

Please send suggested books for review as well as reviews of books, articles of aeromedical interest, films, websites, etc. to
Geff McCarthy, M.D., geffandjulie@comcast.net

Reviews

In this column we will review books, articles of aeromedical interest from other sources, films, websites, and other alternate sources of aerospace medicine and human performance knowledge. This month we offer current research as compiled by NASA and selected by Dr. Watson, a pertinent review from a generalist medical publication from Dr. Rayman, and, first, a convenience sampling of some sources of interest to AsMA members from Dr. McCarthy.

Now that we are formally engaged in Human Performance—our new title!—members and readers may wish to gain further understanding of the basics of Human Factors from this prolific author: <http://airlinesafety.wordpress.com/2014/04/21/the-role-of-cognitive-bias-in-aircraft-accidents/>, a basic lesson in faulty information processing that may lead to adverse outcomes. <http://airlinesafety.wordpress.com/2013/05/03/slow-onset-hypoxia-an-insidious-killer/>: while hypoxia will be routine to most AsMA members, the emphasis on insidious onset is worthy of consideration. Similarly, this link, <http://ergonomi.co.uk/>, leads to basic, quickly readable expositions of basic concepts in ergonomics and occupational medicine.

<http://ntrs.nasa.gov/search.jsp>: This link brings you to a search page. Merely typing “aerospace medicine” returns 12,048 technical reports, papers, and reviews—current and historic. Particularly valuable for the researcher is the “current bibliography” from years past that includes otherwise obscure references from the former Soviet Union. Here is such a reference from the Soviet era: <http://link.springer.com/article/10.1134/S0362119710070017#page-1>. Clicking this link brings one to an account of the life and work of Oleg Gazenko, one of the leading lights of Soviet aerospace research, published in *Human Physiology* in 2010.

Lucas RA, Epstein Y, Kjellstron T. Excessive occupational heat exposure: a significant ergonomic challenge and health risk for current and future workers. *Extrem Physiol Med.* 2014; 3:14; <http://www.extremephysiolmed.com/content/pdf/2046-7648-3-14.pdf>. A very useful review of heat stress and its consequences.

Dempsey JA. Career perspective: Jerome A. Dempsey. *Extrem Physiol Med.* 2014; doi:10.1186/2046-7648-3-13; [accessed 2014 Nov 14] Available from: <http://www.extremephysiolmed.com/content/3/1/13>. This reviewer stands

in awe of the scientists profiled herein. This profile is most worthy of readers’ attention, and includes concepts of pulmonary function control that live in the heart of aerospace medicine. Highly recommended.

Miller R. *The Art of Space*. Minneapolis (MN): Zenith Press, Quarto Publishing Group; 2014; \$35 US; ISBN: 9780760346563 <http://www.qbookshop.com/products/214437/9780760346563/The-Art-of-Space.html>.



Readers with an interest in the cosmos might consider this non-technical offering.

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Geff McCarthy, M.D.

Thankfully NASA has resurrected their SPACELINE current awareness citation service.* The most recent 12 biweekly updates cited 364 new articles, 12 of which were from this journal. Of the remaining 352 there were 114 articles reporting research sponsored by NASA and 238 other articles—a diverse, stimulating, and challenging collection of work. AMHP space allows summaries of just a few of the most pertinent:

Impact of breathing 100% oxygen on radiation-induced cognitive impairment (*Radiat Res.* 2014 Oct. 22). Rat research directed toward investigating the potential for 100% oxygen use during space EVA to potentiate the deleterious effects of radiation exposure. The work showed that the oxygen-breathing rats performed better than the air-breathing counterparts, and concluded that the data suggests “that astronauts are not at greater risk of developing cognitive impairment when exposed to space radiation while breathing 100% O₂ during an EVA.”

* The NASA SPACELINE citation update service is available to members of the Aerospace Medical Association. Subscribers to this service receive a biweekly email listing NASA-supported and other publications and, usually, related URL links (e.g., PUBMED). If you wish to subscribe to this service please contact the SPACELINE editor, Robyn Ertwine, at rertwine@nasaprs.com.

