Editorial

Dentistry in Space Mission: Mission to Mars

The most important health issues for long-duration missions have already been identified during short-term missions: these are radiation, loss of bone mineral density, and behavioral adaptation. The radiation risk of deep space is difficult to quantify. The character of radiations in space is quite different from that to which we are regularly exposed on Earth. In addition, unpredictable solar outbursts cause a spike in radiation levels. Currently, there is no practical way to protect astronauts from them. The potential effects of radiation are increased during acute exposure related to extravehicular activity (so-called space walks) and during the chronic exposure experienced by residents of the ISS, NASA or ISRO. Longer duration missions will increase the risk at least arithmetically (if not exponentially) due to increased length of chronic exposure time and the changing character of radiations in the environment. It leads to oral cancer, xerostomia and dental caries as concerned to dental profession. Reducing radiation exposure by physical shielding represents an engineering challenge that should be met before assigning astronauts to long-term missions in deep space. The loss of bone mineral density, which can result in brittle bones and increased susceptibility to fractures, occurs at an average rate of 1 percent per month in microgravity. The loss is relatively manageable on the short-duration missions of the space shuttle, but it becomes problematic during extended residence on the ISS, NASA, ISRO. The Space agency, therefore, is perhaps the best setting for expanded research on this topic. It leads to periodontitis, and fracture of facial bones as concerned to dental profession If no medical remedy can be devised, an engineering countermeasure, such as artificial gravity, will be necessary. If no method is found to mitigate the loss of bone density, which could be as great as 50% or more if left untreated over a 3-year period, long-duration interplanetary missions will be impossible. Behavioral adaptation and human interactions aboard a confined spacecraft, isolated both temporally and spatially from Earth, may well be one of the most serious challenges to human exploratory missions. The habitability of the spacecraft, marginalized from the outset by the need to restrict weight, will be further compromised by the need to carry all necessary equipment and nourishment at least for the voyage to Mars (if supplies have been stockpiled there), if not for the entire 3-years duration of the mission. Current designs are plagued by high noise levels, less that optimal light, and diminished privacy. In addition, an interplanetary mission would likely be staffed by an international crew; differences in social and cultural backgrounds and politics could increase tension on board. To an already tense environment, add several factors of isolation. Real-time communication with Earth will be impossible; at the farthest distance from Earth, radio and even more advanced messages will take 20 minutes to reach their destination. Likewise, a timely return to Earth will be impossible during an interplanetary flight; a return trip could take months to plan and execute. The success of the mission and the lives of the astronauts will depend on every member of the crew functioning appropriately, both physically and emotionally. Understanding the behavior of individuals in such environments and understanding the interactions of members of a team in prolonged isolation are necessary prerequisites to preventing disruptive behaviors and to dealing adequately with them should they occur. As concerned for dental profession, the microgravity leads to periodontitis, fracture of facial bone, xerostomia, increased the virulence of oral microbial and really dental conditions become medical emergency. So, more research is required on effect of microgravity on oral cavity i.e. Aeronautic dentistry needs to be explored further.

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