Out of this world: fertility investigations and the space program

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Reports from the manned space flights to date have not clarified or mentioned changes in number of type of spermatozoa. Testicular tissue has not been biopsied in the astronauts.

–Cockett et al. (1)

Those of us who practice male reproductive medicine are acutely aware that our patients' thinking tends to diverge from our own. Patients inquire about lifestyle, diet, and environmental exposures. Our clinical prejudice against entertaining such "soft" factors may be due to the lack of well validated advice that can be used to address their concerns. To be sure, there are increasing data correlating overall health with fertility status, but true lifestyle interventional data can seem few and far between. We might, then, recall this thought-provoking manuscript from August 1970. It reflects a multi-institutional effort examining one extreme variable—complete physical immobilization—and its effects on testicular histopathology.

Cockett et al. studied the effects of prolonged immobilization among primates—data generated as a derivative of the space exploration program's ground simulations of space flight. The monkeys were immobilized for 26 days and then underwent testicular biopsy. When excluding the data generated from the primate who actually went into orbit, the results are striking—showing "spermatogenetic arrest" (or maturation arrest, to use current nomenclature). On review of the black and white images, there is likely a component of germ cell aplasia as well. The authors expound that similar testicular pathology can be seen after ischemia, irradiation, and thermal toxicity. While it would be unfair to equate the results of this extreme intervention to any lack of exercise from even our most sedentary patients, the stark relationship demonstrated here is at least thought provoking.

The authors have some interesting theories as to the applicability of their results. They seemed more concerned about the implications of their results for the physiologic effects of space exploration, rather than for the rest of us whiling away here on terra firma. They were keen to point out that the testicular pathology of one ill-fated primate after 8.5 days of space orbit was identical to those of the monkeys kept on land and immobilized for twice that amount time. They lamented that testicular biopsies were not obtained from astronauts. The inclusion of compulsory testicular biopsies for all would-be astronauts would almost certainly have hindered NASA's recruiting efforts and we might have never made it to the moon! Finally, the authors posit that their results may be applied in efforts to curtail the impending "population explosion" among humans, but their rationale is never provided.

This fascinating study—though limited by a lack of any apparent review board oversight, weight changes in the animals, or information on the nutritional care of the experimental animals—is interesting as a maximalist example of the relationship between physical activity changes and fertility potential. We may increasingly wonder what the results of the basic semen analysis reveals for our patients' future general health. This simple study underscores that fertility parameters may also reflect their voluntary (or as in this case, involuntary) lifestyle decisions in the present.

REFERENCE

1. Cockett AT, Elbadawi A, Zemjanis R, Adey WR. The effects of immobilization on spermatogenesis in subhuman primates. Fertil Steril 1970;21:610–4.

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