Dogs living near Chernobyl are genetically different to other groups

The genomes of dogs living near the Chernobyl nuclear plant in Ukraine have been sequenced to investigate how they may have been affected by high levels of radiation

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Dogs living in and around the Chernobyl Nuclear Power Plant in Ukraine are genetically distinct from dog populations living further away from the site of the nuclear accident. The results will be used to try to understand the long-term genetic effects of radiation exposure.

After the Chernobyl nuclear plant exploded in 1986, people living nearby were evacuated. The pets they had to leave behind were culled by authorities to try to stop them from spreading radioactive contamination.

Some pet dogs, however, managed to evade hunters and were fed and cared for by clean-up workers. More than 800 descendants of these dogs are now thought to be living inside and around the defunct nuclear plant.

To explore the effects on this population of the large amounts of radiation released by the nuclear accident, Elaine Ostrander and Gabriella Spatola at the US National Human Genome Research Institute in Bethesda, Maryland, and their colleagues collected blood samples from 302 dogs in the Chernobyl area and sequenced their genomes. The sampling took place between 2017 and 2019, before Russia's ongoing invasion of Ukraine.

Of the dogs sampled, 132 lived in close proximity to the nuclear plant, either inside the facilities that store spent nuclear fuel, in the railway station next to the plant or in the woods directly surrounding it. Another 154 were stray dogs in Chernobyl City, a largely abandoned town 15 kilometres from the nuclear plant. The last 16 were stray dogs in Slavutych, a more populated area 45 kilometres from the plant that has been exposed to less radiation.

The researchers compared these genomes with those of more than 200 free-breeding dogs from other parts of Ukraine and 12 nearby countries.

The genomes of the dogs living close to the nuclear plant and in Chernobyl City were both markedly different to those of dogs in Slavutych, other parts of Ukraine and other countries.

At this stage, it is unclear whether this is because their genomes have been altered by radiation, because individuals with certain genetic features have been more likely to survive the radiation and pass down their genes, or as a result of 37 years of inbreeding due to the dogs' relative isolation.

"We had to characterise these different populations as the necessary first step in order to do the experiment we want to do next, which is to find out how [the Chernobyl dogs] have survived in this hostile environment of radiatio

All the dogs in the study were mixtures rather than any specific breed, but the researchers found that the dogs living close to Chernobyl City and the nuclear plant appear most genetically related to German shepherds, suggesting they are descended from German

shepherd pets. “That means we can use German shepherds from other places as a kind of background to look at genetic scarring on the Chernobyl dogs,” says Spatola.

The team will also compare the Chernobyl dog genomes with those of dog specimens in museums that pre-date the nuclear disaster to look for evidence of genetic alterations.

The results may help to identify genetic variants that increase cancer resistance or assist the development of protections against radiation exposure, both for people on Earth and those venturing into space, where radiation levels are higher, say the researchers.

“A nuclear disaster like this has only happened once in human history – we hope it never happens again – so we want to learn everything we possibly can from it,” says Ostrander.