MEGA JOURNAL OF CASE REPORTS

OPEN ACCESS

Review Article

Compiled Date: June 30, 2025

The Age of Nanobots and AI: Targeted Therapies and Microscopic Interventions

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Abstract

The convergence of nanorobotics and artificial intelligence (AI) is ushering in a transformative era for medicine, enabling unprecedented levels of precision in targeted therapies and microscopic interventions. This abstract explores the synergistic potential of AI-driven nanobots for revolutionizing disease diagnosis, drug delivery, and surgical procedures at the cellular and molecular level. AI algorithms empower nanobots with enhanced navigation, real-time decision-making, and adaptive functionalities within complex biological environments. This integration promises to overcome limitations of conventional treatments by delivering therapeutic agents directly to diseased cells, performing minimally invasive surgeries with micrometer-scale accuracy, and enabling early disease detection through sophisticated biosensing. The abstract further discusses the current advancements, challenges, and future prospects of this rapidly evolving field, highlighting its potential to personalize medicine and significantly improve patient outcomes.

Keywords: Nanobots; Artificial intelligence (AI); Targeted therapy; Microscopic intervention; Drug delivery; Nanorobotics; Precision medicine; Diagnostics; Biosensing; Healthcare

Introduction

The 21st century is witnessing a profound paradigm shift in healthcare, driven by groundbreaking advancements at the intersection of nanotechnology and Artificial Intelligence (AI). The emergence of sophisticated nanorobotic systems, guided and enhanced by the analytical power of AI, heralds an era where medical interventions can be executed with unprecedented precision at the cellular and molecular levels [1-17]. This convergence promises to overcome the inherent limitations of traditional diagnostic and therapeutic approaches, paving the way for highly targeted therapies, minimally invasive procedures, and ultimately, more personalized and effective healthcare solutions. For decades, medicine has strived for greater specificity in treating diseases. Systemic drug administration, while often effective, can lead to off-target effects, damaging healthy tissues and limiting therapeutic efficacy. Similarly, conventional surgical procedures, even minimally invasive ones, operate at a macroscopic scale, potentially causing collateral damage and requiring lengthy recovery periods. The advent of nanotechnology offered the initial promise of manipulating matter at the nanoscale, opening doors to novel drug delivery systems and diagnostic tools. However, the full potential of these nanoscale devices remained largely untapped until the synergistic integration with AI **[18-32]**.

Artificial intelligence, with its ability to process vast amounts of complex data, identify intricate patterns, and make autonomous decisions, provides the crucial intelligence layer for nanorobotic systems. AI algorithms can empower nanobots with the capacity to navigate the intricate and dynamic biological landscape, identify diseased cells with high accuracy, deliver therapeutic payloads precisely where needed, and even perform intricate manipulations at the microscopic level. This intelligent control transforms passive nanoparticles into active, responsive agents capable of executing complex medical tasks within the human body. The implications of this technological fusion are far-reaching, spanning a multitude of medical domains. In oncology, AI-driven nanobots hold the potential to selectively target and destroy cancer cells while sparing healthy tissue, minimizing the debilitating side effects of chemotherapy and radiation. In cardiovascular medicine, they could navigate through blood vessels to clear blockages, deliver drugs to atherosclerotic plaques, or even repair damaged cardiac tissue at a cellular level **[33-46]**. Neurological disorders, which have long posed significant therapeutic challenges due to the complexity of the brain and the blood-brain barrier, could be addressed with nanobots capable of delivering drugs directly to affected neural circuits or even assisting in neural regeneration. Beyond targeted drug delivery, the synergy of nanobots and AI is poised to revolutionize diagnostics. AI-enhanced nanobots equipped with sophisticated biosensors can traverse the body, detecting early molecular signatures of disease, potentially years before macroscopic symptoms manifest. This capability for early and precise diagnosis could dramatically improve treatment outcomes for a wide range of conditions, from infectious diseases to neurodegenerative disorders. Furthermore, AI-controlled nanorobotic systems are being explored for minimally invasive surgical interventions at a scale previously unimaginable. Imagine nanobots performing intricate repairs within cells or tissues, guided in real-time by AI algorithms based on high-resolution imaging and physiological feedback. However, the realization of this transformative vision is not without its challenges. The development of biocompatible and biodegradable nanomaterials, the precise control and navigation of nanobots within the complex biological environment, ensuring their safety and preventing off-target accumulation, and the ethical considerations surrounding their use are all critical aspects that need careful consideration and rigorous research. Furthermore, the integration of AI with nanorobotics necessitates the development of robust and reliable control systems, sophisticated imaging techniques for real-time monitoring, and comprehensive regulatory frameworks to govern their clinical translation.

