Pilots of modern high-performance fighters encounter high +Gz forces, and their spinal structures are consequently subjected to excessive loadings which may exceed pilots’ muscular performance limits.

Degeneration of the spine is defined in radiological terms as loss of disk height, decreased disk and bone marrow signal intensity, and disk protrusion or herniation shown on MRI. Decreased signal intensity of the intervertebral disc is the most common sign of disc degeneration shown on MRI. Even though decreased signal intensity and disc height have been generally accepted as an indicator of disc degeneration, the signal intensity of nucleus pulposus seems to be a more feasible measure of degeneration than absolute disk height. In addition, the High Intensity Zone (HIZ) is particularly diagnostic for painful internal disk disruption. Vertebral end plate changes are also assumed to be associated with degenerative intervertebral disc disease. The aim of this study was to determine the possible degenerative radiological changes in the cervical and lumbar spine induced by +Gz exposure in high performance military aircraft during a 13 year follow-up period.

The test subjects consisted of twelve Finnish Air Force pilot cadets and their age-matched controls. The subjects had no history of noteworthy spinal complaints at the beginning of study, and there were no sport or motor vehicle accidents in either group during follow-up. There were no ejections from aircraft during the follow-up. The baseline MRI of the cervical and lumbar spine were performed at the beginning of the subjects’ flying career, it can be safely assumed that hypothesized early degenerative changes in the spinal column due to high +Gz would become exposed during follow-up years. However, radiological changes that became evident in this study were relatively few and minor.

The above study concludes that periodical cervical or lumbar MRI follow-ups are not recommended for fighter pilots, and it is suggested that assessing the need for imaging be based on clinical outcome.

The results show that time of day has a marked effect on the pattern of fatigue at the start of the duty and on the rate at which fatigue levels increased, with the highest levels in the window of circadian low (0200h–0600h). Fatigue also increased with the length of duty and was 0.56 higher at the end of a two-sector compared to a single-sector. During the study period there were a total of 4206 two-pilot duties between New Zealand and destinations within Australia and the Pacific Islands. Pilots flying two-pilot operations ranging from 3–12 h completed Samn-Perelli fatigue ratings prior to descent at the end of each rostered duty. This study examined pilot fatigue at the top of descent across routine commercial two-pilot operations

The results show that two spondylolisthesis in the pilot group and one spondylolysis with lysis was the control group were diagnosed from lumbar images. Otherwise, changes in the lumbar spine were moderate. A controlled 13 yr follow-up period on spinal changes with exposure to +Gz forces is the longest reported study among military pilot populations. Because this period encompasses a major part of most pilots’ active fighter flying career, it can be safely assumed that hypothesized degenerative changes in the spinal column due to high +Gz would become exposed during follow-up years. However, radiological changes that became evident in this study were relatively few and minor.

The study was conducted from January 1 to March 31, 2003. Here the study reports the findings on two-pilot operations flying one or two sector duties that ranged from 3 to 12 h duty time. Individual sectors were between 3 and 5 h. Data were gathered from pilots operating Boeing 737-300, 767, and 747-400 two-pilot operations.

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