

DoD Biomedical Research Data:

<i>TITLE :</i>	Toxicity Assessment of Degradable Chaff
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<i>Keywords :</i>	Laboratory Animals animal chaff aluminum toxicity aluminum bioavailability degradable glass aluminized glass fibers rat
<i>OBJECTIVE :</i>	Chaff consists of strands of glass coated with a metal of high purity (i.e., >99.9%). The strands are slightly thicker than a human hair and range in length from approximately 0.5 to 1 inch. The Navy, Army, and Air Force all use metalized glass chaff as a passive countermeasure for radar-guided threats, and heightened concern for the impact of deployed chaff on human and animal habitats has led several groups to develop an environmentally friendly, degradable chaff that retains its technical characteristics. Current Navy chaff countermeasures are considered nontoxic to both humans and animals; however, new degradable chaff forms are currently under development at the Naval Air Warfare Center. Toxicity testing of these materials is necessary to evaluate the potential health effects of oral exposure and to assist in human and ecological risk assessment of the geographical areas over which the new chaff will be deployed.
<i>Approach :</i>	Aluminum is the third most abundant element on earth and comprises roughly 8% of the earth's crust. Few adverse human health effects resulting from aluminum exposure have been reported largely because this element is poorly absorbed from the human gastrointestinal tract. Aluminum

has been implicated in the etiology of at least one neurodegenerative disease, although data supporting this hypothesis are inconclusive. United States military aircraft use aluminized glass chaff as a passive countermeasure to radar-guided threats. In an effort to assist in human health and ecological risk assessment of the geographical areas over which chaff is deployed, current studies are evaluating the effects of exposure to aluminized chaff. Results from an in vitro physiologically based extraction test predict that bioaccessibility (intestinal absorption) of aluminum derived from ingested chaff ranges from 1% to 4%. Male Fischer 344 rats are dosed with aluminum lactate, aluminum hydroxide, or one of five different forms of chaff for 5 consecutive days to evaluate the extent of aluminum absorption by the rat gastrointestinal tract. These efforts serve a dual purpose. First, dosing rats with different chaff forms gives insight into potential toxicity. Second, the rat is a good model to compare the results obtained from the physiologically based extraction test. If this laboratory method is validated in the animal model, it could be used in future studies in lieu of additional laboratory animals.

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Research was conducted in compliance with the Animal Welfare Act and other Federal statutes and regulations relating to the use of animals in research and was reviewed and approved by the Institute's Animal Care and Use Committee.