MARCH 1998

CO_2 in the space environment (DLR-Institute of Aerospace Medicine, Linder Höhe, Köln, Germany): "For the operation of manned spacecraft, the removal of CO_2 from the cabin atmosphere, produced by its inhabitants, is essential. This is accomplished by chemical absorption in a gas processing unit, a process which requires energy and consumables. Therefore, in terms of resource management, the CO_2-level should be kept as high as possible. Otherwise, considering crew health and performance and also the interference with life science experiments, the CO_2 load should be as on Earth, close to zero. In order to obtain more information about the permissible CO_2 level for future space missions and also to clarify Space Station design criteria, NASA-ESA-DARA have initiated a ground-based simulation study with two different CO_2 levels: 0.7% (first campaign) and 1.2% CO_2 (second campaign). For this study the deep diving facility of DLR was used to provide atmospheric control and long-term habitation for the test subjects in studying the effect of increased CO_2 on physiological and psychological functions. A number of experiments were implemented, which tested selected effects of raised CO_2 on humans. Four male subjects stayed in the chamber for 26 d in each campaign, in order to perform the different tests in repeated trials, with the aim of evaluating possible long-term effects. CO_2 was controlled by absorption with soda lime, flushing with fresh air and the addition of CO_2, if necessary. Essentially, the CO_2 produced by the subjects was used to maintain the level at 0.7 and 1.2%, respectively. Basic control of CO_2 was carried out in the soda lime container of the Life Support System. In order to maintain the required level, the amount of gas flowing through the soda lime could be adjusted by a remote controlled bypass. With this set-up it was possible to keep CO_2 at an average level between 0.67 and 0.73% in the first campaign and between 1.17 and 1.23% in the second campaign. The results of the experiments support the current CO_2 limits for space operations, insofar as values around 1% do not impose any severe restrictions to human habitation for at least several weeks, whereas life sciences experiments especially sensitive to CO_2 influences have to be carefully evaluated for possible interferences."[3]

MARCH 1973

Combined effects of noise and vibration (Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, OH): "In our laboratory vibration has been shown to be the primary cause of performance impairment in studies of the combined effects of noise and vibration on human tracking performance. Noise has had little consistent effect when presented alone, and has added little or not at all to the impairment produced by vibration. In two studies with heat included as a third stressor, vibration presented alone had a slightly more adverse effect on tracking performance than combined heat, noise and vibration. In the present experiment, 12 subjects were exposed to lower noise and vibration levels for a longer period of time than used previously. Subjects were tested under the following conditions: (1) no vibration–60 dB (dB re 20 $\mu N/m^2$) noise; (2) no vibration–100 dB noise; (3) 6 Hz vibration at 0.10 g_z (peak)–60 dB noise; and (4) 6 Hz vibration at 0.10 g_z–100 dB noise. Noise had no significant effects on tracking performance, while vibration adversely affected both dimensions of the tracking task. On both horizontal and vertical tracking, vibration combined with 60 dB noise produced greater impairment than vibration combined with 100 dB noise. These results parallel previous findings from studies of combined noise, heat, and vibration, and give support to a subtractive interaction interpretation of the combined effects of noise and vibration on human tracking performance."[2]

MARCH 1948

Safety of air evacuation (U.S. Army Air Forces): "During the past five years, the Army Air Forces moved approximately 1,360,000 patients by air. This figure includes those patients who were evacuated from forward medical installations, those who were evacuated from the theaters of war to the Zone of the Interior, and those moved from one hospital in the United States to another for more specialized treatment…

"Forty-six deaths [occurred during this period]…"

"In conclusion, it may be stated that almost any patient suitable for evacuation by any means may safely be transported by air. Precautions to prevent deaths or ill results from air evacuation must include, first, the presence of a physician trained in air evacuation at the point of origin in order to turn down nonacceptable cases, and second, the attendance in flight by a well-trained and well-equipped medical team consisting of a flight nurse and a medical technician. In accepting patients for air evacuation, as in all aspects of medicine, the importance of accurate diagnosis cannot be overemphasized. The case reports at least in part confirm the soundness of the criteria for acceptance of patients for air evacuation."[1]

Civil aviation medicine research (presented at the 18th annual meeting of the Aero Medical Association, Atlantic City, NJ, 1947): "Civilian aviation medicine research has for many years lagged seriously behind the military and has lived a catch-as-catch-can existence. It can no longer afford to do so if the United States is to maintain its aviation superiority. The greatest lesson to be learned from attempting to apply military research to civilian aviation is the necessity for a tremendous increase in civilian aviation medicine research."[4]

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