



**IMPROVING QUALITY WITH SCIENCE**

# **BENEFITS OF IRRADIATED FOODS**

**Richard G. Hunter, Ph.D.**  
**President/CEO**

## Irradiation

- ③ Irradiation means exposing something to radiation
- ③ Most use gamma rays from Cobalt 60 or X-rays or electrons from generating machines
- ③ Energy from the rays kills living organisms by breaking chemical bonds in DNA
- ③ Performed in final packaging which limits recontamination potential
- ③ Safe, reliable process that is used to sterilize over 50% of single-use medical products

## Food Irradiation

- 🌱 **Goal is to kill pathogens or insect pests without changing taste or palatability**
- 🌱 **Food is not sterilized - bacterial pathogens are greatly reduced**
- 🌱 **Cold process – does not raise the temperature of the product**
- 🌱 **Cannot cause food to become radioactive just as a dental x-ray cannot make your teeth radioactive**
- 🌱 **FTSI charges 3 to 10 cents per pound**

## Food-borne Illness in US

- 🌱 1999 CDC estimated 76 million cases resulting in 325,000 hospitalizations and 5,000 deaths
- 🌱 2004 CDC data showed large decreases but concluded *“Other effective prevention measures, such as pasteurization of in-shell eggs and irradiation of ground meat and raw poultry, should be used more widely, particularly for foods eaten by persons at high risk.”*

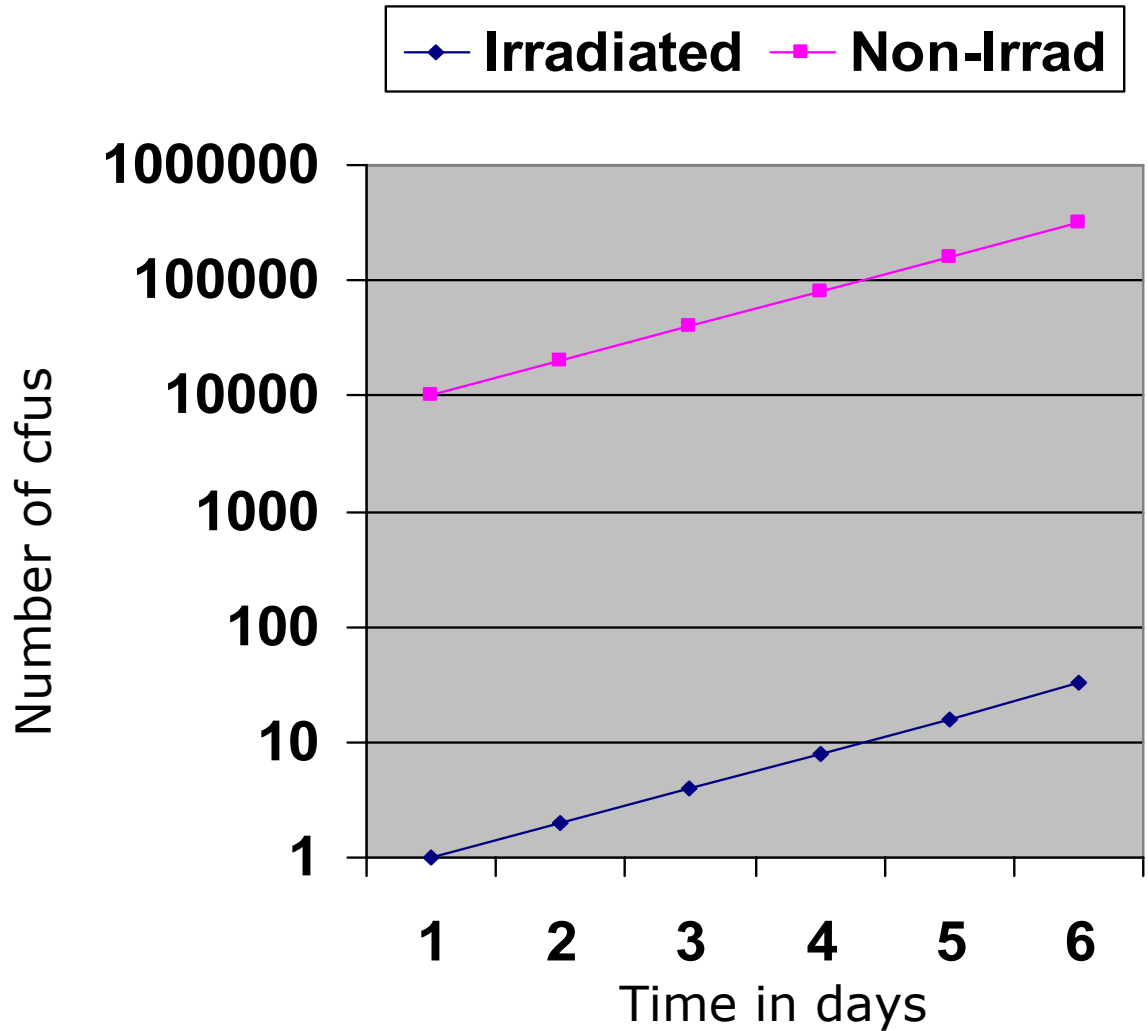
## CDC ESTIMATES OF POTENTIAL BENEFITS OF INCREASED USE OF IRRADIATED MEAT AND POULTRY

