

PACE

March 1967

**PICK YOUR FUTURE:**

Third in a series on creative work in the modern world—what it demands in skill, sweat and spirit

"That's all we'll get back from our moon flight," says Dr. Berry pointing at capsule atop Saturn V model.





**What medical dangers face men in space?**

**Will the astronauts bring back foreign germs from the moon to the earth?**

**How may the medical "fall-out" of the space project affect you?**

**Meet the pioneer of medicine's newest frontier, Dr. Charles A. Berry, NASA's**

# SPACE MEDICINE MAN

As the astronauts are hurtled into the "hostile environment" known as weightlessness, every beat of their hearts, every breath they take and the slightest fluctuation of their blood pressures are being carefully monitored in NASA's mission control in Houston, Texas.

Through the Mercury and Gemini programs 18 men have been exposed to 24 manned flights for a total weightless experience of 1,800 man-hours. It has been a heart-in-mouth experience for the NASA medical staff. The ability of the human body to perform and even to survive in such a state was previously unknown.

The scientific community had expressed legitimate concern. Dire predictions were made that the astronauts would experience hallucinations, disorientation, loss of appetite, nausea, sleepiness, sleeplessness, fatigue, restlessness, euphoria, urinary retention, diuresis, muscular incoordination, muscle atrophy and bone demineralization.

With the completion of the Gemini series the evidence was in. None of the above varied and even contradictory fears proved valid to the point of restriction. Instead of being detrimental, weightlessness was being examined for its therapeutic value.

The way is now clear medically to venture to the moon and beyond. "We're right at the threshold of medical space activity," says Dr. Charles A. Berry, 43, director of medical research and operations at the NASA Manned Spacecraft Center in Houston, and the man whom millions of TV watchers know as the doctor at the monitoring console. "With the start of the Apollo (moon shot) program," he continues, "we're in a new era of space flight. Now we're ready to prove some of our data." Preparations are under way for extensive medical experiments in the Apollo program and especially its successors.

Dr. Berry has had a lifetime of fascination with the medical implications of men in space. The great attribute of this former country doctor from Indio, Calif., has been his persistent optimism that what he calls "normal man" (i.e., unaided by drugs) could adapt to the environment of space. He feels his greatest contribution has been the negation of the medical fears and bugaboos which surrounded the program at its initiation.

"The environment of the moon," he says, "has looked so terribly formidable so far. We've shown that with proper preparation man can handle this environment. I'm sure that the desert out in Utah, Arizona and Nevada looked similarly hostile to the early pioneers."

As a medical space pioneer Dr. Berry has come a long way fast. He was born in Rogers, Ark., September 17, 1923. His family moved to Indio where he graduated from Coachella Valley Union High School. His father, a butcher, had wanted to be a physician himself, but Charles finds it hard to pin down why and when he decided to go into medicine. "I guess my first recollection is wanting to be a doctor."

Mr. Berry, Sr., in spite of his son's rocketing into world prominence, continues his work as usual—now at Sage's Market in Riverside, Calif.

Berry received his MD from the University of California at Berkeley. He was in the Air Force for 12 years, is a lieutenant colonel in the Reserve. He was chosen to be among the first group of Air Force physicians to study aerospace medicine.

In 1958 as chief of the Department of Aviation Medicine at Randolph Air Force Base, Texas, he participated in the selection of the original seven astronauts. In September 1959 he was picked as an aeromedical monitor of Project Mercury flight operations.

In July 1962, Dr. Berry was appointed to his present position. He is one of five directors at the NASA Manned Spacecraft Center under Director Dr. Robert R. Gilruth and Deputy Director George M. Low. He has been in charge of medical operations for both the Gemini and Apollo programs.

In his position Dr. Berry is responsible for the astronauts, their health, physical fitness, preflight physicals, inflight monitoring and postflight debriefing. He is also in charge of the research connected with forecasting what medical difficulties can be expected and whether they can be risked. As the program has grown he has been able to pass much of the responsibility for these different phases on to others and mainly concern himself with inflight monitoring and research.

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Gordon Cooper, Jr., (left) gets preflight physical. Optimism about man's space capabilities has been justified.



# What Dr. Berry is discovering about man in space

Not all the medical problems of men in space are solved by any means, nor even identified, and Berry is quick to point that out. He and his staff, however, have encountered some fascinating discoveries and as yet unexplained phenomena.

**MOTION SICKNESS:** Other than what developed while sitting inside their space capsule as

it bobbed in the ocean waiting for pick-up, the U.S. astronauts have had no vestibular problems whatsoever. This has not been true of the Russians who have reported severe cases of sickness while in orbit. Berry can only attribute this to the fact that the U.S. crewmen have all been test pilots by training while several cosmonauts, particularly Valentina Tereshkova, had little or no flight experience.

**BLOOD DISTRIBUTION:** Several men have reported a feeling of fullness in the head similar in character to the fullness experienced when one is upside down and allows the blood to go to the head. There has been no sensation of being turned upside down, however, and it is believed that this results from altered distribution of blood in the weightless state.

