



Science & Technology Watch

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Long duration commercial flights often result in dehydration and other consequences of jet-lag. This month we present results of a novel in-flight assessment of product to ameliorate these effects.

A New Approach to Rehydration During Flight: Results of a Flight Trial Evaluation of a New Rehydration Product

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One of the problems associated with long-haul flights on commercial aircraft is dehydration. This is due to the relatively low humidity level of the cabin air, which is a consequence of the aircraft cabin routinely being pressurized to a lower altitude than the one at which the aircraft flies most efficiently. Without this pressurization system the occupants of the aircraft would be at great risk from the low oxygen levels and extremely cold temperatures of the atmosphere at aircraft cruising altitudes. However, the dehydration suffered by passengers during aircraft flight contributes to problems such as travel fatigue and dryness of the nose, mouth, sinuses, and eyes.

A new product, known as Flight Recovery™ (FR) has recently come on the market. It is a rehydration formula specifically created to offset the dehydration inherent in long-haul aircraft flight. It contains a variety of carbohydrates, electrolytes, amino acids, and trace minerals aimed at enhancing fluid retention and replacement. According to the manufacturers, the product is designed to effectively make water "work better" in a relatively dry environment. It aims to prevent the ongoing loss of fluid from the body in such an environment, which should then result in passengers suffering much less (or no) dehydration and loss of body fluids. The end result of this should be that passengers feel better at the end of a long-haul flight than they otherwise would, as they would not be as dehydrated.

In an attempt to examine the efficacy of this product under real-world conditions, a flight trial was undertaken to examine the efficacy of this product at relieving flight-related dehydration.

There were 10 volunteer subjects, average age 48, who undertook 2 closely matched international regularly scheduled commercial flights of approximately 7 hours duration on a Boeing 777 aircraft. The subjects all flew in economy class. Both flights were daytime flights, and each was scheduled to depart the

origin airfield at approximately the same local time. Food and fluid intake were matched across the two flights. On one of the flights each subject used FR and on the other flight did not. Pre- and post-flight blood tests were performed on each subject for each flight. Blood was analyzed for hemoglobin (Hb) and hematocrit (Hct), and estimations were made of the change in plasma volume (PV) using these variables. Data was tested for statistical significance using analysis of variance and confidence limit-based tests for clinical significance. An indication of likely clinical significance/likelihood of true value was given by an assessment of confidence limits from each relevant statistical p value (where a 5% change in value was considered to be the smallest clinically important value of the effect statistic).

The subjects spent 3 days and 4 nights at the destination, thus allowing sufficient time between flight exposures to recover. During the stopover, each subject was allowed to do as they wished, provided prolonged exposure to the ambient weather conditions (hot and humid), strenuous exercise, and heavy alcohol intake were avoided. Each subject completed a food, fluid, and activity diary during the stopover.

After the pre-flight blood tests, the five subjects scheduled to take FR on each of the flights were informed of this requirement, and then took the product. These test subjects thus took FR approximately 2 hours prior to the scheduled aircraft departure. The FR product comes in a small sachet of powder, which was mixed in 200 ml of room-temperature water.

In accordance with the manufacturer's recommendations, the second dose was taken 4 hours after the first, approximately 2 hours into the flight. The third dose was taken 4 hours later, which was approximately 1 hour prior to landing.

All subjects completed the flights with no difficulty, and none experienced any adverse reactions to either the experimental protocol or the use of FR. Although not formally assessed, anecdotal reports showed that all participants subjectively felt that FR had worked, and that they felt better after the FR flight than the non-FR flight.

The flight trial results showed some evidence that FR is an effective rehydration product for the flight environment. On Flight 1, it resulted in a clinically significant increase in PV in those taking it compared with those not taking it (8% increase in PV compared with 3%). The results of Flight 2 were not as clear cut - there was a modest and similar decrease in PV for both groups, with no significant difference between them.

However, those who took FR on the first flight appear to have protected their PV during the stop-over period, as shown by an additional 2% increase in PV and a 0.74% decrease in Hct over this period. By contrast, the non-FR users on Flight 1 had opposite results, with a 4% decrease in PV and a 0.76% increase in Hct. These changes were statistically significant. These data suggest that the non-FR users were not able to preserve their PV during the 3-day stop-over, while the FR users were. This is interesting, given the hot and humid ambient conditions to which none of the subjects were acclimatized. All subjects spent some time outdoors during the stop-over, being exposed to this thermally challenging ambient environment, and to a certain extent developing at least some partial acclimatization to it by the morning of the return flight. Despite

all of this, the two groups showed quite significantly different abilities to maintain their hydration status during the time spent on the stop-over.

This suggests that FR has a persistent effect on hydration status, and is able to maintain or protect PV over a longer time period than was perhaps originally estimated. As such, at the beginning of Flight 2 the original FR users had not completely returned to the same normal state as at the beginning of Flight 1. During Flight 1 the use of FR boosted their PV by 8%, and 3 days later their PV had increased a further 2%. By contrast, the non-users of FR on Flight 1 had an increase in PV of 3% after Flight 1, but lost 4% of their plasma volume after 3 stop-over days.

The findings of this flight trial demonstrate that FR appears to be effective at preventing the dehydration associated with commercial air travel, as shown by an increase in plasma volume. There also appears to be a persistent effect of FR on plasma volume, which confers ongoing protective benefits for a number of days. Furthermore, the study highlights the significant research opportunities that exist with a carefully conducted and planned flight trial. Such real-world testing conditions confer some important advantages for researchers in the aviation medicine community.

The AsMA Science and Technology Committee provides the Watch as a forum to introduce and discuss a variety of topics involving all aspects of civil and military aerospace medicine. Please send your submissions and comments via email to: barry.shender@navy.mil. Watch columns are available at www.asma.org in the AsMA News link under Publications.

SMA Jeff Myers Young Investigator Award

The Space Medicine Association's Jeff Myers Young Investigator Award is presented to a young investigator who is the primary author of an outstanding presentation in the area of Aerospace Medicine presented at the current Annual Scientific Meeting of the Aerospace Medical Association. In addition to being the primary author, the work must be original and the young investigator must be presenting at the Annual Scientific Meeting for the first time. The Award is intended to encourage young investigators new to the field of Aerospace Medicine.

The applicant must submit a draft manuscript of their presentation to the chair of the Young Investigator Award sub-Committee. To be considered for the 2008 award, manuscripts must be submitted by March 15, 2008 to:

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