Sama, Sharghi Nasim, Mansouri Sepideh, Nabavian Omid, Memari Fereidoon, Mahmoodzadeh Habibollah, Miri Seyed Rouhollah, Abdolahad Mohammad (2025)., EUROPEAN JOURNAL OF CANCER CARE, 2025(-).

- Enhancing breast cancer diagnosis through machine learning algorithms. Amraei Javad, Mirzapour Aboulfazl, Motarjem Kiomars, Abdolahad Mohammad (2025)., Scientific Reports, 15(-).

- Electrochemotherapy for Recurrence and/or Metastatic Skin Cancers: A Prospective Case Series in Iran. Yazdan Parast Seyed Mojtaba, Mansouri Sepideh, Rostami Pouria Farshid, Manoochehri Navid, Namakin Kosar, Naserghandi Alvand, Miri Seyed Rouhollah, Mahmoodzadeh Habibollah, Nabavian Omid, Zaresharifi Shirin, Abdolahad Mohammad (2025)., TECHNOLOGY IN CANCER RESEARCH & TREATMENT, 24(-).

- Advancing Upper Gastrointestinal Cancer Detection: A Single-Center Pilot Study Exploring the Potential of Electrical Impedance Spectroscopy in Endoscopic Procedures. Mokhtari Dowlatabad Hadi, Mahdavi Reihane, Miri Seyed Rouhollah, Fattahi Mohammad Reza, Ataie Hosen, Yousefpour Narges, Manoochehri Navid, Taslimi Reza, Abdolahad Mohammad (2025)., DIGESTIVE DISEASES AND SCIENCES, -(-).

- Impedance-based detection of cervical lymph-node involvement in thyroid cancer patients: a human model study. Ataie Hosen, Seraj Mohammad, Mahdavi Reihane, Fardoost Ali, Shafiee Abdollah, Shamsi Khosro, Fattahi Mohammad Reza, Ebrahiminik Hojat, Hoseinpour Parisa, Sane Shahram, Ghazimoghaddam Mehran, Akbari Mohammad Esmaeil, Abdolahad Mohammad (2025)., SURGERY TODAY, -(-).

- Evaluation of the Concordance of Cancer Diagnostic Probe Findings During Surgery and Suspected Distortion in Pre-surgical Mammography Based on Pathology. Delshad Belal, Abdolahad Mohammad, Aghasi Maryam, Hosseinpour Parisa, Zojaji Kohan Fatemeh, Akbari Mohammad Esmaeil (2025)., Indian Journal of Surgical Oncology, -(-).

- From resting potential to dynamics: advances in membrane voltage indicators and imaging techniques. Shakibi Reyhaneh, Yazdipour Fatemeh, Abadijoo Hamed, Manoochehri Navid, Rostami Pouria Farshid, Bajooli Taraneh, Simaee Hossein, Abdolmaleki Parviz, Khatibi Ali, Abdolahad Mohammad, Moosavi Movahhedi Ali Akbar, Khayamian Mohammad Ali

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- Real-time Monitoring of Peripheral Blood After Electrochemical Therapy by Electrical Impedance Spectroscopy: A Clinical Trial Study. Aghaei Faeze, Delshad Belal, Mahdavi Reihane, Fardoost Ali, Hajighasemi Farzane, Ataie Hosen, Yousefpour Narges, Abbasvandi Fereshteh, Miripour Zohre Sadat, Abdolahad Mohammad, Akbari Mohammad Esmaeil (2024)., International Journal of Cancer Management, 17(1).

- Intra Operative Mild Cooling of Large Tumors Reduces Their Invasive and Metastatic Functions While Increasing Their Resistance to Apoptosis. Tavassoli Noureddin, Ghahremani Alireza, Namakin Kosar, Naserghandi Alvand, Miri Seyed Rouhollah, Abdolahad Mohammad (2024)., Therapeutic Hypothermia and Temperature Management, 14(4), 290-298.