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DOI: 10.3357/AMHP:4207.2015

The oxygen-rich postnatal environment induces cardiomyocyte cell-cycle arrest through DNA damage response (Cell. 2014 Apr. 24; 157(3):565-579). At birth our hearts have quite remarkable regenerative capabilities. This facility is lost soon after birth. This report concludes that that loss—cardiomyocyte cell cycle arrest—is linked to postnatal oxygen exposure and explores some potential therapeutic implications. The 29 May 2014 issue of *Nature* published a comment on this article, entitled “Cardiovascular biology: Switched at birth.”

Cumulative neurobehavioral and physiological effects of chronic caffeine intake: individual differences and implications for the use of caffeinated energy products (Nutr Rev. 2014 Oct.; 72(Suppl. 1):34-47). This article is one of fifteen published in the NIH topic review supplement: “Special Issue: The Use and Biology of Energy Drinks: Current Knowledge and Critical Gaps.” Collectively they provide some very interesting insights into the caffeine-based energy drink phenomenon ... a \$12.2 billion USD market in 2012 alone.

The power of the mind: The cortex as a critical determinant of muscle strength/weakness (J Neurophysiology. 2014 Oct. 1; pii: jn.00386.2014). Subjects’ wrists were immobilized to induce weakness. One group of subjects undertook mental exercises, of strong muscle contractions, regularly during the immobilization period and exhibited approximately 50% less weakness as a result of the immobilization. The authors suggest neurological, probably cortical, mechanisms as contributing significantly to disuse induced weakness.

Effects of sex and gender on adaptation to spaceflight: behavioral health considerations (J Women’s Health. 2014 Sep. 26). Part of a larger work this manuscript explores gender differences in adaptation to spaceflight and identifies differences in: 1) sleep, circadian rhythms, and neurobehavioral measures; 2) personality, group interactions, and work performance and satisfaction; and 3) stress and clinical disorders. Those differences were further considered to “substantially impact the risks and optimal medical care required by spacefaring women” and the imperative of understand further the influences that sex and gender have on behavioral health changes occurring during spaceflight.

Distance and size perception in astronauts during long-duration spaceflight (Life. 2013; 3(4):524-537). Like many other orientation illusions induced by microgravity exposure, astronauts’ perceptions of size and distance appear to also be altered.

Cognitive neuroscience in space (Life. 2014; 4(3):281-294). An informative review article available online without charge.

Two weeks of predatory stress induces anxiety-like behavior with comorbid depressive-like behavior in adult male mice (Behav Brain Res. 2014 Sep. 6; pii: S0166-4328(14)00579-8). Animal models are often used in the exploration of mechanisms underlying the relationship between stress and mental health disorders in the hope of developing improved treatment options. This paper describes the use of natural predator-prey relationships to induce stress in mice and “elicit robust anxiety-like behaviors with evidence of co-morbid depressive-like behavior, as well as changes in cognitive behavior.”

How much gravity is needed to establish the perceptual upright? (PLoS One. 2014 Sep. 3; 9(9):e106207). Approximately 0.15 G for a 50% threshold, at least in the centrifuge model used in this study. That’s close to the gravity level of the Moon, but much higher than the threshold for detecting linear acceleration along the long axis of the body. That difference may partially explain the instability of Moon-walkers, but is seen by the authors as being good news for future missions to Mars.

Reviewed by
Dougal Watson, M.B.,B.S.

McGuire S, Sherman P, Profenna L, et al. White matter hyperintensities on MRI in high-altitude U-2 pilots. Neurol. 2013; 81:729-735. The authors evaluated the imaging (MRI) findings of 102 U-2 pilots, comparing this cohort with a cohort of 92 controls. The U-2 pilots demonstrated a significant increase of volume and number of white matter hyperintensities. Although the article did not suggest any clinical significance, the authors did hypothesize that the lesions are associated with exposure to a hypobaric environment.

Reviewed by
Russell B. Rayman, M.D.