

on these abilities,” says Tyler-Smith, who calls the possible links to events in human prehistory “highly speculative.”

Lahn and colleagues also found a pronounced pattern in the distribution of the favored alleles in populations around the world: The *microcephalin* allele, for example, is much more common in Europe, Asia, and the Americas than in sub-Saharan Africa. Using a larger sample from 1184 individuals, the team found this allele in roughly 75% or more of Italians, Russians, and Han Chinese, and in nearly 100% of Colombians. In contrast, the allele had frequencies of less than 10% in the

Zime of Cameroon and the San of Namibia, and about 30% of Tanzanian Masaai. The *ASPM* allele also showed a skewed geographic distribution.

Lahn and his co-workers say that several scenarios could account for the pattern. For example, the favored alleles may have arisen outside Africa, or they may reflect a genetic “bottleneck” that occurred when a relatively small founding population carrying the alleles migrated out of Africa.

The possibility that the favored alleles might confer some sort of cognitive edge—and that they are unevenly distributed in human populations—raises social and ethi-

cal issues, researchers say. Lahn warns that there is “a lot of potential for over- and misinterpretation” of his results. He points out that other advantageous alleles might have a very different population distribution. “You don’t necessarily come out ahead” if you have these alleles, Lahn says: “We only picked out two.”

Although they acknowledge such social concerns, most scientists who spoke to *Science* say that the only way to answer the questions posed by this research is to do more research. “We should treat these genes just like any others,” says Tyler-Smith.

—MICHAEL BALTER

## NUCLEAR MEDICINE

# Panel Puts Eventual Chernobyl Death Toll in Thousands

**VIENNA, AUSTRIA**—A study released this week predicts that 4000 people or even more will die from cancers caused by the 1986 Chernobyl nuclear accident, a figure that dwarfs the 50 known deaths linked to the disaster so far. The report,\* compiled by the Chernobyl Forum, a joint effort of eight United Nations agencies and the governments of Ukraine, Belarus, and Russia, also highlights the thousands who are suffering a variety of mental health problems since the accident.

The meltdown of one of the reactors at the Chernobyl power plant in Ukraine on 26 April 1986 released approximately 50 tons of radioactive material into the atmosphere, contaminating an area inhabited by 5 million people. Because the most pernicious contamination was radioactive iodine-131, which lodges in the thyroid, most of the casualties are expected to succumb to thyroid cancer, which typically takes 25 years or more to show up.

Over the 19 years since the accident, estimates of the final death toll from radiation-induced cancer have ranged from zero to tens of thousands. The panel of 100 scientists involved in the Chernobyl Forum reduced that uncertainty by reviewing all available data and discounting studies that were not sufficiently rigorous. “But that only considers the 600,000 people living in the most exposed areas. [The total] could double to 8000 if you also consider people around that area,” says forum member Fred Mettler, a radiologist at the University of New Mexico in Albuquerque.

Radiation biologist Mikhail Balonov was part of the Soviet team rushed in to assess Chernobyl in 1986, and he says his

team “also predicted 4000 deaths. But our conclusions were classified.” The forum’s 600-page report, released by the International Atomic Energy Agency (IAEA) here on 5 September, also echoes initial predictions that the radiation will have no effect on fertility or the frequency of birth defects in the second generation. “Luckily, the exposure was too low for that,” says Balonov, who now heads IAEA’s Radioactive Discharges Unit. Other effects of the radiation are either too subtle or have not yet been detected.

The outlook for the environment around Chernobyl appears somewhat better.

According to the report, 90% of the radioactive contamination was cleaned up through a massive removal of surface soils. Researchers are developing special salts and fertilizers to inhibit the remaining radioactive material in soil from getting into crop plants. But on the whole, the forum concludes, most of the originally exposed area is close to background levels of radiation.

The report’s most surprising conclusion is that mental health problems appear to be more common than any radiation-linked disease. The incidence of high anxiety is twice normal levels, and unexplained pain or debilitation is three to four times that in similar unexposed populations. One possible cause is the trauma experienced by the 350,000 residents who were forcibly relocated.

Mettler, a member of the international scientific team that first visited the Chernobyl site in 1990, says another factor “is the psychological impact on people of not knowing the extent of contamination or the real health risks it poses.” That uncertainty, according to the report, seems to have translated into unhealthy lifestyle choices such as heavy smoking, drinking, drug use, and poor diet.

Removing anxiety won’t be easy, says Balonov. People in the Chernobyl area do not trust government officials, he notes, because “there was a tradition of lying” in Soviet times. Mettler hopes the Chernobyl Forum report will reassure residents. “It’s a start,” he says.

—JOHN BOHANNON

John Bohannon is a writer in Berlin, Germany.



**Sleeping giant.** A guard walks past the remains of Chernobyl’s reactor #4, which is encased in a now-crumbling sarcophagus.

\* *Chernobyl’s Legacy: Health, Environmental, and Socio-economic Impacts*, www.iaea.org/NewsCenter/Focus/Chernobyl