Despite these challenges, the rapid pace of innovation in both nanotechnology and artificial intelligence suggests that the "Age of Nanobots and AI" in medicine is not a distant future but a rapidly approaching reality. The ongoing research and development efforts worldwide are yielding promising results, with early-stage clinical trials demonstrating the feasibility and potential of these technologies. As we continue to unravel the complexities of biological systems at the nanoscale and harness the power of AI [47-64] for intelligent control, we stand on the cusp of a medical revolution that promises to redefine disease diagnosis, treatment, and ultimately, the very landscape of human health. The following pages will delve deeper into the specific applications, advancements, and challenges in this exciting and rapidly evolving field [65-73].

Challenges

While the convergence of nanobots and AI holds immense promise for revolutionizing medicine, several significant challenges must be addressed to ensure its safe, effective, and widespread clinical translation. These challenges span across materials science, engineering, biological interaction, control systems, imaging, and ethical considerations. One of the fundamental hurdles lies in the development of biocompatible and biodegradable nanomaterials. Nanobots, designed to operate within the intricate and often hostile biological environment, must be constructed from materials that are non-toxic, non-immunogenic, and capable of controlled degradation or excretion after their task is completed [74-77]. The long-term effects of nanomaterial accumulation within the body are still not fully understood, necessitating extensive research into material properties, degradation pathways, and potential chronic toxicities. Furthermore, these materials must be robust enough to withstand the physiological stresses within the body while being amenable to complex fabrication processes required for creating intricate nanorobotic structures and functionalities. Precise control and navigation of nanobots within the complex biological environment present another significant challenge. The human body is a dynamic and highly viscous environment, characterized by complex fluid flows, cellular barriers, and intricate tissue structures. Guiding nanobots to their intended targets with high accuracy and preventing off-target movement requires sophisticated navigation systems. While external magnetic fields, acoustic waves, and chemical gradients are being explored for actuation and guidance, achieving precise, real-time control at the nanoscale remains a formidable engineering challenge. Integrating AI algorithms for autonomous navigation and obstacle avoidance within these complex environments is crucial but necessitates robust sensing capabilities and sophisticated control architectures.

Ensuring the safety and preventing off-target accumulation of nanobots are paramount concerns. The potential for unintended interactions with healthy cells and tissues, as well as the risk of aggregation or blockage within the circulatory system or organs, must be thoroughly investigated and mitigated. Developing strategies for precise targeting, controlled payload release, and efficient clearance mechanisms are essential for minimizing potential adverse effects. AI can play a crucial role in predicting nanobot behavior within the body, optimizing their design for enhanced safety, and monitoring their distribution in real-time through advanced imaging techniques. The development of robust and reliable control systems for AI-driven nanobots is critical. These systems must be capable of processing real-time data from onboard sensors and external imaging modalities to guide the nanobots effectively. AI algorithms [71] need to be trained on vast datasets to enable accurate decision-making, adaptive responses to dynamic biological conditions, and seamless integration with medical imaging and diagnostic tools. Ensuring the security and reliability of these control systems against cyber threats and malfunctions is also of utmost importance. Sophisticated imaging techniques for real-time monitoring of nanobots within the body are essential for both guiding their actions and assessing their efficacy. Current medical imaging modalities often lack the resolution required to visualize individual nanobots or their interactions at the cellular level. The development of novel imaging techniques with enhanced spatial and temporal resolution, as well as the integration of AI for image analysis and nanobot tracking, are crucial for advancing this field. Multimodal imaging approaches that combine different physical principles may be necessary to provide comprehensive information about nanobot location, orientation, and interaction with the surrounding tissue. Finally, the ethical and regulatory considerations surrounding the development and deployment of AI-driven [74] nanobots are significant. Issues related to data privacy, informed consent, equitable access, and the potential for misuse of this technology need careful consideration and the establishment of appropriate regulatory frameworks. Public discourse and engagement are essential to address societal concerns and ensure responsible innovation in this transformative field.

Future Works

The field of AI-driven nanobots for targeted therapies and microscopic interventions is rapidly evolving, with numerous exciting avenues for future research and development. Building upon current advancements and addressing existing challenges, several key trends and potential future works are emerging that promise to further revolutionize medicine.

