



# Biosafety and Biosecurity in the Age of Biotechnology

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## BIOTECHNOLOGY

Biotechnology has become a paradigm-shifting science in all branches of biology. Biotechnology's benefits have reached many practical domains, including human health, animal health, and agriculture. However, everywhere biotechnology is used, there is a biohazard linked with it, and the detrimental consequence can affect all living organisms, including people (Alfirevic 2017). As a result of the collaboration of the foremost institutes in this sector, concepts and applications of biosafety and biosecurity have been developed. The Middle Eastern countries are regarded biotechnology practitioners, with a firm embrace of this sector (Sekizawa et al., 2003). However, the Middle East region is one that is confronting the most multiple issues, which would cause genuine and visible concern at the local and international levels. As a result, the region's ability to deal with the surrounding biological threats is limited, and the path to the single health concept is difficult. As a result, the purpose of this article is to give light on the efforts of Middle Eastern countries in the field of biotechnology, as well as to address potential biological risks, whether natural, such as viral propagation, or purposeful, such as biological attacks and bioterrorism. Based on available data, the article also highlights the region's countries' capacity in the fields of biosafety and biosecurity (Rigo et al., 2019). As a result, several governments lack the necessary level of preparedness to deal with potential biological threats. Multi-institutional and international cooperation between the concerned countries will significantly enhance the capacity of the region in biosafety and biosecurity to meet the level. The Middle East region lacks well defined geographical borders. Rather, the phrase refers to a cultural region (Siekmann 2013). Middle Eastern countries may include Bahrain, Cyprus, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Turkey,

the United Arab Emirates (UAE), and Yemen, depending on the context. It is critical to distinguish between the Middle East region and the Middle East and North Africa (MENA) region, which include Algeria, Djibouti, Libya, Morocco, Sudan, Tunisia, and occasionally other nations. These issues may result in economic, social, and political instability, as well as public health concerns, potentially raising the possibility of infectious disease transmission and the use of biological weapons. Simultaneously, several Middle Eastern countries are considered to be biotechnology practitioners, exposing them to the risk of biohazards linked with biotechnology. Some biohazards include, for example, laboratory-acquired diseases in research or medical practise laboratories where pathogenic organisms must be handled carefully. Furthermore, dealing with poisonous, corrosive, and carcinogenic compounds in laboratories poses a number of chemical dangers. Biosafety and biosecurity are becoming increasingly significant in a variety of biological domains, particularly with recent advances in biotechnology science. As a result, various definitions of biosafety and biosecurity are currently in use, depending on the field in which they are employed. However, biosafety is often defined as the procedures, tactics, and actions used to prevent, minimise, and avoid potential unintentional biohazards that endanger individuals or the environment. Because the Middle East is confronting many issues, biosafety and biosecurity measures should be introduced as soon as possible. As part of a global system, any possible public health issues that arise in the Middle East region will have an impact on the rest of the world. Furthermore, the One Health concept posits that three important parts are interrelated and cannot be separated. As a result, biosafety and biosecurity should be regarded as enablers of the One Health concept's goals. The current review's assessment of the Middle Eastern region in biosafety and biosecurity revealed that several Middle Eastern countries are capable of preventing

potential biological risks. Biotechnology is the use of science to benefit humans by utilising live creatures or their products. Biotechnology is the development of products or the solution of problems via the use of various technologies that can be applied to biological beings. Humans have used biotechnology for centuries. Traditional biotechnology applications include yoghurt fermentation and selective breeding for livestock and crops. Modern biotechnology has progressed to include the genetic manipulation of living organisms through the use of recombinant DNA technologies (Armbruster 2017). The Gulf countries and Israel are among the Middle East's high-income countries. The Gulf countries are the richest in the region and are thought to have strong healthcare systems. Between 1996 and 2013, the Gulf countries published around 40,797 research publications, many of which focused on biomedical and clinical research. The construction of the National Biotechnology Centre (NBC) in collaboration with the King Abdulaziz City for Science and Technology and the King Faisal Specialist Hospital and Research Centre demonstrates the Kingdom of Saudi Arabia's commitment to the medical use of biotechnology. The Biotechnology General (BTG) and Interpharm companies were created in Israel in the late 1970s, heralding the start of the country's biotechnology industry. Despite its small size, insufficient water supply, and volatile political climate, Israel saw the establishment of around 160 biotechnology

companies between 1970 and 2000. More than half of all scientific papers in Israel are said to be in biology, medicine, or agriculture, reflecting the country's strong biotechnology development. Several corporations and research universities have set the scientific and commercial boundaries of Israeli biotechnology in medicinal drugs, genetics, stem cells, diagnostics, bioinformatics, and agriculture.

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