

## Chapter 13

# Microchip–Induced Tumors in Laboratory Rodents and Dogs: A Review of the Literature 1990–2006

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### ABSTRACT

*This chapter reviews literature published in oncology and toxicology journals between 1990 and 2006 addressing the effects of implanted radio-frequency (RFID) microchips on laboratory rodents and dogs. Eleven articles were reviewed in all, with eight investigating mice and rats, and three investigating dogs. In all but three of the articles, researchers observed that malignant sarcomas and other cancers formed around or adjacent to the implanted microchips. The tumors developed in both experimental and control animals and in two household pets. In nearly all cases, researchers concluded that the microchips had induced the cancers. Possible explanations for the tumors are explored, and a set of recommendations for policy makers, human patients and their doctors, veterinarians, pet owners, and oncology researchers is presented in light of these findings.*

### PROBLEMS WITH MICROCHIP IMPLANTATION – AND WHY THEY MATTER

Since their introduction in the late 1980s, implantable microchips have become the industry standard for identifying mice and rats used in laboratory research. Animal shelters and veterinarians now routinely inject microchips into dogs and cats. More recently, there has been a push to implant

microchips into people for security and building access, to manage medical records, and to identify elderly patients.

American workers at the now-defunct City-Watcher surveillance company (VeriChip Corp., 2006) and officials with the Mexican Attorney General's office (Applied Digital Solutions, 2004) have been microchipped. Concern that the practice could spread has raised the specter of Big Brother and prompted lawmakers in three states to pass

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laws preventing the forced or coerced implantation of microchips in human beings. California, Wisconsin, and North Dakota have all passed laws banning forced or coerced microchip implantation in human beings. See: California SB 362 (2007), Wisconsin AB 290 (2005), and North Dakota SB 2415 (2007).

There is now an ongoing debate regarding the safety of the chips. As a result of lobby pressure combined with heavy advertising by Schering Plough for its HomeAgain pet recovery system, close to 5% of the United States' estimated 164 million dogs and cats have now been chipped (Banfield the Pet Hospital, 2005). Animal shelters around the United States are routinely chipping dogs and cats before releasing them for adoption, and governments, including those of Portugal, Singapore, Bangkok, Los Angeles County, and El Paso, Texas, have passed ordinances requiring that all dogs under their jurisdiction be microchipped. El Paso has extended the chipping mandate to cats and ferrets.

In addition, horses around the nation are also being chipped, and the USDA recently approved the use of equine radio-frequency identification (RFID) injectable transponders as part of the National Animal Identification System (NAIS). The National Animal Identification System (NAIS) is a national premises registration, animal identification, and animal tracing program for owners of livestock. NAIS is a national program run by the United States Department of Agriculture (USDA), but is being implemented primarily at the state level.

As for human beings, an estimated 300 Americans and 2,000 people worldwide have been implanted with microchip transponders. This chipping apparently proceeded with the full consent of the implantees until early 2007, when the VeriChip Corporation began implanting Alzheimer's patients and their caregivers with microchips as part of a research study. These patients have reduced mental capacity and are unlikely to understand what is being done to them.

It appears that few people undergoing microchip implantation have been told about the potential health risks associated with the device. In fact, up until September 2007, almost three years after FDA approval, no mention had been made by the company or the FDA in relation to the well-established, though generally under-reported, finding that the microchip caused cancer in laboratory mice and rats.

### **Microchip-Induced Cancer in Mice and Rats**

In at least six studies published in toxicology and pathology journals between 1996 and 2006, researchers found a causal link between implanted microchip transponders and cancer in laboratory mice and rats. The tumors were typically sarcomas, including fibrosarcomas. Other cancers found included rhabdomyosarcoma, leiomyosarcoma, malignant fibrous histiocytoma, mammary gland adenocarcinoma, malignant schwannoma, anaplastic sarcoma, and histiocytic sarcoma.

In almost all cases, the tumors arose at the site of the implants and grew to surround and fully encase the devices. In several cases the tumors also metastasized or spread to other parts of the animals, including the lungs, liver, stomach, pancreas, thymus, heart, spleen, lymph nodes, and musculature of the foreleg.

The tumors generally occurred in the second year of the studies, or after half a lifetime's exposure to the implant. At the typical time of tumor onset the animals were in middle to advancing age. The exception to this was the Blanchard (1999) study, in which genetically modified mice developed fast-growing cancers well before six months.

The percentage of mice and rats developing microchip-induced tumors in the six studies reviewed ranged from 0.8% to 10.2%. Several researchers, including Elcock et al. (2001), Le Calvez et al. (2006), and Tillmann et al. (1997) suggest that the actual rate of tumor formation may have been higher than was reported in their

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