



**Cymbalta**  
duloxetine HCl  
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KNOWN RISK OF depression and some other psychiatric disorders. Call your doctor right away if you have new or worsening depression symptoms, unusual changes in behavior, or thoughts of...

Depression can have a broad range of symptoms.

Cymbalta is indicated for the treatment of depression.

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## Flying and Radiation Risk

### Physicist Calls for Airline Industry to Educate Workers about Radiation Levels

September 1, 2005 — At the high altitudes and latitudes commercial airlines fly, crews are subjected to higher-than-normal radiation levels from the sun and cosmic rays. Physicist Robert Barish believes airline crew members are exposing themselves to more radiation than almost any other occupation and is calling for the airline industry to better educate workers about radiation.

**See also:** NEW YORK--Most careers have an occupational hazard, but frequent fliers may be exposed to cosmic radiation and not even know it.

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We all know the risks when we fly, but one risk we don't know about comes from what's in the sky. Captain Joyce May, a commercial airline pilot, says, "By the time you're at normal jet cruising altitude of, say, 39,000 feet, the total radiation is about 64 times greater than what it is at sea level."

May fears fellow crewmembers and frequent business fliers don't know the risk of cosmic radiation from solar flares. She says,

"Aircrew members, by-and-large, are unaware of this issue."

Robert Barish, physicist and author of "The Invisible Passenger: Radiation Risks For People Who Fly," says, "The sun is really a big thermo-nuclear device." Barish believes airline crewmembers are exposing themselves to more radiation than almost any other occupation. He says, "People who work in the nuclear power industry on an average basis are getting 1.6. There are people who fly in airplanes who are getting 2 or 3 or 4 milliSieverts per year. So they are truly radiation workers."

Everyone is exposed to some radiation every day. The sun constantly emits charged particles that intensify during solar flares. Normally, the earth's atmosphere absorbs much of this, but at the high altitudes and latitudes airliners fly, crews are subjected to higher radiation levels and possibly are at higher risk for developing cancer. In Europe, it is mandatory flight crews be educated about cosmic radiation, but that's not the case in the United States.

The risk is not the same for everyone. Casual fliers have nothing to worry about. Only people who fly at least once or twice a week.

**BACKGROUND:** Airline pilots and flight crews may be exposed to higher radiation levels and therefore greater risk of developing cancer.

**WHAT ARE SOLAR FLARES:** Deep inside, the sun produces energy by joining atoms of hydrogen, and these nuclear reactions produce the heat and light from the sun. The earth's magnetic field protects us from most of the sun's radiation, and so does our atmosphere. The sun's surface also has magnetic fields, stronger in some places than others, and occasionally the magnetic fields can become twisted. A solar flare is a tremendous explosion on the sun that occurs when energy stored in a "twisted" magnetic field is suddenly released. This produces a burst of radiation across the entire spectrum, from radio waves to X-rays and gamma rays.

**HOW RADIATION AFFECTS CELLS:** Most of us are aware that the sun's ultraviolet (UV) radiation can damage surface skin cells, even leading to skin cancers, but at high energies it can become ionizing radiation. Ions are electrically charged atoms, a byproduct of a high-energy light ray (X-rays or gamma rays) knocking electrons off of atoms. The

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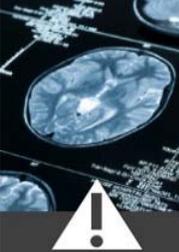
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which can then spread. And if the mutation occurs in a sperm or egg, the result can be birth defects, which is why pregnant women should never be subjected to X-rays.

**HOW MUCH IS TOO MUCH:** Not all of the radiation from a solar flare reaches the earth at the level where we live, but commercial aircraft fly at much higher altitudes where the earth's magnetic field is weaker. So higher levels of radiation may be present. Still, the levels of radiation aren't all that dangerous: on a par with an X-ray or CT scan. This could still be harmful to pregnant women, however, and pilots and flight crew fly so frequently that over time, they receive much larger doses of radiation. Although most studies to date have shown no ill effects from this exposure, the effect can add up over long periods of time.

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