Radiation riddle remains even after scientist's lifetime research

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A large tract of land not far from E. John Ainsworth's Pleasanton, Calif., home bears no evidence of the research on radiation health effects he led in the 1960s, at the height of the Cold War.

But it was there, at a military installation in Dublin, Calif., called Camp Parks, that sheep, burros, goats and pigs were placed inside a triple-fenced pasture. A machine then bathed them in dangerous gamma rays, which penetrated deep into tissue and damaged their cells.

Ainsworth's pioneering work in Dublin, and also in San Francisco, helped in the development of the handful of approved drugs for treating those exposed to the damaging rays. It also deepened understanding of radiation's effects on tissue, blood and DNA.

And his insistence that the nuclear threat hadn't ended with the 1989 fall of the Berlin Wall kept alive the military's largest radiation health effects research program, based in Maryland. Experts now consider the program critical to national security.

"Greater minds in Washington had decided it (the program) was no longer necessary," said Tom Seed, a senior scientist with the countermeasures division at the Armed Forces Radiobiology Research Institute in Bethesda, Md., speaking of his institute.

But Ainsworth, who served as its scientific director from 1989 to 1998, and the officer heading the lab vigorously lobbied the Department of

Defense to keep it running.

The DOD rescinded the closure order.

Then came the Sept. 11, 2001, attacks. Soon after came the discovery of an al-Qaida training manual for making a "dirty bomb," composed of radioactive material and conventional explosives. And Mideast instability and hostility toward Western nations continue to stoke fresh fears about nuclear proliferation.

"All of a sudden, there was a realization that the threat hadn't gone away but was just reconfigured," Seed said. "It was a different form, but still sizable."

The lab is now regaining its prominence and employs a staff of 150. "It's growing by leaps and bounds," said Terry Pellmar, who retired last month as the institute's scientific director.

In addition, Ainsworth and Glen Reeves, a colleague at the lab, established a successful program to work with Russian radiation experts after the Cold War ended. They did it, Ainsworth said, to keep the newly unemployed Russian scientists from seeking work with countries antagonistic toward Western nations.

"Having them go to bad places was not in the world's best interest," Ainsworth said. He and Reeves also arranged for the transfer of radiation research from the Soviet Union previously unavailable in the West.

Born in 1933 in Indiana, Ainsworth entered his youth at the dawn of the Atomic Age, after two nuclear bombs were dropped by the United States on Japan in the waning days of World War II. He graduated from Brown University with a Ph.D. in biology, and dedicated his life to researching

ways to reduce the threat of radiation by understanding how it does its harm. That knowledge opened doors to developing medicines to counteract its damage, or to prevent injury.

"If we have to send troopers into a radiation field, then we can give them a pill that will spare them the damage that kills cells," said Ainsworth, describing a still-elusive research goal that his work helped hone.

The California program he headed, which was then the largest radiation health effects program of its kind nationwide, captured the attention of his peers.

"He was a prime mover and shaker of his day," Seed said. "What Dr. Ainsworth developed was a sense of what exposures were damaging and what (exposures) people could recover from."

The large animals served as proxies in the quest to find radio protection for civilians and for military personnel. In both San Francisco and Dublin, dogs taken from the pound were used in tests, Ainsworth said.

In Dublin, the farm animals were tested in a fenced-in pasture, which in turn was surrounded by another fence, and then another -- to keep trespassers out of the dangerous area.

One time, Ainsworth recalled, a sky diver landed near the outer fence, although apparently not while experiments were under way. But it caused a furor, and signs were erected warning people away from the area, including one on the ground large enough for a passing plane -- such as one carrying sky divers -- to see.

"We had to keep people out of the damn place," Ainsworth said.

He and other researchers observed the experiments from a shack on a

distant hill, equipped with binoculars. The studies yielded numerous insights, he said.

From those experiments with dogs, for example, Ainsworth and others learned that not only did gamma rays destroy bone marrow, but they caused damage to the lining of the intestine. So only treating bone marrow, then a common procedure for radiation exposure, might not be enough.

The work also helped researchers understand which animals' biology more closely matched humans, and therefore made more effective research subjects.

There was little controversy then over the use of animals for medical studies, Ainsworth said.

Since then, however, options have narrowed for the use of animals, and one 2005 study cited such limitations as "a major bottleneck" in the development of new or improved drugs for radiation injury treatment or prevention. In 2008, the Food and Drug Administration also issued revised guidelines on the use of animals in research, including animal welfare issues. That report, however, reiterated the agency's mandate that "when human efficacy studies are not ethical or feasible" scientists are required to use animals for research leading to the approval of drugs.

Pellmar, the former scientific director of the radiobiology research institute, said she still points new radiation biologists to older studies like Ainsworth's findings on large animals.

"There's been a tremendous amount that's already been done that they can build on, instead of reinventing it," she said.

"Dr. Ainsworth did some of the seminal work on understanding the

biological effects of radiation," Pellmar said.

Ainsworth, who has been married 48 years, has two daughters, a son and seven grandchildren, all of whom live in the area. He still consults, and Seed said many seek out his advice.

Ainsworth, now 75, has esophageal cancer, and his wife, Carolyn, said that three months ago, doctors gave him months to live. His cancer isn't linked to his radiation work, Ainsworth added. "I ascribe it to old age and bad genes."

Ainsworth, an avid photographer, spent the past year transferring a lifetime of slides, photos and home movies to digital formats. He also looks healthy and energetic, and easily smiles.

"He's accepted this with such grace that he amazes us all," Carolyn Ainsworth said. "As he has often said, 'I've lived a wonderful life, and each day is a blessing.' "

Ainsworth expresses some frustration at the progress of research in the area to which he devoted his life, and he marvels at the technological tools now available to radiation biologists. Had they been available to him, Ainsworth said he would have dug into genetic and physiological responses to radiation, enabling a more sophisticated comparison between animals and humans.

"Next time," he said, smiling.

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