

ITU



Basketball Basic Technical Training Course Project Research

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Contents:

- 1) Selection Process of Astronauts to be Sent to Space
- 2) Foods Astronauts Consume to Stay in Shape
- 3) Sports and Exercise in Space
- 4) Health Problems That May Occur in Space
- 5) Conclusion
- 6) References



1) Selection Process of Astronauts to be Sent to Space

Astronauts are people who work in manned space exploration and these people go through a long and difficult training before becoming astronauts. Although the first known astronauts in history were made up of people included in the military group, over time, astronauts began to be selected from among experts (at least in bachelor's degree) and physically high in fields such as physics, mathematics, chemistry, according to the needs of space sciences. Psychological factors were also included in these features later.

The characteristics that astronauts should have may vary according to the tasks they will perform in space. However, as general conditions briefly; Their visual acuity can be listed as 20/20 (an object of a certain size can be seen from 20 feet, ie approximately 6 meters away), their blood pressure does not exceed 140/90 mmHg when sitting, and their height is between 1.60 m and 1.90 m.

The functioning of the selection process is briefly as follows: Those who meet the basic conditions for becoming an astronaut first make their applications. Candidates whose applications are accepted are interviewed after some psychological and physical tests. Candidates who pass these stages start an intensive training program. While the training process at NASA takes about 2 years, ESA astronaut candidates are required to complete a 40-month training period.

There are difficult tasks that people are subjected to in astronaut training. Both pilots and non-pilots are trained to fly T-38 jets. These are highly acrobatic aircrafts that can reach 15,000 meters. Pilots are required to fly 15 hours a month and work extra (100 more hours) to download the Shuttle Training Vehicle. Non-pilots, on the other hand, must fly for at least four hours a



month on the T-38. But before astronaut candidates even step into the flight simulator, they have to get military water survival training. This means getting an underwater certificate and proving that you can swim three times the size of an Olympic-sized pool with full flight gear and shoes. In case of unexpected situations, candidates learn how to find the way by looking at the stars and survive with fruits, and they also receive training for survival in nature. To sort out the weak, candidates are exposed to extremely high and low pressures and trained to cope with their "consequences". Then they can get on the KC-135, also called the "vomit comet," and taste weightlessness for 20 seconds. Some people like it, while others have a bad experience that takes them inside out.

Then it's time to memorize dozens of user manuals to intensively train everything from flight controls to hydraulic levers and toilet use in life-size and fully functional simulators. Every astronaut candidate can take an emergency from pre-launch checks.

It is trained on every step up to landing procedures. Candidates are also trained at the Johnson Space Center's Neutral Buoyancy Lab. This is a huge pool that simulates weightlessness with almost the original. They do "spacewalks" underwater in full spacecraft and try to make freeze-dried snacks in the little space shuttle kitchen.

Finally, when it comes to mission training, each member of the team is running numerous simulations in their area of expertise. Scientists repeat their experiments over and over. Engineers are doing mock spacewalk repeated hundreds of times to improve space station components. Pilots camp in flight simulators. After two years of full-time training, candidates receive silver lapel pins that officially prove they are astronauts. After their first flight, the silver pin is replaced with a gold one.



Although the USA and Russia generally come to mind when it comes to space research, organizations responsible for space research such as the European Space Agency (ESA), the Japan Space Research Agency (JAXA), the Canadian Space Agency (CSA) also send astronauts to space. Therefore, the conditions required to become an astronaut may vary from country to country.

2) Foods Astronauts Consume to Stay in Shape

One of the most important factors in maintaining the fitness of the body in space is nutrition. Foods play a very important role in the balance between muscle and adipose tissue. Considering the sports and exercises that astronauts are doing in terms of physical health, the role of food becomes even more remarkable. It is tried to reduce bone resorption by mandatory diet rich in calcium and minerals. Since there is no nutrition like in the normal world, new and useful methods have been developed with the contribution of technology.