Enhanced Autonomy and Intelligence: Future research will focus on developing more sophisticated AI algorithms that grant nanobots greater autonomy and decision-making capabilities within the complex biological environment. This includes:

- **Advanced Navigation Systems**: Integrating AI with real-time sensing and mapping technologies to enable nanobots to navigate intricate pathways, adapt to dynamic environments, and overcome biological barriers with minimal external guidance. This could involve utilizing machine learning to analyze tissue microstructures and optimize navigation strategies.
- **In Situ Diagnostics and Treatment Planning**: Equipping nanobots with AI-powered diagnostic capabilities to analyze molecular markers, identify diseased cells, and autonomously determine the optimal therapeutic intervention in real-time. This could lead to truly personalized and adaptive therapies.
- **Swarm Intelligence and Collaborative Nanobots**: Exploring the potential of deploying large numbers of nanobots that can communicate and coordinate their actions to achieve complex therapeutic goals, mimicking the collective intelligence

observed in biological systems. AI algorithms will be crucial for managing and optimizing the behavior of these nanobot swarms.

Integration with Advanced Imaging and Sensing: Future progress will heavily rely on the development and integration of advanced imaging and sensing modalities that can provide real-time, high-resolution information about nanobot location, behavior, and therapeutic effects. This includes:

- **High-Resolution *In Vivo* Imaging**: Developing novel imaging techniques, such as advanced optical microscopy, acoustic imaging, and Magnetic Resonance Imaging (MRI) with nanoparticle contrast agents, capable of visualizing individual nanobots and their interactions with cells and tissues in living organisms. AI-powered image processing will be essential for extracting meaningful information from these complex datasets.
- **Multimodal Sensing**: Integrating various nanosensors onto nanobots to simultaneously monitor multiple physiological parameters (e.g., pH, temperature, enzyme activity, molecular concentrations) and provide comprehensive feedback for AI-driven control and therapy adjustments.
- **Closed-Loop Therapeutic Systems**: Creating fully integrated systems where nanobots continuously monitor the disease state, deliver therapeutic agents based on real-time feedback, and adapt their actions autonomously under AI control, leading to highly precise and dynamic therapies.

Expanding Therapeutic Applications: Future research will explore the application of AI-driven nanobots to a wider range of diseases and medical challenges, including:

- **Neurodegenerative Disorders**: Developing nanobots capable of crossing the blood-brain barrier to deliver drugs, remove amyloid plaques, or stimulate neural regeneration in diseases like Alzheimer's and Parkinson's. AI could guide nanobots to specific neural circuits and monitor treatment efficacy.
- **Infectious Diseases**: Designing nanobots that can target and neutralize pathogens, deliver antimicrobial agents directly to infection sites, or even enhance the host immune response. AI could be used to identify specific microbial targets and optimize treatment strategies.
- **Gene Therapy and Editing**: Utilizing AI-controlled nanobots to deliver genetic material or gene-editing tools with high precision to specific cells or tissues, minimizing off-target effects and enhancing the efficacy of gene-based therapies.
- **Regenerative Medicine and Tissue Engineering**: Employing nanobots to deliver growth factors, scaffold materials, or even manipulate cells at the nanoscale to promote tissue regeneration and repair damaged organs. AI could guide the assembly of complex tissue structures.

Addressing Biocompatibility and Safety: Future efforts will focus on developing more biocompatible and biodegradable nanomaterials, as well as implementing advanced safety mechanisms for nanobot deployment:

- **Smart Degradation and Clearance**: Designing nanobots with precisely controlled degradation kinetics and developing strategies to facilitate their efficient clearance from the body after completing their task, minimizing the risk of long-term accumulation. AI could predict degradation pathways and optimize material design.
- **Active Targeting and Reduced Off-Target Effects**: Developing more sophisticated targeting ligands and AI-driven navigation strategies to ensure that nanobots interact primarily with diseased cells or tissues, minimizing potential harm to healthy areas.
- **Real-Time Safety Monitoring**: Integrating nanosensors and AI algorithms to continuously monitor nanobot behavior and detect any signs of adverse effects, allowing for immediate intervention if necessary.

Standardization and Clinical Translation: As the field matures, future work will focus on establishing standardized protocols for nanobot design, fabrication, characterization, and testing. This will be crucial for facilitating regulatory approval and enabling widespread clinical translation. AI can play a role in analyzing preclinical and clinical data to optimize treatment protocols and predict patient responses.