**READJUSTMENT TO THE EARTH:** It is interesting that on return to the one G environment of earth the crews are suddenly aware that their arms and legs do have weight and require effort to move. There has been some postflight muscle stiffness following the prolonged missions that may be more associated with the confinement of the spacecraft than with weightlessness. There has been no other significant complaint in readapting to earth's atmosphere.

**SPACE WALKING:** Extravehicular activity or EVA has put added stress on the human body. The highest breathing rate (40 a minute) and heart rate (180) were recorded during EVA but neither with adverse symptomatology. The men reported that the work involved in carrying out almost any task is roughly four times as hard as performing the task in a pressurized suit in a one G environment. The bulk of this energy cost is related to attempts to maintain position. Any motion requires corrective motion and therefore a great deal of energy is expended in just staying near a particular task. The solution lies in providing propulsion to the task and fixation at it.

**LOSS OF RED BLOOD CELLS:** An unsolved mystery is a change in the makeup of the blood during the weightless period. In space, the number of white blood cells increases while red cells decrease, but this condition returns to normal within 24 hours of reentering the earth's environment. Why these changes occur no one yet knows, but Berry believes it is going to lead to a new understanding of how these cells function.

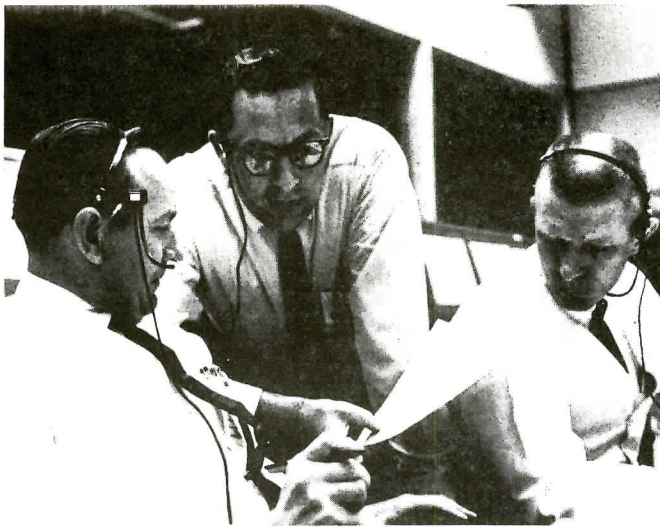
**VARIETY OF THE HUMAN BEING:** Central in all these observations is a great variety in the reactions of the different men involved. The heart rate, for instance, is normally highest at the point of reentry into the earth's atmosphere. For many men it has been up around 160 or 170. For another it was 90. And one crewman slept right through it. Human reactions can be so variable that Dr. Berry has been careful not to jump to medical conclusions.

**"BACK CONTAMINATION":** As man plans to go to other celestial bodies further questions are being raised. On the forthcoming moon visit the possibility of back contamination is a lively concern. Will the astronauts bring back moon bugs or bacteria which will infect the earth? Berry does not think so. In any case a special isolation chamber is being built which will quarantine the first moon visitors for at least two weeks after their return to earth. There they will be thoroughly examined and tested by a team of three scientists who will join them in the chamber.



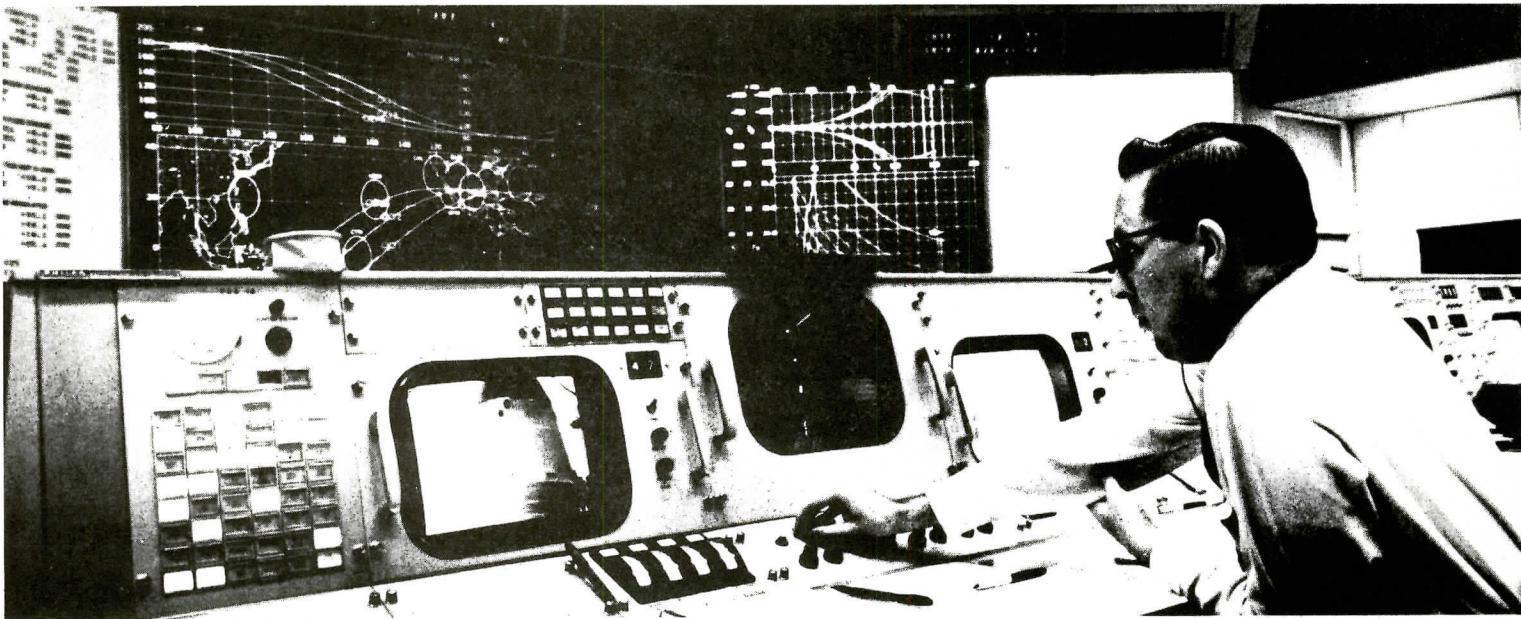
The late Astronauts Roger B. Chaffee (l.) and Edward H. White II (c.) sit with Astronaut James McDivitt in the Apollo command vehicle. Berry believes more space will be necessary for exercise during longer trips.