Pathogen	Major Complications	Annual number of prevented cases	hospitalizations	deaths
<i>E. Coli 0157:H7</i>	At least 250 cases of HUS	23,000	700	20
Campylobacter	250 cases of GBS	500,000	2,500	25
Salmonella	6,000 cases of reactive arthropathy	330,000	4,000	140
Listeria	60 miscarriages	625	575	125
Toxoplasma	100-1,000 cases of congenital toxoplasmosis	28,000	625	94
<b>Total Prevented</b>	<b>6,600 catastrophic illnesses</b>	<b>881,625</b>	<b>8,500</b>	<b>352</b>

**Products receive a dose measured in Kilograys.  
Most food products in the range of 1 to 3 kGy.**

<b>Pathogen</b>	<b>1-log reduction dose (kGray)</b>	<b>5-log reduction dose (kGray)</b>
<i>Campylobacter</i>	0.20	1.00
<i>Toxoplasma</i> cysts	0.25	1.25
<i>E. coli</i> 0157	0.30	1.50
<i>Listeria</i>	0.45	2.25
<i>Salmonella</i>	0.70	3.50
<i>Vibrio vulnificus</i>	0.125	0.75

**Irradiation dose to decrease selected pathogens at 35° F by 1 decimal log (90%) and 5 decimal logs.**



IMPACT OF 4-LOG REDUCTION ON BACTERIA IN FOOD

# Safety of Raw Meat Relies on Multiple Barriers

- ③ The first is plant sanitation - HACCP
- ③ The last is proper handling and cooking
- ③ Irradiation does not replace these, it adds another barrier at very low cost
- ③ The Jack-in-the-Box example
- ③ The cross-contamination example



## Regulation of Irradiated Foods

- ③ Food irradiation is classified as a food additive due to Federal Legislation in 1950s
- ③ Classes of food must specifically be approved for irradiation by FDA
- ③ Process begins with a petition demonstrating safety and efficacy of irradiation
- ③ Authorizations for ground/whole red meats, poultry, eggs, fruits, vegetables, mollusks
- ③ Irradiated foods sold at retail must be labeled

## Fruit and Vegetable Irradiation

- ③ **Very low dose – not intended to prevent food borne illness**
- ③ **Used to destroy insect pests so they are not transported/established in other areas**
- ③ **Less impact on fruit quality and replaces methyl bromide gas**
- ③ **Delays ripening and extends shelf life – allows exotic fruits to be shipped longer distances**
- ③ **18 new food irradiators in Asia in next 3 years, also Central and South America**

## Who Supports Food Irradiation?

- ① American Medical Association
- ① American Dietetic Association
- ① World Health Organization
- ① Assoc. of State and Territorial Health Officials
- ① Centers for Disease Control and Prevention
- ① Amer. Veterinary Medical Association
- ① Food and Agriculture Organization of the U.N.
- ① Scientific Committee of the European Union
- ① U.S. Food and Drug Administration
- ① U.S. Department of Agriculture

# **CLAIM - Not Needed. Simply clean up processing plants**

## **FACTS:**

**US has World's safest food supply. FBI is declining but still significant problem.**

**No matter how many safeguards/how much effort, infectious disease will occur.**

**Why not just mandate hospital-like cleanliness in food processing plants?**

**Hospital acquired infections occur in 5% of acute care hospitalizations. There are 2 million cases/year and 20,000 deaths/year.**

**This is despite strict sanitation procedures and legions of infection control staff.**

**Multiple barriers are critical to prevent food-borne illness.**

**CLAIM - Makes food look, smell, taste bad**

**FACTS:**

**Any food preservation technique, if improperly applied, can degrade palatability**

**FTSI irradiates over 10 million pounds of ground beef annually**

**Opponents misrepresent studies**

**As presented by the Center for Food Safety and Food and Water Watch in the publication "Food Irradiation: A Gross Failure"**

