

THE GENETIC REVOLUTION IS HERE.
ARE YOU READY FOR IT?

SPACE GENES

with **Dr. Jenn Gardy**

OVERVIEW:

There are two big doors to the future: one is genetics and the other is Space. Both are connected. This series will show the audience how our journeying into Space and genetics will rely on and impact one another.

Who we are as humans, and our planet, are a result of our place in Space. Our position in our solar system and the make-up of planet Earth have had a leading-hand in our genetic make-up. To understand what Space travel will mean and how it will be achieved, the series will not just look-forward, but will also look-back at our planet's and our genetic history.

The series will look-forward to what travelling to and living in Space will be like: the food we'll eat, our health, whether the human species will need to be genetically modified, how we'll sleep, the medicines that we'll need, and what it will mean for our future as a species.

The series will be illustrated by unique, proprietary graphics and be guided by cutting-edge Space and genetic science. It will look at loads of really fun and cool things from the the genes of identical twins (one in space and one on earth), the genes we've inherited along the way, what we can learn from the genes of other animals and plants, and how we'll need to genetically engineer for life on Mars.

Link: **Chris Mason and the space consortium**, who works with NASA designing for life in space:

<https://spacegenetics.hms.harvard.edu/people/christopher-mason-phd>

<https://tedmed.com/talks/show?id=528172>

Link: **Touching Triton**, which is a serious game including genetics and space, was used to help teach and learn an understanding of the interaction of multiple factors that we'll face in Space:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5287419/>

<https://triton.hudsonalpha.org/>

Triton, one of Neptune's moons, is now thought of by NASA as the best place for humans to travel into deeper Space.

SYNOPSIS:

EP 1: THE JOURNEY TO THE LAUNCH PAD - THE LONG AND WINDING ROAD

The journey from the origin of our human species to the launch pad has been a long and complex one – and has been powered by natural selection and random mutation. Earth, located where it is in our solar system, has determined our physical and genetic make-up. Our distance from the sun, a planet covered with water, a protective atmosphere, our magnetic field, our large moon, and the effect of gravity have all contributed to who we are. Understanding this as we venture into Space will mean we can prepare for everything that Space will throw at us.

Link: how low gravity alters our genes:

<https://www.wired.com/2012/01/low-gravity-genetics/>

EP 2: A LOT OF HELP ALONG THE WAY - SOMETHING BORROWED SOMETHING NEW

Travelling into and surviving in Space will also be helped by the other life forms that we share our Earth with. We've inherited genes – including the ancient bacteria from an 'alien' species that provides the power supply to run our genetic system (the mitochondria) – as well as learning from how other animals and plants have adapted and evolved to life on Earth. These will give us the learnings that we'll need for Space in order to survive and thrive.

Link: why the mitochondria is like 'The Force' and the midi-chlorians in "Star Wars":

<https://theconversation.com/the-force-of-biology-is-strong-in-star-wars-89128>



EP 3: GETTING READY FOR TAKE-OFF - THINGS WILL BE A-CHANGING

The three main things, or drivers, that determine our individual genes – how genes are transmitted, who our biological parents are, and our environment – will all be impacted by our going into Space. On Earth, the influences on these drivers have led to the many variations in all life forms. But Space will have an exponential effect. The series will show how our genes will be affected by Space and what can we learn from the many mutations and adaptations of life on Earth and how will this prepare us for Space. Just like life on Earth, we'll have to decide if and how much we'll move away from natural selection and random mutation – to – unnatural selection and non-random mutation.

Link: what does non-natural selection and non-random mutation involve (author interview):

<https://www.youtube.com/watch?v=RIx1GtbihXw>

EP 4: THE DARK DEPTHS OF SPACE - HOW NOT TO SCREAM

Space is not only big – it's super deadly. Radiation, the lack of natural light and gravity, and the huge distances and time spans involved will mean life will not be 'normal'. We'll experience altered sleep, loss of bone density and height, vision problems, shorter life-expectancy, biofilms that break-down the materials that our space ships are made from. And then there's the need to find and make the right fuels, create special medicines, and grow the food that we'll need to survive.

Links: biofilms: and research into materials that mess with biofilms – altering bacterial social networks:

https://www.nasa.gov/mission_pages/station/research/news/microorganisms.html

<https://news.mit.edu/2019/3-questions-how-to-control-biofilms-in-space-mit-iss-research-1101>

Link: how we can protect our cells from radiation:

<https://www.nature.com/articles/nature.2016.20648>

EP 5: THE RIGHT THERAPY - HUMANS INVENT THE NEW TOOLS

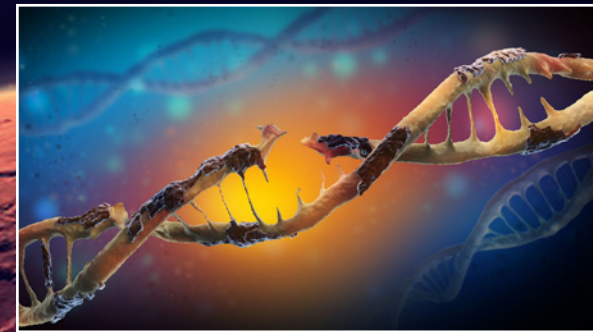
Gene therapy is an emerging field. Until now, it's been the stuff of "Deadpool" and "Spiderman". But advances in treatments for conditions such as AIDS and cancer are rocketing along. The 'Gene Industry', using the tools of Big Tech and AI, will provide the money and the brainpower to translate what we already know into what we'll need to know for Space - and help us deal with the unknown that we will encounter.

Link: what is gene therapy and how does it work:

<https://www.fda.gov/consumers/consumer-updates/what-gene-therapy-how-does-it-work>

EP 6: BACK TO THE FUTURE - THE DELOREAN MARK II

The space race of the 1960s gave us the microwave oven and velcro. It's little known that the US Military drove and paid for the human genome project that led to the mapping and understanding of our genes. The military is now building the super-soldiers that will be the template for our future astronauts and Space pioneers. Our fight against Terror has given us unique insights and understandings of the influence of drugs and genetics. And then there are the lessons from the world of sports through doping and selecting for optimal traits. This series will show the audience what we future humans will be like.



METADATA:

Host **Jenn Gardy** (now with the Bill & Melinda Gates Foundation)

Links:

<https://www.gatesfoundation.org/about/leadership/jennifer-gardy>

https://en.wikipedia.org/wiki/Jennifer_Gardy

Scientific **Partner Garvan** Institute

Link:

<https://www.garvan.org.au/>

Scientific advisor **Edwin Kirk**

Link:

<https://med.unsw.edu.au/our-people/edwin-kirk>

<https://www.amazon.com.au/Genes-That-Make-Us-revolution-ebook/dp/Bo87SCFYXJ>

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