

Enhancing Biosecurity and Safety in the Middle East Region Amid the Nanotechnology Age

Seth Rathod*

Academy of Scientific and Innovative Research (AcSIR), India

Abstract

Among all the subfields of biology, biotechnology developed as a science which was groundbreaking. The applications of biotechnology are ubiquitous in all areas of agriculture, animal husbandry, and human health. However, biotechnology methods are always accompanied with biohazards, which can have a negative impact on all living things, including people. Thus, the development of the theories and practices of biosafety and biosecurity is the result of a joint effort of the top organizations in this sector. The Middle Eastern countries are recognized as biotechnology leaders and have demonstrated a strong embrace of this discipline. Regretfully, nevertheless, the Middle East is the region most troubled by challenges which would be a cause for serious and obvious worry on both a national and worldwide scale.

The obstacles posed by wars and other violent conflicts, decreasing economic conditions, a sizable immigrant population, and the increasing incidence of several diseases. As a result, the area will be less equipped to manage the biological threats that surround it and will find it challenging to adopt a single health concept. Thus, the purpose of this article is to address possible biological hazards, whether purposeful or not, including biological assaults and bioterrorism, as well as to throw light on the biotechnology-related activities of the Middle Eastern nations. Natural biological risks include the spread of viruses. Based on information that is currently available, the article additionally shows the region's countries' capacities in the areas of biosafety and biosecurity. As a result, a number of countries may not have the necessary level of readiness to deal with possible biological threats.

Keywords: Biosafety; Biosecurity; Biotechnology; Bioterrorism; Biological weapons; Middle East; Viruses

Introduction

Nanotechnology has emerged as a revolutionary field with the potential to transform various industries, including healthcare, energy, and electronics, in the Middle East region. While the promise of nanotechnology is immense, it also brings new challenges to biosecurity and safety. The responsible and secure development of nanotechnology is vital to ensure the well-being of society [1]. In this article, we will explore the key factors affecting biosecurity and safety in the Middle East region as it embraces nanotechnology.

Nanotechnology and its applications

Nanotechnology involves manipulating and controlling materials at the nanoscale, typically below 100 nanometers. In the Middle East, this technology has gained prominence in various sectors, including medicine, energy, water treatment, and electronics. For instance, it is used in drug delivery systems, enhancing solar cell efficiency, and designing advanced water purification technologies [2].

Biosecurity challenges

Nanomaterial toxicity: While nanomaterials offer significant benefits, they can also pose risks to human health and the environment. It is crucial to conduct thorough research on the toxicity and potential hazards associated with these materials to ensure their safe use [3]. The Middle East must establish regulatory frameworks and safety guidelines for handling nanomaterials.

Dual-use dilemma: Nanotechnology research can lead to the development of dual-use technologies, which have both civilian and military applications. The Middle East region should address the ethical, legal, and regulatory aspects of dual-use technologies to prevent misuse [4].

Safety concerns

Occupational safety: Workers in the nanotechnology industry are exposed to nanoparticles, which can have adverse health effects if not handled properly. The Middle East must enforce strict workplace safety measures, provide training for employees, and promote the use of personal protective equipment.

Environmental impact: The disposal of nanomaterials and waste from nanotechnology processes can have unintended consequences on the environment [5]. Establishing guidelines for waste management and environmental protection is vital to mitigate these risks.

Biosecurity measures

Data sharing and international collaboration: The Middle East should actively engage in international collaborations and information sharing to develop a common understanding of biosecurity risks associated with nanotechnology. This approach can help identify potential threats and vulnerabilities and facilitate a coordinated response [6].

Regulation and oversight: Governments in the Middle East should implement and enforce robust regulatory frameworks for the responsible development and use of nanotechnology [7]. This includes

*Corresponding author: Seth Rathod, Academy of Scientific and Innovative Research (AcSIR), Ghaziabad 201002, India, E-mail: Rathods7@gmail.com

Received: 01-Nov-2023, Manuscript No. jbtbm-23-119502; **Editor assigned:** 03-Nov-2023, PreQC No. jbtbm-23-119502 (PQ); **Reviewed:** 17-Nov-2023, QC No. jbtbm-23-119502; **Revised:** 22-Nov-2023, Manuscript No: jbtbm-23-119502 (R); **Published:** 29-Nov-2023, DOI: 10.4172/2155-952X.1000357

Citation: Rathod S (2023) Enhancing Biosecurity and Safety in the Middle East Region Amid the Nanotechnology Age. J Biotechnol Biomater, 13: 357.

Copyright: © 2023 Rathod S. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

mandatory reporting of nanomaterial production, handling, and research [8].

Education and awareness: Increasing awareness about the biosecurity and safety aspects of nanotechnology is essential for researchers, industry professionals, and the general public. Training programs and educational initiatives can promote responsible practices [9,10].

Conclusion

Nanotechnology offers significant opportunities for advancement and innovation in the Middle East. However, the region must be vigilant in addressing biosecurity and safety concerns associated with this technology. By establishing comprehensive regulatory frameworks, enhancing awareness, and fostering international collaboration, the Middle East can harness the potential of nanotechnology while ensuring the well-being of its citizens and the preservation of its environment. Biosecurity and safety are not optional but fundamental pillars for the responsible development of nanotechnology in the Middle East. Biotechnology is used in several Middle Eastern nations in a variety of academic, scientific, clinical, and practical disciplines. These countries are hence exposed to several biological dangers.

Simultaneously, the field of biotechnology science will persist in its advances and could unveil novel technologies that raise grave issues if misused. As a result, the region has greater challenges in maintaining both its animal and plant resources and the general health of its citizens. According to the current inspection of these nations, certain

nations have all the biosafety and biosecurity components needed to handle possible biohazards. Others still need to put in a lot of work in this area, though.

References

1. Deblois RW, Bean CP, Wesley RKA (1977) Electrokinetic measurements with submicron particles and pores by resistive pulse technique. *J Colloid Interface Sci* 61: 323-35.
2. Graham MD (2003) The Coulter principle: Foundation of an industry. *J Lab Autom* 8: 72-81.
3. Wanunu M (2012) Nanopores: A journey towards DNA sequencing. *Phys Life Rev* 125-158.
4. Prosdocimi F, Farias ST, José MV (2022) Prebiotic chemical refugia: multifaceted scenario for the formation of biomolecules in primitive Earth. *Theory Biosci* 141: 339-347.
5. Kasianowicz JJ, Robertson JWF, Chan ER, Reiner JE, Stanford VM (2008) Annual review of analytical chemistry. *Annual Reviews* 1: 737-66.
6. Bayley H, Martin CR (2000) Resistive-pulse sensing-From microbes to molecules. *Chem Rev* 100: 2575-94.
7. Halverson KM (2005) Anthrax biosensor, protective antigen ion channel asymmetric blockade. *J Biol Chem* 280: 34056-62.
8. Wang C, Zou P, Yang C, Liu L, Cheng L, et al. (2019) Dynamic modifications of biomacromolecules: mechanism and chemical interventions. *Sci China Life Sci* 62: 1459-1471.
9. Vay LK, Mutschler H (2019) The difficult case of an RNA-only origin of life. *Emerg Top Life Sci* 3: 469-475.
10. Hazen RM (2006) Mineral surfaces and the prebiotic selection and organization of biomolecules. *Am Mineral* 91: 1715.