**"In the FDA's own Risk Analysis for irradiation of raw oysters, a study cited for demonstrating the treatment's effectiveness found also that irradiation at levels of 2kGy or greater, as FDA has recently approved, produced an "UNPLEASANT YELLOW EXUDATE." That researcher later described the exudate as resembling "SALIVA."**

**- Andrews, L.S. et al. 2002. "Gamma irradiation processing to reduce the risk of Vibrio infections from raw oysters." (unpublished presentation at the Institute for Food Technologists 2002 Annual Meeting), abstract at <http://ift.confex.com/ift/2002/techprogram/paper11111.htm>: L.S. Andrews, pers. com., Aug. 24, 2005**

## Gamma irradiation processing to reduce the risk of *Vibrio* infections from raw oysters

L. S. ANDREWS, Experimental Seafood Processing Laboratory, CREC, Mississippi State University, 2710 Beach Blvd, Suite 1E, Biloxi, MS 39531, et al

Live oysters, with naturally incurred and artificially inoculated *Vibrios*, were exposed to 0-3 kGy dose Cobalt-60 gamma radiation. *Vibrio vulnificus* was effectively reduced from 106 cfu/g oyster meat to nondetectable levels (<3 mpn/g oyster meat) with an exposure dose of 0.75 kGy. *Vibrio parahaemolyticus*, TX03:K6, proved to be more resistant and required 1.0 kGy for its reduction to nondetectable levels. Sensory quality was maintained with irradiation exposure up to 1.5 kGy. Higher irradiation doses increased the mortality rate and reduced shelf life. At  $\geq 2$  kGy, the oysters produced an unpleasant yellow exudate. In summary, a 1 kGy dose reduced the *Vibrios* to nondetectable levels and at the same time maintained good sensory quality, a normal shelf life of 15 days, and minimum mortality. Upon approval by the USFDA, irradiation processing of live oysters will provide an effective post harvest treatment for reducing the risk of *Vibrio* illnesses.



## CLAIM - Public does not accept

### FACTS:

11-01 survey - 52% said government *should* require irradiation to help ensure a safe food supply

FTSI irradiates over 10 million pounds of ground beef annually

Is the public really against food irradiation?

# Online Petition System

## GLOBAL WEEK OF ACTION AGAINST FOOD IRRADIATION

Join the 901 people that have already signed this petition.

November 23 - 29, 2003

We, the undersigned, dedicate the week of November 23-29 to Global Week Of Action Against Food Irradiation from all continents unite to declare the world must be safe from the questionable and unnecessary technology of food irradiation.

<http://www.citizen.org/action/petition/index.cfm?ID=3&source=14> **12/4/2003**

## **CLAIM: Contains harmful byproducts**

### **FACTS:**

**World Health Organization** – “The toxicological safety review of findings from a considerable number of animal investigations and clinical studies using human volunteers, supports the conclusion that **irradiated foods using a variety of sources under a variety of conditions are toxicologically safe for human consumption.**”

**US FDA** - “In the safety evaluation of irradiated meat and poultry, the agency examined all of the available data from toxicological studies relevant to the safety of irradiated flesh-based foods, including studies on fish high in PUFAs. **No toxicologically significant adverse effects attributable to irradiated flesh foods were observed in any of the studies.**”

**Opponents Misrepresent Studies**

**As presented by the Center for Food Safety and Food and Water Watch in the publication "Food Irradiation: A Gross Failure**

**"A Tendency for Lower Body Weights were noted in both sexes of rats receiving 1.0 and 3.0% irradiated thaumatin [a sugar alternative that could soon reach the marketplace]. No body weight retardation was noted in rats fed 3% non-irradiated thaumatin. Food consumption in controls and treated animals showed no clear differences."**

**- Hagiwara, A. et al. 2005. Thirteen-week feeding study of thaumatin (a natural proteinaceous sweetener), sterilized by electron beam irradiation, in Sprague-Dawley rats. Food and Chemical Toxicology, 43:1297-1302.**

Thirteen-week feeding study of thaumatin (a natural proteinaceous sweetener), sterilized by electron beam irradiation, in Sprague-Dawley rats.

Hagiwara A, Yoshino H, Sano M, Kawabe M, Tamano S, Sakaue K, Nakamura M, Tada M, Imaida K, Shirai T.