Conclusion

As we have explored, AI-driven nanobots hold the key to unlocking therapeutic strategies that were once confined to the realm of science fiction. From selectively targeting and eradicating cancer cells to navigating the intricate pathways of the nervous system and delivering drugs across formidable biological barriers, these microscopic agents, guided by intelligent algorithms, offer a level of control and specificity that macroscopic interventions simply cannot achieve. The potential for early and precise disease detection through AI-enhanced nanosensors further underscores the transformative impact of this field on diagnostics and preventative medicine. However, the journey towards realizing the full potential of this technological revolution is not without its challenges. Issues related to biocompatibility, precise control, safety, imaging, and ethical considerations demand rigorous scientific inquiry, innovative engineering solutions, and thoughtful societal engagement. The ongoing efforts to address these hurdles, coupled with the rapid advancements in both nanotechnology and artificial intelligence, provide a strong impetus for continued progress. Looking towards the future, the trajectory of AI-driven nanobot therapies points towards increasingly sophisticated and autonomous systems. We envision nanobots capable of navigating the body with minimal external guidance, making real-time diagnostic and therapeutic decisions, and collaborating in swarms to tackle complex medical challenges. The seamless integration of these microscopic agents with advanced imaging and sensing technologies will provide clinicians with an unprecedented window into the inner workings of the human body, enabling highly tailored and adaptive treatment strategies.

References

1. Dr. Omid Panahi. Forging a Healthier Future Through Responsible AI in Families and Communities. Archives of Community and Family Medicine. 2025; 8(1): 21-30.

2. Panahi O (2025) Robotic Surgery Powered by AI: Precision and Automation in the Operating Room. SunText Rev Med Clin Res 6(2): 225.
3. Panahi, D. U., & HOC, A. (2025). Networks: Applications. Challenges, Future Directions, Scholars' Press, ISBN, 978-3.
4. Omid Panahi (2024) f: Expanding Access to Oral Healthcare. Journal of Dental Science Research Reviews & Reports. SRC/JDSR-203.
5. Omid P, Reza S. How Artificial Intelligence and Biotechnology are Transforming Dentistry. Adv Biotech & Micro. 2024; 18(2): 555981.
6. Omid Panahi. "AI: A New Frontier in Oral and Maxillofacial Surgery". Acta Scientific Dental Sciences 8.6 (2024): 40-42.
7. Omid Panahi*and Reza Safaralizadeh. AI and Dental Tissue Engineering: A Potential Powerhouse for Regeneration. Mod Res Dent. 8(2). MRD. 000682. 2024.
8. Omid Panahi*. Artificial Intelligence: A New Frontier in Periodontology. Mod Res Dent. 8(1). MRD. 000680. 2024.
9. Omid, P. (2024). Empowering Dental Public Health: Leveraging Artificial Intelligence for Improved Oral Healthcare Access and Outcomes. JOJ Pub Health, 9(1), 555754.
10. Omid P. Artificial Intelligence in Oral Implantology, Its Applications, Impact and Challenges. Adv Dent & Oral Health. 2024;17(4): 555966.
11. Omid Panahi. "AI Ushering in a New Era of Digital Dental-Medicine". Acta Scientific Medical Sciences 8.8 (2024): 131-134.
12. Panahi O, Zeinaldin, M. (2024). AI-Assisted Detection of Oral Cancer: A Comparative Analysis. Austin J Pathol Lab Med, 10(1), 1037.
13. Panahi O. AI in Surgical Robotics: Case Studies. Austin J Clin Case Rep. 2024; 11(7): 1342.
14. Panahi O, Zeinaldin M. Digital Dentistry: Revolutionizing Dental Care. J Dent App. 2024; 10 (1):1121.
15. Omid Panahi, Sevil Farrokh. USAG-1-Based Therapies: A Paradigm Shift in Dental Medicine. Int J Nurs Health Care. 2024;1(1):1-4.
16. Omid Panahi, Sevil Farrokh. Can AI Heal Us? The Promise of AI-Driven Tissue Engineering. Int J Nurs Health Care. 2024; 1(1):1-4.
17. O. Panahi. (2025). Algorithmic Medicine, Journal of Medical Discoveries, 2(1).
18. O. Panahi. (2025). Deep Learning in Diagnostics, Journal of Medical Discoveries, 2(1).
19. Panahi, O. (2023). KetenciÇay F. Nano Technology. Regenerative Medicine and Tissue Bio-Engineering. Acta Sci Dent Sci, 7(4), 118-122.
20. Panahi O, et al. (2025). Smart Robotics for Personalized Dental Implant Solutions. Dental. 7(1).
21. Panahi, P., Bayılmış, C., Çavuşoğlu, U., &Kaçar, S. (2021). Performance evaluation of lightweight encryption algorithms for IoT-based applications. Arabian Journal for Science and Engineering, 46(4), 4015-4037.
22. Panahi, U., & Bayılmış, C. (2023). Enabling secure data transmission for wireless sensor