- Clinical validation on role of cancer diagnostic probe in detecting the involved cavity margins missed in permanent pathology of tumor side in breast cancer surgery. Abbasvandi Fereshteh, Miripour Zohre Sadat, Bayat Mahdis, Mousavi-Kiasary Seyed Mohamad Sadegh, Shayanfar Samira, Shojaeian Fatemeh, Aghaei Faezeh, Jahanbakhsh Fahimeh, Abbasvandi Niloofar, Omranihashemi Maryam, Akbari Atieh, Yousefi Morteza, Hadizadeh Mohammad, Shahrabi Farahani Naiemeh, Hosseinpoor Parisa, Parniani Mohammad, Nourinjad Zeinab, Abdolahad Mohammad, Akbari Mohammad Esmaeil (2024)., Diagnostic Pathology, 19(-).

- Breast cancer diagnostics by the intelligent analysis of white blood cells' interaction with target cancer cells using convolutional neural networks. Khayamian Mohammad Ali, Salemizadeh-Parizi Mohammad, vanai shohreh, Ghaderinia Mohammadreza, abadijoo hamed, Shalile Shahriyar, Saghafi Mohammad, Simaee Hossein, Abbasvandi Fereshteh, Akbari Navid, Karimi Arash, Sanati Hassan, Sarrami-Forooshani Ramin, Abdolahad Mohammad (2024)., MICROCHEMICAL JOURNAL, 205(-), 111344.

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Seyed, Abdolahad Mohammad (2024)., Journal of Clinical Medicine, 13(19), 5823.

- The presence of cancer-associated fibroblast in breast cavity side margins is in correlation with the expression of oncoproteins by adjacent epithelial cells: a new era in cancerous potential. Miripour Zohre Sadat, Aminifar Mina, Hoseinpour Parisa, Abbasvandi Fereshteh, Karimi Koosha, Ghahremani Alireza, Parniani Mohammad, Ghaderinia Mohammadreza, Makiyan Farideh, Aghaee Parisa, Akbari Mohammad Esmaeil, Abdolahad Mohammad (2024)., JOURNAL OF CANCER RESEARCH AND CLINICAL ONCOLOGY, 150(9).

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- Electrical lymph node scanning (ELS) system for real-time intra-operative detection of involved axillary lymph nodes in adjuvant breast cancer patients. Abbasvandi Fereshteh, Mahdavi Reihane, Bayat Mahdis, Hajighasemi Farzane, Jahanbakhsh Fahimeh, Aghaei Faezeh, Sami Nafiseh, Khoundabi Batoul, Ataie Hosen, Yousefpour Narges, hoseinpour Parisa, Mousavi Kiasary Seyed Mohamad Sadegh, Omrani Hashemi Maryam, Shojaeian Fatemeh, Akbari Atieh, Bagherhosseini Najmeh, Moradi Afshin, Akbari Mohammad Esmaeil, Abdolahad Mohammad (2024)., Scientific Reports, -(1).

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Reza, Sarrami-Forooshani Ramin, Abdolahad Mohammad (2023)., Nano Energy, 112(108510), 108510.

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- **Books**

The books Cancer Electronics and Electro-Metabolomics are currently in preparation (under authorship).

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- **1. Use of Electroporation Along the Tumor–Lymph Node Axis for Immune System Modulation and Stimulation and Evaluation of Its Effect on Tumor Progression and Immune Response**

Hossein Ataei, Mohammad Abdolahad, M.Sc., 2024-09-18

2. Feasibility Study of Using Electrical Stimulation to Increase Patient Blood Pressure During Severe Hypotension

Navid Manouchehri, Mohammad Abdolahad, M.Sc., 2024-09-17

3. Investigation of the Effects of Electroporation-Induced Electric Fields on Preventing Tumor Recurrence Using Conductive Surgical Sutures

