Chapter 5
The Role of Space Medicine to Improve Medical Competencies in Traditional Medical Education Curricula:
Integrating Space Medicine Into Medical Education

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ABSTRACT

Investing in space activities is on the rise worldwide due to the recognized benefits they offer. Also, space exploration has brought significant scientific advancements

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in different fields of knowledge, including medicine. The effects of microgravity and radiation exposure on the human body are prompting research in various physiological systems, and technologies developed to sustain the human presence in space has been incorporated into terrestrial medicine, resulting in innovations like telemedicine and robotic surgical techniques. However, there is a gap in formal medical education regarding the challenges of space medicine. Integrating space medicine topics into medical curricula using innovative teaching methods can enhance students' knowledge and interest, preparing them to work in a growing space market but also to better address healthcare challenges not only here on Earth but also beyond. This chapter proposes and discuss the integration of space-related subjects in medical education to align with current trends and foster interdisciplinary learning opportunities.

INTRODUCTION

The number of countries investing in space activities is rapidly increasing, driven by the understanding of the broad benefits associated with the sector. Space applications are becoming progressively integrated into the daily routines of modern societies: telecommunications, global connectivity and automation of complex systems; meteorological forecasts as essential inputs for sectors such as transportation, energy, agriculture, water resource management, and natural disaster response; environmental, urban, natural reserve, and border monitoring; as well as security and defense. All of these societal needs can be more effectively addressed through space products and services, which explains the growing global interest in the sector.

However, the impacts of space activities extend beyond practical applications. The space exploration has brought significant scientific advancements across several fields, including astronomy, astrophysics, earth sciences, biology and astrobiology, physics, chemistry, materials science, to name a few. Today, there are several private initiatives aiming in making access to space more affordable for tourism and commercial operations, and dozens of space agencies are collaborating to enable the human presence further into space, and to establish long-term, possibly permanent bases, first on the Moon, with aspirations to go beyond. The substantial increase of the space activities is expected to consolidate during the professional lives of current medical students.

All these efforts lead to substantial scientific and technological research not only regarding how to get there, but also concerning the development of safe vehicles and habitats, the creation of closed-loop life support systems, and understanding the effects of microgravity and ionizing radiation on the human body over extended exposure. This knowledge will impact life here on Earth, offering consistent