networks based IoT applications. Ain Shams Engineering Journal, 14(2), 101866.
23. Omid Panahi, and UrasPanahi. AI-Powered IoT: Transforming Diagnostics and Treatment Planning in Oral Implantology. J Adv ArtifIntell Mach Learn. 2025; 1(1): 1-4.
24. Panahi, P., & Dehghan, M. (2008, May). Multipath Video Transmission Over Ad Hoc Networks Using Layer Coding And Video Caches. In ICEE2008, 16th Iranian Conference On Electrical Engineering, (2008) (pp. 50-55).
25. bakikoyuncu, pejmanpanahi, Kalman Filtering of Link Quality Indicator Values for Position Detection by Using WSNS, Int'l Journal of Computing, Communications & Instrumentation Engg. (IJCCIE), volume 1, 2014.
26. Pejman Panahi and Cneyt Baylm, "Car indoor gas detection system", International Conference on Computer Science and Engineering (UBMK), 2017.
27. Panahi P. Providing consistent global sharing service over VANET using new plan. In 2009 14th International CSI Computer Conference. IEEE. 2009: 213-218.
28. Panahi P, Dehghan M (2008) Multipath Video Transmission Over Ad Hoc Networks Using Layer Coding and Video Caches. In ICEE2008, 16th Iranian Conference on Electrical Engineering pp. 50-55.
29. Dr UrasP anahi, Redes AD HOC: Aplicações, Desafios, Direcções Futuras, Edições Nosso Conhecimento, ISBN: 978-620-8-72962-2.
30. Dr Uras Panahi, Sieci AD HOC: Zastosowania, wyzwania, przyszłekierunki, Wydawnictwo Nasza Wiedza, ISBN: 978-620-8-72967-7.
31. Dr Uras Panahi, Reti AD HOC: Applicazioni, sfide e direzioni future, Edizioni Sapienza, ISBN: 978-620-8-72965-3.
32. Dr Uras Panahi, Redes AD HOC: Aplicaciones, retos y orientacionesfuturas, EdicionesNuestroConocimiento, ISBN: 978-620-8-72966-0.
33. Dr Uras Panahi, Réseaux AD HOC : Applications, défis et orientations futures, Editions Notre Savoir, ISBN: 978-620-8-72964-6.
34. Dr Uras Panahi, AD HOC-Netze: Anwendungen, Herausforderungen, zukünftige Wege, Verlag Unser Wissen, ISBN: 978-620-8-72963-9.
35. Dr Omid Panahi, Dr Faezeh Esmaili, Dr Sasan Kargarnezhad (2024), Künstliche Intelligenz in der Zahnmedizin, Unserwissen Publishing. ISBN: 978-620-3-6722696.
36. Dr Omid Panahi, Dr Faezeh Esmaili, DrSasan Kargarnezhad (2024), Artificial Intelligence in Dentistry, Scholars Press Publishing. ISBN: 978-620-6772118.
37. Dr Omid Panahi, Dr Faezeh Esmaili, Dr Sasan Kargarnezhad (2024), Inteligencia artificial enodontología, NUESTRO CONOC, MENTO Publishing. ISBN: 978-620-6622764.
38. Dr Omid Panahi, Dr Faezeh Esmaili, Dr Sasan Kargarnezhad (2024), L'intelligenceartificielledansl'odontologie,

