

## Changes in Neutrophil Functions in Astronauts

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Neutrophil functions (phagocytosis, oxidative burst, degranulation) and expression of surface markers involved in these functions were studied in 25 astronauts before and after 4 space shuttle missions. Space flight duration ranged from 5 to 11 days. Blood specimens were obtained 10 days before launch (preflight or L-10), immediately after landing (landing or R+0), and again at 3 days after landing (postflight or R+3). Blood samples were also collected from 9 healthy low-stressed subjects at 3 time points simulating a 10-day shuttle mission. The number of neutrophils increased at landing by 85 percent when compared to the preflight numbers. Neutrophil functions were studied in whole blood using flow cytometric methods. Phagocytosis of *E. coli*-FITC and oxidative burst capacity of the neutrophils following the 9 to 11 day missions were lower at all three sampling points than the mean values for control subjects. Phagocytosis and oxidative burst capacity of the astronauts was decreased even 10-days before space flight. Mission duration appears to be a factor in phagocytic and oxidative functions. In contrast, following the short-duration (5-days) mission, these functions were unchanged from control values. No consistent changes in degranulation were observed following either short or medium length space missions. The expression of CD16, CD32, CD11a, CD11b, CD11c, L-selectin and CD36 was measured and found to be variable. Specifically, CD16 and CD32 did not correlate with the changes in oxidative burst and phagocytosis. We can conclude from this study that the stresses associated with space flight can alter the important functions of neutrophils.