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GRAVITATIONAL STRESS DURING PARABOLIC FLIGHTS INDUCE CHANGES IN HUMAN LEUKOCYTE SUBSETS

Abstract

BACKGROUND: Technological advances make space flights feasible for a broader public use. Such held out in prospect possibility prompts question about alteration in organ functions associated with gravitational changes. The Immune system is known to regulate most functions in organism and previous studies suggested impairment of immune function under gravitational stress. However, systematic studies aiming to investigate the effect of microgravity on cellular immune response in humans are lacking. Parabolic flights are considered a feasible model to investigate a short-term impact of gravitational changes. METHODS: The impact of gravitational changes were determined by analysis of immune cells before and after a three-hour parabolic flight. Corresponding time points performed on a ground one day before flights were used as controls to address the changes induced by circadian effects. RESULTS: Indeed, we observed several alterations in immune cell regulation induced by parabolic flight maneuvers. While alterations in adaptive immunity including T- and B-cell numerical changes upon gravitational stress became evident, also innate cells including neutrophils, basophils and eosinophils were affected. Interestingly, the observed changes cannot exclusively be attribute to cortisol levels, since they remained stable for most volunteers. CONCLUSION: Taking together, our data demonstrated significant changes in adaptive and innate immune cell composition, which could be correlated with gravitational changes and are independent of cortisol levels. Further studies need to investigate, whether the immunological alterations could affect the susceptibility for infections, auto-immunity, or tumors also considering short and long-term exposures to microgravity.