This study was designed to evaluate and characterize any subchronic toxicity of thaumatin sterilized by electron beam irradiation (5.0 kGy) when administered at dietary levels of 0% (control), 0.3%, 1.0% and 3.0% to groups of 10 male and 10 female Crj: CD (SD) IGS rats for 13 weeks. Separate groups of both sexes received 3.0% non-irradiated thaumatin. **There were no treatment-related clinical signs or adverse effects on the survival rate, body weight, food consumption, water consumption and urinalysis, ophthalmology, haematology, or blood biochemistry data. No treatment-related alterations in gross pathology or organ weights were found in any group.** On histopathological examination, sporadic spontaneous lesions known to occur in this strain of rats were the only findings, with no specific relation to the test substance. Thus, the no-observed-adverse-effect-level (NOAEL) was judged to be a dietary level of at least 3.0% (2502 mg/kg body weight/day for males, 2889 mg/kg body weight/day for females) for electron beam irradiated thaumatin under the present experimental conditions. **It was concluded that electron beam-irradiation of thaumatin does not cause changes of any toxicological significance.**

## As presented by the Center for Food Safety and Food and Water Watch in the publication "Food Irradiation: A Gross Failure"

**"Much of this advocacy highlighted the numerous published studies on potential mutagenic effects (involving potential damage to genes) in mammals, as well as the important 2001 study that linked colon tumor promotion in laboratory rats to new chemical compounds that are found only in irradiated foods, known as 2-alkylcyclobutanones (2-ACBs)."**

- Burnouf, D., **Delincée, H.**, Hartwig, A., Marchioni, E., Miesch, L., Raul, F., Werner, D. (2002) Etude toxicologique transfrontalière destinée à évaluer le risque encouru lors de la consommation d'aliments gras ionisés / Toxikologische Untersuchung zur Risikobewertung beim Verzehr von bestrahlten fetthaltigen Lebensmitteln. Eine französisch-deutsche Studie im Grenzraum Oberrhein. Rapport final / Schlussbericht INTERREG II.Projet / Projekt No. 3.171. (Marchioni, E., Delincée, H., Eds.) Berichte der Bundesforschungsanstalt für Ernährung, Karlsruhe, BFE-R--02-02, pp. 1-198. (also available at the web: <http://www.bfa-ernaehrung.de/Bfe-Deutsch/Information/bfeber91.htm> )

***Henry Delincée, Institute of Nutritional Physiology,  
Federal Research Centre for Nutrition, Karlsruhe, Germany***

**I am writing this statement because Public Citizen uses my research as evidence in their allegations against food irradiation. However, this obvious case of producing distrust among consumers regarding irradiated food in school lunches puzzles me.**

**In a review requested by our Federal Ministry of Consumer Protection, Food and Agriculture in Germany (Delincée et al., 2002) we have shown that "Bad Taste" is a collection of allegations, half-truths, misunderstandings and misinterpretations. "Bad Taste" is not a responsible report from a conscious consumer organization which is concerned about public health, but is written to cause distrust and to spread fear among consumers.**

**Public Citizen has not provided new evidence or new information that food irradiation is not safe nor nutritionally inadequate. They only stir up emotions by mere allegations and thus do a disservice to public trust. Exactly the opposite of what they should do as a consumer organisation.**

**The crucial question is whether the benefits of food irradiation gained by inactivating harmful bacteria such as the dangerous *E.coli* O157:H7 will outweigh the possible risks. In my view – and this is also the opinion of WHO and other international and national organisations – the benefits far outweigh the risks.**

Excerpted from [http://www.mnbeef.org/statement\\_to%20public%20citizen.delincee.htm](http://www.mnbeef.org/statement_to%20public%20citizen.delincee.htm)

# **CLAIM: Removes vitamins and nutrients**

## **FACTS:**

**ADA – Because irradiation does not substantially raise the temperature of the food being processed, nutrient losses are small and are often substantially less than nutrient losses associated with other methods of preservation such as canning, drying, and heat pasteurization and sterilization. The relative sensitivity of different vitamins to irradiation depends on the food source, and the combination of irradiation and cooking is not considered to produce losses of notable concern.**



## Question - What is it?

“After the turn of the century, the process was well established but critics continued to claim that \_\_\_\_\_ plants were dangerous and that the \_\_\_\_\_ process removed nutrients and vitamins.”

Hint – Unprotected humans exposed to this process will die in minutes.

## Question - What is it?

“After the turn of the century, the process was well established but critics continued to claim that \_\_\_\_\_ plants were dangerous and that the \_\_\_\_\_ process removed nutrients and vitamins.”

**Answer – Frozen Food**

## Summary

- ③ **Food irradiation prevents foodborne illness and is an important disease prevention tool**
- ③ **Irradiation effectively eliminates insect pests from fruits and vegetables**
- ③ **Irradiation does not replace the need for hygienic processing plants or proper food handling and preparation**
- ③ **Numerous science-based professional organizations, public health agencies and regulatory agencies support food irradiation and have declared it safe and effective**



**Thank You!**

**WANT TO KNOW MORE?**

**[WWW.FTSI.US](http://WWW.FTSI.US)**