Farshid Rostami Pouria, Mohammad Abdolahad, M.Sc., 2024-09-17

4. Feasibility of 3D Filtering of Malignant Cells from Adjacent Cells in Cytology Samples with Different Viscosities Using Electric Fields (Electrophoresis/Dielectrophoresis) for Diagnostic and Therapeutic Applications

Shima Moharrami-Pour, Mohammad Abdolahad, Ph.D., 2024-02-17

5. Evaluation of Vacuum Therapy Effects on Regression and Elimination of Experimental Neoplastic Masses in Syrian Mice

Majid Hassanlou, Mohammad Abdolahad, M.Sc., 2023-11-21

6. Study of Cell-Free Culture Media Characteristics Using Electrochemical Techniques (CV and EIS Feasibility) and Correlation with Cell States for Cancer Diagnosis

Faegh Borborhoseinbeigi, Mohammad Abdolahad, Ph.D., 2023-09-30

7. Design and Fabrication of Targeted Polymeric Drug-Delivery Systems Under Electrostatic Fields for Treatment of Solid Tumors

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8. Investigation of Fe_3O_4 Nanoparticles Penetration into Healthy and Cancerous Mouse Tissues Using Electroporation (Electric Stabilization)

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14. Continuous Cancer Recurrence Monitoring Using Flexible Implantable Sensors

Yasin Karde-Lachin, Mohammad Abdolahad, M.Sc., 2021-09-20

15. Electrochemical Monitoring of Drug Effects on Cancer Cells Using Silicon Nanowire-Based Biosensors

Hani Sha'sha'ani, Mohammad Abdolahad, Ph.D., 2021-09-19

16. Effect of Time-Varying Electric Fields (TTF) on Suppressing Cytokine Storm and Preventing Excessive Immune Cell Activation in COVID-19-Related Pulmonary Inflammation

Hamed Abedijoo, Mohammad Abdolahad, M.Sc., 2021-09-19

17. Design and Fabrication of an Electroporation System for Therapeutic Applications and Drug Delivery into Superficial Tumors

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18. Effect of Signal-Reading Electrodes on Electrical Impedance Response of Healthy and Cancerous Tissues

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19. Monitoring Hypoxia–Glycolysis in Healthy and Cancerous Tissues for In-Vivo and In-Vitro Cancer Detection Using Integrated Nano-Electrical Sensors

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24. Effects of Electrostatic Force on Blood Cells and Circulating Cancer Cells

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25. Electromechanical Behavior of Healthy and Cancer Breast Cells Under Dielectrophoresis

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34. Nanoelectronic Biosensors for Detecting Cancer Cell Metastasis to Vascular Endothelial Layers

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36. Optical Biosensors Based on Plasmonic Properties of Metals

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46. Mechanical Stimulation of Cancer Cells Using Nanobiosensor Components

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47. Development of Silicon- and Carbon-Based Nano-Biosensors for Detecting Invasive Cancer Cells

