Biological Superhero

Space Things Team

First: Impact of space travel on living organisms

Before knowing our superhero’s characteristics ,we must first know the impact of a space trip on several living organisms.

# [A] Impact on Humans’ life:

Space missions force astronauts to live in an environment different than ours even in simple tasks as working and riding vehicles!

This is just to make them get used to tolerance of space environment which contains challenges as: (microgravity, radiation, extreme temperatures, low pressure and isolation).(3)

So negative impacts taking place in an astronaut body must be observed to limit it and find solution for them.

A.1 According to Human Research Roadmap mainly risks are classified according to criteria into (2)

A.1.1 Low Earth orbits missions:

Mainly these criteria have negligible or small impact on astronauts’ lives.

A.1.2 Lunar orbital missions without landing:

These criteria have small to normal impact on astronauts lives.

A.1.3 Lunar orbital missions with landing:

These criteria usually have normal to big impact on humans’ lives during the journey.

A.1.4 Mars missions:

These criteria mainly have big impact on human lives leading sometimes to severe risks to Humans’ health (in Mars Planetary missions) that requires instant mitigation.

A.1.5 Mars mission’s main impacts (4)

Space radiation is one of the most hazards that can damage central nervous system, cause cancer and more severe impacts.

Being on a planet that is away 140 million mile away from your planet leads us to the next 2-hazards Isolation as your calls can have up to 20 minutes delay and for about 3-years stay astronauts could face challenges as balancing their consumption of supplies as if you burn your engines for Mars, there is no turning back and no resupply.

Finally gravity is a problem an astronaut will face on the red planet, he must get used to gravity of 3/8 that of the Earth which ends up for them returning back Earth with problems to readapt Earth’s gravity.

# [B] Main difficulties in a Space Mission on humans

# B.1 Space pressure:

Air pressure in space is extremely low which equals approximately zero!

Human beings in Earth adapt with Earth air pressure by having internal pressure equal to pressure outside their body (air pressure).

Space vacuum is extremely dangerous for humans’ lives sometimes this causes lung ruptures and eventually death!(1).

# B.2 Gravitational force difference:

Gravity in space is extremely smaller than Earths’ as it also approximately equals zero.

Vestibular System which plays an important role in stabilizing human body turns gravitational information it gets into electrical impulses and then sends it to the brain.

Impulses coming from the vestibular system change though a space mission which leads to misleading the brain what by turn causes space sickness.

Usually your face gets swollen in space. The reason for that is that your blood and other fluids in your body is pulled by gravity towards your lower limbs but when you go to space, gravity is nearly zero and fluids accumulate in your upper body so face gets swollen in space. (5)

This can lead though to: loss of hearing, deformity in eye and more symptoms.

# B.3 Radiations

In outer space, without any atmosphere radiations are much denser and have lot of impacts on human body as they can lead to change heart or vessels function which will lead in turn to arteriosclerosis and will damage some tissues too.

If neurons or neuroglials cells damages, it will be difficult to heal new cells which will lead to mental weakness and insufficiency of memory.

# [C] Capabilities of creatures rather than humans to adapt in space:

# C.1 Mice

Mice have shown that they are one of the most creatures that can adapt space journeys as we will discuss:

C.1.1 Mice adaptivity to gravitational disturbance in space:

Mice have shown that they are able to adapt micro gravities in space.

By observing mice behavior, special behavior was noticed from some mice

The study included two categories (Earth mice & space mice) where the space mice showed the same results as Earth’s.

Unique behavior was observed from the mice after a week of launch where groups of young and old female mice started what scientist called (race-tracking) as they were moving as in racing laps. (6)

C.1.2 Female Mice adaptivity to Galactic Cosmic Radiations:

Our major obstacle for successful deep space journey is the negative impact of the GCR (Galactic Cosmic Radiations) on living organisms.

Upon exposing male and female mice to GCR it was observed that males only was affected by it and females haven’t any unordinary behaviors at all.

From those researches we claimed that females might be better than males in some space missions. (7)

# C.1 Tardigrades (water bear):

C.1.1 Characteristics

They are microscopic, eight-legged animals that can survive the apocalypse.

They can survive up to 30-years without food!

They can also survive a meteoroid of the power of that made the dinosaurs extinct..

Scientist says that only and only if sun died Tardigrades might be wiped out.

It is considered an aquatic animal.

C.1.2 A true superhero

Surviving high temperatures, low temperatures and different pressures here comes our microscopic superhero which will detail us with dangers upon astronauts’ lives and how to find solutions for them.

Resources:

(1): <https://sitn.hms.harvard.edu/flash/2013/space-human-body>

(2): <https://humanresearchroadmap.nasa.gov/risks/>

(3) <https://www.asc-csa.gc.ca/eng/astronauts/space-medicine/concerns.asp>

(4) <https://www.nasa.gov/hrp/5-hazards-of-human-spaceflight>

(5) <https://humans-in-space.jaxa.jp/en/life/health-in-space/body-impact/#:~:text=The%20face%20often%20swells%20in%20space&text=When%20you%20go%20to%20space%2C%20gravity%20weakens%20and%20thus%20fluids,astronauts%20often%20have%20congested%20noses>.

(6) <https://www.nasa.gov/feature/ames/studying-behavior-in-space-shows-mice-adapt-to-microgravity>

(7) <https://www.sciencedirect.com/science/article/pii/S0889159118304173>