Water-soluble salt is used for the foods I have listed below. Because when salt is used as grain, it can fly and block the filters. In addition, sauces such as mayonnaise, mustard, ketchup are used optionally. In addition, we hear from astronauts who were there at the time that the taste of meals in space is not the same as food on Earth.

Apart from normal stocks, three-week spare food and beverage for emergency is also stored at the space base. Food bags, napkins, spoons and forks are attached to the table with a system called velcro. Spoons and forks are cleaned with a moist napkin and removed for later use. Food to be sent is cleaned many times and packaged without losing air. And it is divided into types of eats.

Food types in space are generally divided into eight categories:

- Rehydrated foods:

Water is extracted from rehydrated foods to facilitate storage. This dehydration process is also known as freeze drying. Water is added to food before it is consumed.

- Thermostabilized food:

Thermostabilized foods are heat treated. Therefore, they can be stored at ambient temperature. Most fruit and fish are thermostabilized in canned food. These tins are similar to containers that can be purchased at local grocery stores and can be opened easily with pulling tools. Desserts are also packaged in plastic containers.

- Medium moisture foods:

Moderate moisture foods leave enough water to preserve the soft tissue and protect the product by absorbing a little water. With this method, it can be eaten without any preparation. These foods consist of dried peaches, pears, apricots and dried meat.

- Food in its natural form:

These foods are ready to eat and packaged in flexible bags. For example; nuts, dried fruit and cereal mixes, cookies and biscuits.

- Food exposed to radiation:

These products are baked, packaged in flexible foil bags and ionized. It is sterilized by irradiating radiation. Therefore, they can be stored at ambient temperature. Steak and smoked turkey as examples of irradiated foods can be given.

- Frozen food:

These foods are quickly frozen to prevent the large ice crystal from accumulating. This method preserves the original texture of the food and helps to give it a fresh taste. Examples of these foods are vegetable tart, quiche, casserole, chicken pie.



- Fresh foods:

These foods are not processed and artificially preserved. Apple and banana can be given as examples of these foods.

- Chilled food:

A cold and cool environment is required to prevent these foods from spoiling. Cream cheese and sour cream can be given as examples of these foods.



3) Sports and Exercise in Space

Although it sounds nice to float and stay in the air in space conditions, it is actually a very dangerous environment for the human body. Leaving aside the forces and radioactivity exposed during launch, space conditions that the human body is not accustomed to cause many health problems in astronauts. In the absence of gravity, plasma, the liquid portion of blood, is reduced. Fluids accumulate in the chest cavity much more than in the world. It causes a feeling of pressure and distress in the chest. Especially in the first days of space travel, it is seen that astronauts feel bad, they feel an illness similar to seasickness. Sometimes it may be accompanied by anorexia, nausea and vomiting. It is inevitable that some psychological problems will arise in astronauts who have to encounter the unknown and solve many problems in a narrow place. The most typical effects of being in space are muscles and is on the bones. Spaceships and space stations are equipped with exercise areas to avoid muscle weakness and muscle loss. In order to activate the muscles in these very narrow volumes, electrostimulation, that is, the method of stimulating the muscle by giving an electrical current from outside, and an exercise bike are used.

Despite all the precautions, there is a loss of muscles and bones in astronauts. These losses are particularly evident in the legs. Calcium loss in bones has been calculated at around 0.5% per month. Therefore, in an astronaut, who has a completely normal bone structure, it may be years later that the bone loses enough calcium to break. However, calcium excreted in the urine can accelerate the formation of kidney stones. In order to protect the muscular and skeletal systems of the astronauts, suitable exercise equipment was placed in the spacecraft and the astronauts were provided to exercise at least 2 hours a day. So everyone in space is doing



compulsory exercise. For these exercises, tools with springs and applying a reverse force to the user are generally used. Some of these are as follows:

-Space Bike:

Although its appearance is different from the bicycle we know, the working principle is the same. The astronaut, who fixes himself, makes a pedal movement after getting support by holding on. The exercise astronaut is doing is under observation and observes how much energy he consumes. The work done here is against the moment of inertia of the bicycle.