EDITION NOTRE SAVOIR Publishing Publishing. ISBN: 978-620-6622771.
39. Dr Omid Panahi, Dr Faezeh Esmaili, Dr Sasan Kargarnezhad (2024), Intelligenzaartificiale in odontoiatria, SAPIENZA Publishing. ISBN: 978-620-6622788.
40. Dr Omid Panahi, Dr Faezeh Esmaili, Dr Sasan Kargarnezhad (2024), Inteligência Artificial em Medicina Dentária, NOSSO CONHECIMENTO Publishing. ISBN: 978-620-6622795.
41. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Peridontium: Estrutura, função e gestãoclínica, lSBN: 978-620-8-74561-5.
42. Dr Omid Panahi, Dr Shabnam Dadkhah, AI in der modernen Zahnmedizin, ISBN:978-620-8-74877-7.
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47. Dr Omid Panahi, Dr Shabnam Dadkhah, A IA namedicinadentáriamoderna, ISBN:978-620-8-74885-2.
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50. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Dr Masoumeh Jabbarzadeh, Dentisterienumérique et intelligence artificielle, ISBN: 978-620-8-73912-6.
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52. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Dr Masoumeh Jabbarzadeh, Stomatologiacyfrowaisztucznainteligencja, ISBN: 978-620-8-73914-0.
53. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Dr Masoumeh Jabbarzadeh, Medicinadentária digital e inteligência artificial, ISBN: 978-620-8-73915-7.
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58. Dr Omid Panahi, Cellule staminalidellapolpadentaria, ISBN: 978-620-4-05359-2.
59. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Peridontium: Struktur, Funktion

und klinisches Management, ISBN:978-620-8-74556-1.
60. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Peridoncio: Estructura, función y manejoclínico, ISBN:978-620-8-74557-8.
61. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Le péridontium: Structure, fonction et gestionclinique, ISBN:978-620-8-74558-5.
62. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Peridonio: Struttura, funzione e gestioneclinica, ISBN:978-620-8-74559-2.
63. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Peridontium: Struktura, funkcjaipostępowaniekliniczne, ISBN:978-620-8-74560-8.
64. Dr Leila Ostovar, Dr Kamal KhademVatan, Dr Omid Panahi, (2020). Clinical Outcome of Thrombolytic Therapy, Scholars Press Academic Publishing. ISBN: 978-613-8-92417-3.
65. Dr Omid Panahi, Dr Faezeh Esmaili, DrSasanKargarnezhad (2024), Искусственныйинтеллект в стоматологии, SCIENCIA SCRIPTS Publishing. ISBN: 978-620-6622801.
66. Panahi O. The evolving partnership: surgeons and robots in the maxillofacial operating room of the future. J Dent Sci Oral Care. 2025;1(1):1–7.
67. O. Panahi. (2025). The Future of Medicine: Converging Technologies and Human Health. Journal of Bio-Med and Clinical Research. RPC Publishers. 2(1).
68. O. Panahi. (2025). Nanomedicine: Tiny Technologies, Big Impact on Health. Journal of Bio-Medand Clinical Research. RPC Publishers. 2(1).
69. O. Panahi. (2025). The Age of Longevity: Medical Advances and The Extension of Human Life. Journal of Bio-Med and Clinical Research. RPC Publishers. 2(1),
70. Panahi O. Predictive Health in Communities: Leveraging AI for Early Intervention and Prevention. Ann Community Med Prim Health Care. 2025; 3(1): 1027.
71. Panahi, O. (2025). Digital Health Equity: Leveraging IT and AI for Community Well-being. Ann Community Med Prim Health Care, 3(1), 1028.
72. Dr. Omid Panahi, Innovations in Surgical Healthcare: The Future of Medicine. Journal of Surgical Case Reports and Investigations (JSCRI) 2025. 1(1). 01-08.
73. Dr. Omid Panahi. Advancing Healthcare: A Surgical and Oral Medicine Perspective. J Surg Case Rep Investigations (JSCRI). 2025;1(1):21-27.
74. Dr. Omid Panahi. The Interconnectedness of Modern Medicine: Surgery, Oral Health, and Implantology. J Surg Case Rep Investigations (JSCRI). 2025;1(1):09-14.
75. Dr. Omid Panahi. Holistic Approaches in Healthcare: Integrating Surgical and Oral Therapies. J Surg Case Rep Investigations (JSCRI). 2025;1(1):15-20.
76. Panahi O. The oral-systemic link: Using AI to analyze dental data for cardiovascular risk assessment. Ann Cardiol. 2025;2(1):1008.
77. Dr. Omid Panahi. Health in the Age of AI: A Family and Community Focus. Arch Community Family Med. 2025;8(1):11-20.

Citation of this Article

Falkner S. The Age of Nanobots and AI: Targeted Therapies and Microscopic Interventions. Mega J Case Rep. 2025;8(6):2001-2010.

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