

A little-known fact: all living things possess tiny amounts of radioactive material. This is an inherent part of nature

In the early universe, many elements consisted of a mixture of radioactive and stable isotopes. While many of the radioactive isotopes decayed over millions of years, eventually becoming entirely stable, some decayed very slowly. Consequently, a small proportion of these atoms remained radioactive. As life emerged on Earth approximately 3.7 billion years ago, these unstable, radioactive elements were incorporated into the structures of nascent life forms. Initially present in bacteria, they subsequently became part of plants, then animals, and ultimately, through the food chain, became incorporated into our own bodies.

Potassium, a salt found in every living cell, is the cause

The potassium isotope K-40 decays slowly throughout your life, emitting a minuscule amount of radiation that poses no health risk, but can be readily measured (see Table 1 for details). Given that we're discussing the safety of the urea breath test, it's worth noting that the natural radiation produced by our bodies over approximately three days is equivalent to that of the test itself.

An interesting comparison involves bananas, a food rich in potassium, including K-40. It's been estimated that consuming three bananas daily for a month results in a similar level of radiation exposure as a urea breath test. The radiation dose from the K-40 in bananas is about 0.1 μ Sv. However, considering excretion, the effective dose is closer to 0.033 μ Sv. Therefore, a conservative estimate is that the radiation dose from **30 to 50 bananas** is equivalent to that of a urea breath test (2-3 μ Sv).

Table 1. Natural Radiation in Your Body compared with the C-14 Urea Breath Test

Average annual human exposure to ionizing radiation in millisieverts (mSv) per year			Breath Test Equivalents
Radiation source	dose (mSv)	Remark	
Inhalation of air	1.26	Mostly comes from radon gas, and how well a space is ventilated matters	400
Ingestion of food & water	0.29	(potassium 40, carbon 14, etc)	90
Radiation from the earth	0.48	Can vary based on the type of soil and materials used in buildings	160
Cosmic rays from space	0.39	Changes depending on how high above sea level you are	130
Sub total (natural)	3.1	Everyone is exposed to this each year	780
Urea Breath Test	0.002-0.003	much less than natural	1

The total radioactivity emitted from your body's potassium over a 12-month period is measurable and equivalent to approximately 100 breath tests.

Internal Carbon-14 (C-14)

C-14 is naturally present in your body. The 12 kg of natural carbon in the human body contains the radioactive isotope C-14, which produces approximately 3,700 beta particles (electrons) per second. Given that the amount of C-14 remaining in the body 72 hours after a C-14 urea breath test is equivalent to the amount naturally present, the test is considered equally safe. In fact, the level of radiation exposure from the body's natural C-14 is comparable to receiving about 10 breath tests annually.

Cosmic Radiation from Outer Space

Everyone is exposed to cosmic radiation from space, which passes through the atmosphere. It's mainly high-energy protons that hit air molecules, creating particles that reach our bodies. **Each year, we get a dose equal to about 100 urea breath tests.** This exposure affects everyone—men, women, children, even unborn babies. The amount is tiny and has no known harmful effects, much like a routine breath test. It's a natural, unavoidable part of life on Earth.



The Absolute Safety of the C-14 Urea Breath Test



“Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we can fear less.”

- Marie Curie, Nobel Prize in Chemistry.

Terrestrial and Background Radiation (cosmic rays)

The table provides background levels, which are on the low side of the average. In some U.S. states with granite-rich soil, such as Colorado, residents receive additional radiation from naturally occurring radioactive materials in the Earth. These materials, including uranium, radon, and thorium, are present in the rocks beneath everyday environments, such as streets and residential basements. This terrestrial radiation, while measurable, adds an average of 500 μSv per year in the United States, equivalent to approximately 200 C-14 breath tests. Given that millions of people are routinely exposed to this level of natural radiation without ill effect, the far lower dose from medically administered breath tests is not a cause for concern.

Laboratory Tests

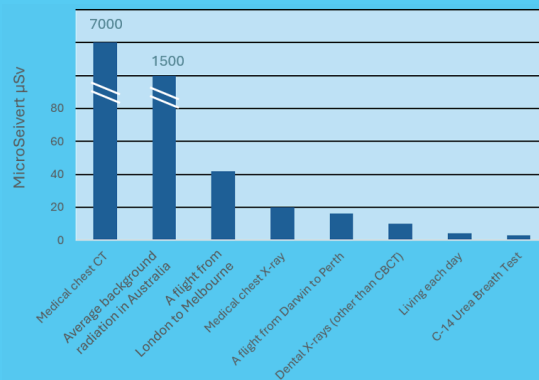
Colorado residents receive about 1,000 μSv more natural radiation each year than people in New York City—roughly equal to 300 extra breath tests annually. Over 50 years, that's 15,000 additional breath tests. Yet, no increase in radiation-related illness has been observed in the population. This suggests that both natural background radiation and the C-14 in our bodies pose extremely low health risks. In fact, **the radiation from a urea breath test is far lower than other common exposures**, like spending time in a basement. These tiny, measurable doses have no known harmful effects.



Altitude and Cosmic Rays

Everyone is exposed to cosmic radiation, and this exposure increases with altitude. Consequently, individuals on Mount Everest or in an airplane receive a higher dose than at sea level. In fact, **passenger jet travel results in an additional cosmic radiation exposure of 3 μSv per hour, equivalent to one C-14 urea breath test per hour.**

This level of exposure poses no concern for the health of passengers, including women, children, and pregnant women, who require no special precautions during air travel. Therefore, a round trip flight from California to New York, for example, results in a cosmic radiation dose equivalent to approximately 10 breath tests for all passengers. This illustrates that the radiation exposure from a C-14 urea breath test is considerably less than that from common activities like air travel.



For more information please visit arpansa.gov.au or ada.org.au

In conclusion, the C-14 urea breath test is completely safe.

This test was discussed by the world's top experts at a hearing of the US FDA. The statement by the FDA expert was: **"I can see no reason for not doing the test in women, whether pregnant or not, or on children**, whenever there is a medical basis for its use... exposure is to a fraction of a day's natural background and there's absolutely no basis on which to believe that this is hazardous".



Author Barry Marshall, Nobel Prize in Medicine 2005. For a more detailed explanation and a full reference list for this document, scan the QR code below.