Hani Sha'sha'ani, Mohammad Abdolahad, M.Sc., 2014-08-24

48. Application of Silicon Nanowires and Nanotubes in Biosensor Fabrication

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Patents

id	title
US-10591462-B2	Electrochemical method and device for detecting the effect of anticancer drugs
US-2016178613-A1	Electrical Cell-substrate Impedance Sensor (ECIS)
US-10845336-B2	Electrochemical approach for COVID-19 detection
US-2021231600-A1	Real-time and label free analyzer for in-vitro and in-vivo detecting the suspicious regions to cancer
WO-2017060784-A1	Isolation and detection of circulating tumor cells (ctcs)
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US-2022202305-A1	Preventing cytokine storm in covid-19 patients by suppressing clonal expansion in activated lymphocytes using alternating electric fields
US-2013102027-A1	Method for detecting cancer cells using vertically carbon nanotubes
US-2022015660-A1	Bioelectrical cancer diagnosis of margins of a freshly dissected cancerous tumor
US-2019001151-A1	Inducing internal apoptosis in malignant tumors by positive electrostatic charges
US-11986166-B2	Real-time diagnosis of cancer involved sentinel lymph nodes (SLNS) based on pH sensing
US-2020049641-A1	Electrochemical lipidomics for cancer diagnosis
US-12035962-B2	Inducing internal apoptosis in malignant tumors by positive electrostatic charges
US-2018313812-A1	METASTATIC CANCER DIAGNOSIS VIA DETECTING pH-DEPENDENT ACTIVATION OF AUTOPHAGY IN INVASIVE CANCER CELLS
US-2021022650-A1	Real-time and label-free approach for cancer diagnosis
WO-2019243902-A1	Electrochemical biosensor and method to monitor biological cells behavior in acidic conditions
US-2017350876-A1	Biosensor for single cell analysis
WO-2021214734-A1	Real-time and label free analyzer for in-vitro and in-vivo detection of the suspicious regions to cancer
US-2021001118-A1	Electrostatic drug delivery
US-2016356761-A1	Electrochemical approach for cancer detection
WO-2017195085-A1	Integrated methods and systems for electrical monitoring of cancer cells stimulated by electromagnetic waves
US-2018149652-A1	Electrical cell-substrate impedance sensor (ecis)

US-2021386330-A1	Real-time and label free analyzer for in-vitro and in-vivo detecting the suspicious regions to cancer
US-2025065027-A1	DEACTIVATION OF CIRCULATING TUMOR CELLS (CTCs) IN THE BLOODSTREAM BY ELECTROSTATIC STIMULATION OF THE PERIPHERAL BLOOD
US-12208189-B2	Deactivation of circulating tumor cells (CTCs) in the bloodstream by electrostatic stimulation of the peripheral blood
US-2022192583-A1	Detecting sentinel lymph nodes during surgery
US-2020393439-A1	Method and system for metastasis diagnosis and prognosis
WO-2022043740-A1	Method and system for metastasis diagnosis and prognosis
WO-2025125853-A1	Electroporation/electrochemotherapy of internal regions with low infected depth
US-2017269087-A1	Method and system for metastasis diagnosis and prognosis
EP-3634573-A1	Ultrasound-assisted electrochemical distinction of normal and cancerous cells
US-2022022946-A1	Electrochemical therapy of cancerous tumors based on intra-therapeutical impedance monitoring
WO-2025146568-A1	Electroporation/electrochemotherapy of hard to access sensitive regions
WO-2023094892-A2	Detection of lung inflammation based on glucose level in sputum sample
WO-2025046258-A1	Electroporation/electrochemotherapy of surgically sensitive regions
US-2022022771-A1	Electrical impedance spectroscopy for evaluation of excision-required suspicious masses
WO-2021214733-A1	Apparatus for in-vivo measuring of h 2o 2 oxidations
WO-2023209433-A1	Electrochemical therapy of cancer tumor with an external anode
WO-2022084969-A1	Electrochemical biosensing of cancer-involved lymph nodes
WO-2021214537-A1	An electrochemical approach for covid-19 detection
WO-2025219749-A1	Variable-distance finger probe for electrical stimulation of target cells
US-2023140879-A1	Electrochemical measuring of reactive oxygen species (ros) levels in peripheral blood to detect ratio of low-density neutrophils (ldns) to high-density neutrophils (hdns), suitable to alarm presence of cancer in suspicious cases
WO-2024116093-A1	Hydroelectric macro device for 3-dimensional analysis of electrophoretic and dielectrophoretic behavior of cancer cells
WO-2022053861-A1	An electromechanical approach for cancer detection
US-12085530-B2	Electromechanical approach for cancer detection
US-11536684-B2	Electrochemical method and device for detecting the effect of anticancer drugs
WO-2021181154-A1	An electrochemical method and device for detecting the effect of anticancer drugs