**What It’s Like to Go to Mars**

By [Michael Lemonick](http://science.time.com/author/mikelemonick/)May 30, 2013

A trip to [Mars](http://topics.time.com/mars/) would be the adventure of a lifetime. Just ask the 78,000-plus people who signed up to move there, as part of Mars One’s [hypothetical colonization project](http://newsfeed.time.com/2013/05/09/78000-people-apply-for-one-way-trip-to-mars/).

But it would also be really, really unpleasant. And we’re not just talking about the general annoyance of spending a year-long voyage huddled in a tiny capsule with all kinds of strangers whose every irritating habit would play out thousands upon thousands of times.

Rocket scientists have long known that voyagers to Mars — or any space destination, really — would be bombarded to some degree with interplanetary radiation. Now, however, we know exactly how much: 1.8 millisieverts per day, which is roughly the equivalent to 100 full-body CT scans per round trip — enough to increase an astronaut’s lifetime risk of dying from [cancer](http://topics.time.com/cancer/) by at least 3%. “Even the best available shielding wouldn’t help much,” says Cary Zeitlin, of the Southwest Research Institute in Boulder, Colo., who authored a paper on the subject in the latest issue of *Science*.

How can Zeitlin be so sure? Because he’s got an expert source: the radiation detector that tagged along on [Curiosity](http://lightbox.time.com/2012/08/20/interactive-360-panorama-from-mars-curiosity-rover/)’s mission to Mars, whose job was to sniff out potential dangers to humans that might someday make the same journey.

The detector noted two kinds of dangerous particles slamming through the walls: solar energetic particles, or SEPs, flung away from the sun by [solar flares](http://techland.time.com/2011/06/08/spectacular-solar-flare-impresses-may-disrupt-gps-and-power-grids/) and [coronal mass ejections](http://science.time.com/2013/01/22/solar-blob-attacks-the-earth/), and galactic [cosmic rays](http://science.time.com/2013/02/19/solved-how-cosmic-rays-are-made/), or bits of matter blasted across the Milky Way by exploding stars. It’s the latter, which was by far the most prominent, that “punch through any reasonable shielding,” says Zeitlin.

You could always go with *un*reasonable shielding, of course — lead or concrete walls a few feet thick, or a giant water-filled bubble (materials rich in hydrogen, like H2O, are excellent at keeping out space particles). But those would be impossibly heavy. And even something as seemingly impervious as a foot-thick hull of aluminum, says Zeitlin, “wouldn’t reduce the dose by much.”

But it isn’t just the journey that’s a problem — it’s the destination. On earth, our planet’s strong magnetic field keeps most dangerous particles at bay, and even the [International Space Station](http://topics.time.com/international-space-station/) orbits low enough to stay relatively safe. Mars doesn’t have much of a magnetic blanket, though, so astronauts would be bombarded with radiation on its surface, as well.

The dose would only be half as much: “In space, radiation comes from all directions,” Zeitlin explains. “When you’re on a planet, it only comes from above.” (The radiation detector is now on the surface with Curiosity, putting actual numbers to that general rule of thumb.)

Still, it all adds up — and there’s no protective solution in sight. Which means that if we were sending astronauts to Mars today, the only thing NASA could do is inform them of risks and hope for the best, which is ethically dubious.

“Fortunately,” says Zeitlin, evidently discounting the Mars One fanatics, “nobody’s going to Mars anytime soon.”