What the first American astronauts taught us about living in space

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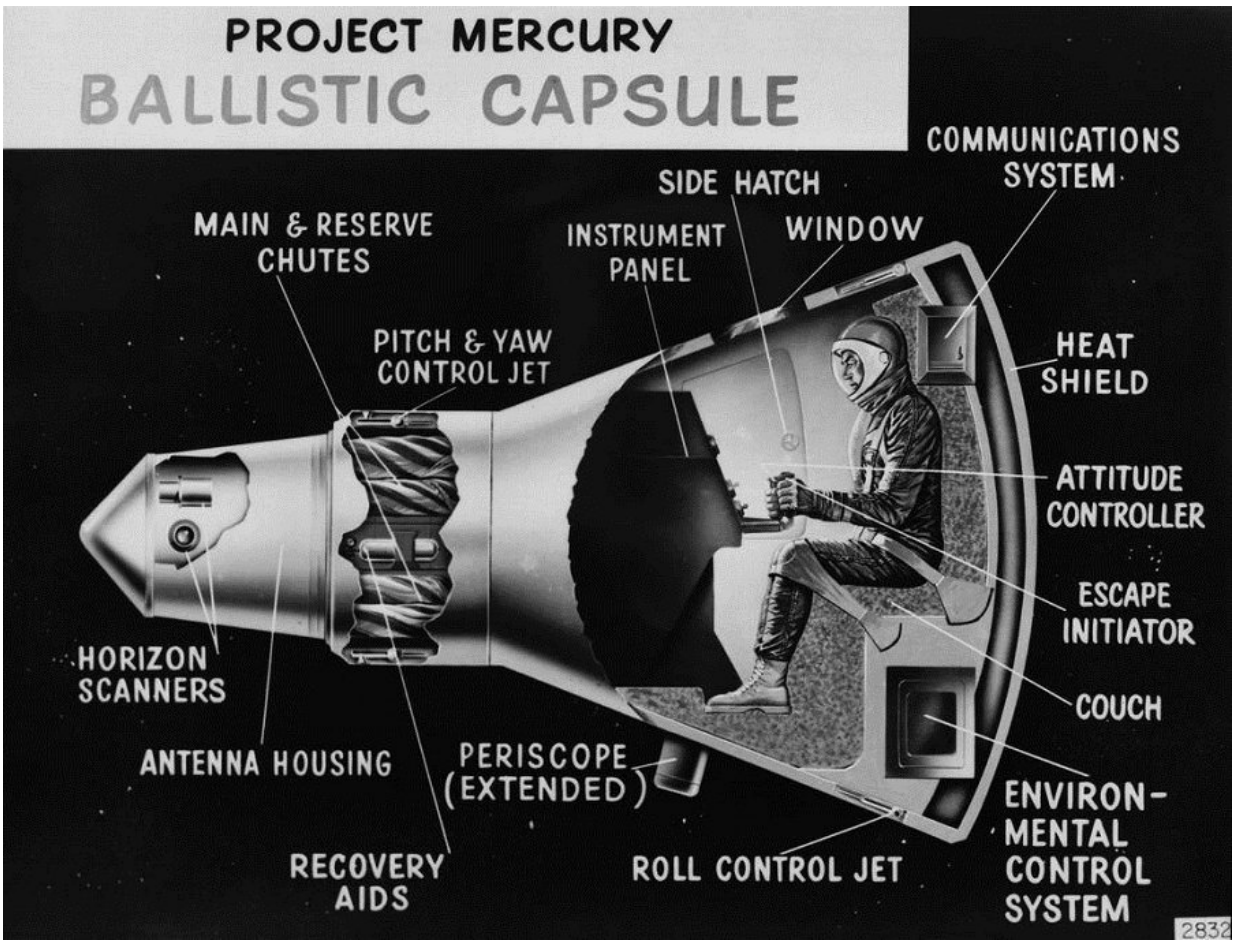

Less than a year after its birth, NASA announced Project Mercury, the first American attempt to send a person to space. Project Mercury proved that humans could live and work in space, paving the way for all future human exploration. This cutaway drawing of the Mercury capsule was used by the Space Task Group at the first NASA inspection, on Oct. 24, 1959. Credit: Courtesy of NASA.

NASA's Project Mercury was the United States' first human-in-space program. Between 1961 and 1963, six astronauts carried out successful one-person spaceflights that offered physicians and scientists the first opportunity to observe the effects of living in space on the human body.

"Spaceflight data is hard to come by; we should remember what's already been done, so we can make the most of new opportunities to do human research in space," said corresponding author Dr. Virginia Wotring, associate professor of the Center for Space Medicine and pharmacology and chemical biology at Baylor College of Medicine.

The Project Mercury astronauts were military test pilots on active duty who volunteered for these missions. They were between 35 and 40 years of age at the time of the flight, and, because room was limited inside the space capsule, they had to be no taller than 5 feet 11 inches.

Depending on the mission, the flights were either in a suborbital or in a low-orbit path and lasted between 15 minutes and 34 hours. During the flights, the astronauts wore a 20-pound spacesuit designed to back up the capsule's support system and remained restrained by a harness in a semi-supine position while performing their tasks. Common clinical measures, such as heart rate, body temperature and breathing rate, were taken to monitor their medical condition. At the time, scientists and physicians knew little about the human tolerance to a sustained weightless environment, only what ground simulations - 'dress rehearsals' - would predict. These first flights provided some answers to what to expect during short-term space flights.

"The Mercury missions taught us that human beings could function in the space environments for more than a day. Other findings were that heart rate and the weight loss on early space flight missions related more

to time spent in a space suit, as opposed to time spent in weightlessness," said Wotring, who also is chief scientist and deputy director of the Translational Research Institute for Space Health. "Also, that the 'dress rehearsals' were excellent predictors of what would be seen later in space."

We hope that these and other findings will influence the design of space suits and that ground simulations and 'rehearsals' will be given the attention they deserve," she said.

The Project Mercury astronaut data can be of interest to operators of future commercial space flights as the short duration of the Mercury missions is similar to that of planned future tourist spaceflight opportunities.

"When Dr. William R. Carpentier at NASA Johnson Space Center offered the National Space Biomedical Research Institute and the Center for Space Medicine at Baylor the opportunity to collaborate on this publication, we felt privileged to work with him," Wotring said. "This paper is our effort to make available all the medical data collected in those early days of crewed space flight so that future researchers can find it and benefit from it."

More information: William R. Carpentier et al, Biomedical findings from NASA's Project Mercury: a case series, *npj Microgravity* (2018). DOI: 10.1038/s41526-018-0040-5

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