In other words, when astronauts start the wheel in motion, it causes them to do work. The faster the wheel, the more work. In addition, since the exercise of the astronaut is observed from electronic devices, it can be ensured that the astronauts do not work too hard.

-Running Band:

When astronauts fix themselves, they can actually run through space. They do this fixation by tying them to their vests thanks to the bow we know from bungee-jumping. Astronauts, fixed on the platform, start running on a belt on the International Space Station as if they were running on Earth.

-Enhanced Resistive Exercise Device:

This tool, as its name suggests, allows to do the opposite of a force that opposes the person. It is used as one of the most important tools for bodybuilding. The device, just like the springs,

creates a reaction force against you when you apply a force, so you feel like working with weights. This is one of the essential principles for maintaining your muscle structure.

4) Health Problems That May Occur in Space

Typically, astronauts are sent to the International Space Station for six months. However, American Scott Kelly made history by staying 340 days in space with Russian cosmonaut Mikhail Kornienko in 2016.

The goal of the mission was to better understand what weightlessness, radiation, and isolation do to the human body during long periods in space. Kelly's experience in space, whose twin is an astronaut, has provided unique insights into the effects of space travel on the human body. As part of the research, his brother Mark stayed at his home, and the twin brothers could later be compared in comparison. "Most health problems are asymptomatic, you cannot feel your own bone mass," Kelly told the BBC. As soon as Scott Kelly returns to earth, he was thoroughly tested. During his long stay in space, he had manifested many symptoms on his body. "There was aches and stiffness in my body, some bone loss and some muscle loss. There was swelling and increased pressure inside my skull," Kelly explained. While trying to adapt to the earth's atmosphere, he also suffered from skin diseases such as rash and hives, nausea and dizziness.

As a result of researches on other astronauts, it was observed that the following problems occurred in general:

- Tumorization and cancer in cells as a result of exposure to high radiation from the earth's orbit
- Bone and muscle tissue losses and related diseases
- Circulatory and immune (lymphatic) system diseases that may occur as a result of not being fully balanced in the body fluids



- Visual impairment
- Increased pressure felt in the head
- Changes in palate

Most of these diseases occur after leaving space and coming to Earth. The body tries to adapt to its environment in order to protect itself. As a result of this habituation, after returning, the real effects begin to emerge. In addition, since they are in an isolated structure while in space, there is no question of getting sick. Since the disease is not infected, the immune system cannot remain as strong as before. This situation significantly affects the increase in the probability of getting the disease when returning to Earth. Most of the astronauts who were sent to space with old technologies and then returned home, unfortunately, died from various diseases within a few years.



5) Conclusion

As a result, living in space is generally a serious discipline, work and attention. Therefore, people who will go are subjected to very difficult conditions. With sports and exercises, it is aimed to reduce the damage to the body. However, it is not possible to prevent this completely. The body's fitness is tried to be maintained with foods and vitamins. The human body tries to get used to the space it is alien to, and this causes observable trouble on returning to Earth. With the development of technology, these damages cannot be completely prevented even if they are tried to be minimized with the support of equipment. The physical analyzes of the astronauts are recorded live at every moment and the necessary actions are taken in case of a mishap. Since his exercises are also regularly recorded in the system, all precautions are ready and observant to prevent them from harming them. The health of astronauts is always in danger, even if they have proven themselves in physical proficiency tests with high degrees. This is tried to be prevented as much as possible. Psychological support is provided to people not only physically but also spiritually. All these difficulties actually remind us that we need to reconsider the idea of living in that space that filled our dreams. However, for human beings, borders are only perceptual obstacles. Many things that cannot be done with the necessary infrastructures can be done well, and they have been done. As the research, development, study and lessons are continued, many more successes will inevitably find humanity.



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