Left: At mission control Berry checks in with Christopher C. Kraft, Jr., assistant director for flight operations (left). At right is Eugene F. Kranz of flight control operations at Houston center.

Below: Berry sits at console where more than a thousand hours of manned space flight have been monitored by him and his staff.



**LARGER SPACECRAFT:** In the future we shall see the results of the strong connection between what Berry calls "physiology and the size of the hardware." Longer duration flights are going to demand a better life-support system. Larger vehicles (hardware) will be needed to give the men room to move about, exercise and have some privacy. More calories and water must be consumed per day than have been in the missions of up to 14 days. A fuel cell is being worked on to create a source of water to save space, but it is definite that larger craft will be the order of tomorrow.

**MEDICAL "FALL-OUT":** The side benefits or fall-out of the space program will involve medicine as well as technology and defense. There are plans to utilize the universe for medical research and even therapy. Weightlessness reduces the work load on the heart. Dr. Berry thinks it possible that an orbiting hospital could be in operation within 20 years.

On earth intensive-care patients are already being monitored from a central control station as a result of biosensors developed for the space effort. "The next step," speculates Berry, "might be for the family doctor to attach sensors to a patient and send him about his daily tasks. The physician would then be able to 'look' at his patient at any point in the day or night."

The great side effect of the space program to Dr. Berry, however, is what it has done to ignite the imagination and enlist the entire talent of the nation. "This sort of thing happens during a war and total mobilization," says Berry. "I think if we never get anything else out of the space program, it would be a great thing if we stimulated this nation like that without a war."

"I think a challenge does something to you," he continues. "You need something to challenge your spirit. Like Rome, when everyone's fat and happy, they're sitting ducks for anything. They start to decay. I hope our country never reaches that stage. I believe that space is a counterpart for war in this field. You can go almost anywhere in the U.S. from coast to coast and you'll find someone connected with the space effort, if only producing a tiny transistor or screw."

It is obvious what this challenge has done in the life of Dr. Berry himself. He arrives at work an hour ahead of his staff, usually at 7 or 7:30. He does not get out of the office until 7 or 8 at night or even later. Yet his energy is abundant. During a 5:30 p.m. interview he bubbled over with his enthusiasm for his field and seemed relaxed with plenty of steam yet to expend. His reason for keeping such lengthy hours: "You feel a responsibility and a load."

"Most everyone here has that spirit," he says. "You just couldn't ask for people more dedicated to their jobs. It's not just the glamor and publicity. They want to be a part of a pioneering-type effort. They are satisfied being a part of something which is in the forefront of the advance of mankind, even if their job is just getting some paper typed before 5 p.m. It sounds like big words and waving the flag, but it's true."

Berry has won dozens of awards for his contribution to medicine and travels widely on speaking tours. He is a disarmingly natural person and is a devoted family man. He loves to hunt and do any kind of fishing with his son Mike, 20. His faith in the youth of today is firm. "One of the most important things is that the young people are interested in their fellow man," he declares. "This belies a lot of what you hear."

As an illustration he lists the ambitions of his three children. Mike starts medical school next year. Charlene, 17, wants to be a teacher. Janice, 16, is going to be a social worker. "And all this not because we said so but because they want to," he adds.

Dr. Berry looks to the future of space medicine with enthusiasm and excitement, and encourages anyone interested in medicine to try this side of it. "I'd rather do this than anything else in the world," he says. "I think in the long run we're limited only by our imagination."