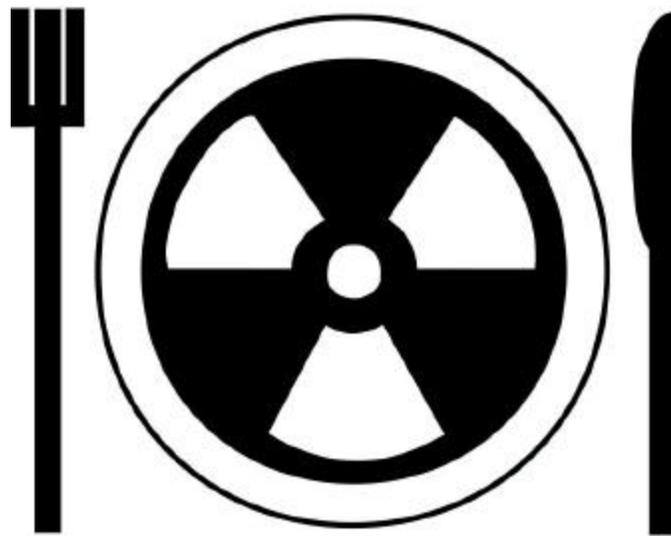


# **THE STOP FOOD IRRADIATION CAMPAIGN**



## **2003 STUDENT ACTIVIST KIT**



I ne kaaura  
International Symbol for Irradiation



# THE STOP FOOD IRRADIATION CAMPAIGN STUDENT ACTIVIST KIT

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Buyers Up • Congress Watch • Critical Mass • Global Trade Watch • Health Research Group • Litigation Group  
Joan Claybrook, President

Hello! Thank you for your interest in the Stop Food Irradiation campaign at Public Citizen. We are a national consumer and environmental advocacy organization, engaged with a wide range of organizations throughout the United States and the world in an effort to ensure the safety and wholesomeness of our food supply, to maintain the integrity of regional and local economies, and to encourage environmentally, economically and socially sustainable agricultural practices.

Public Citizen fundamentally opposes the use of ionizing radiation as a "treatment" for food. Irradiation destroys vitamins and other nutrients, forms chemicals known or suspected to cause cancer and birth defects, and masks unhygienic food production practices. Instead of this shortsighted quick-fix, we are encouraging the food industry and government regulators to institute comprehensive solutions in response to food safety challenges.

It is time to take back control over the way our food is processed, and what better way to start than by keeping irradiated food off our plates! This Student Activist Packet is designed to help you raise awareness on your campus about the negative impacts of food irradiation and to help change our food system, starting in your own backyard. College campuses are major sources of income for large foodservice corporations, like SYSCO and Alliant, who have either indicated interest or begun selling irradiated food to colleges. Alarming, irradiated food **does not have to be labeled in college dining halls!** By starting a campaign at your school, you are not only working to stop a dangerous and unsafe technology, you are taking a more active role in ensuring the quality of the food you are served on campus.

The steps outlined in this packet are by no means an exhaustive list, but merely a tool to help you work with your student government and foodservice staff to ensure that students receive safe, healthy, wholesome food. We are always available to answer any questions or concerns, or help with media and resources, so please feel free to contact us any time at the information below.



PUBLIC CITIZEN – DC OFFICE  
215 Pennsylvania Ave, SE  
Washington, DC 20003  
(202) 546-4996  
[www.citizen.org/cmep/foodsafety](http://www.citizen.org/cmep/foodsafety)  
[cmep@citizen.org](mailto:cmep@citizen.org)

PUBLIC CITIZEN – CALIFORNIA OFFICE  
1615 Broadway, 9<sup>th</sup> Floor  
Oakland, CA 94612  
(510) 663-0888  
[www.citizen.org/california](http://www.citizen.org/california)  
[california@citizen.org](mailto:california@citizen.org)

# STOP FOOD IRRADIATION ON YOUR CAMPUS: HOW TO GET STARTED

In order to organize a campaign, you must know where to begin. Below are some tips on how to utilize the materials in this kit, and some general advice on how to get started.

**Educate yourself.** Check out the websites included on the “Resources” page. You will find it helpful to learn enough about the issue to explain it clearly and to answer people’s questions. However, don’t put off organizing until you’ve learned everything—there will always be something you don’t know. Educating yourself should be an ongoing process.

**Talk about it.** Talk to friends, acquaintances, instructors, and whoever else is willing to listen about food irradiation. Bring it up in class discussions when it’s relevant. This will be a good way to practice your “rap” on food irradiation, and to find out what people’s reactions are.

**Get a group together.** Find a student organization willing to take up this issue. Environmental clubs, nutrition societies, social justice or other progressive groups are possible candidates. Ask them to form a committee on food irradiation. Or form your own organization with a few interested friends.

**Get the word out.** Hang up posters, submit articles to the school newspapers, hand out leaflets at university events, set up an information table in the student union or dining hall, distribute literature in dorms, and speak on your college radio station. Ask professors you know or those who may be sympathetic (environmental studies, social sciences, and humanities) if you can speak to their class for a few minutes about food irradiation. Speak to other student organizations about the issue, and ask them to endorse your campaign.

**Recruit.** Always have a list available where you can get the names, email addresses and phone numbers of interested people. When you speak to groups, make sure you pass around a sign up sheet.

**Circulate a petition.** Petitions are a good way to spread the word about an issue, build support, and give people a concrete action to take. You can use this petition in a number of ways: show it to the student government to demonstrate opposition to irradiated food, present it to the food services director, bring it to local supermarkets and ask them to pledge not to sell irradiated food. It will show the decision-makers you are trying to influence that lots of people feel strongly about an issue.

**Host a forum or event.** Bring in someone to speak about the issue, have an organic food festival or a pot-luck dinner. Or organize a trip to a local farm and have the farmer talk about the importance of locally grown food (see fact sheet entitled “Endangered

Family Farms: How Food Irradiation Threatens American Agriculture.”) Be sure to make your event fun as well as informative. Food is always a good recruiting tool.

**Bring the issue to your student government.** Speak about food irradiation at student council meetings, and urge the student council to pass a resolution against irradiated foods. It is important to have a strong support base for this. Bring supporters to these meetings, and encourage them to speak about the issue.

**Send a letter to the university Food Services director.** Express your concern about food irradiation, and offer ways to work with him or her to make sure that your university does not serve it. Research food suppliers that do not use irradiated foods, and suggest them to him or her. Better yet, suggest local and sustainable growers and food producers as an alternative. (Contact the Community Food Security Coalition’s Farm to College program that is listed on the Resources sheet in this packet for more information.) Always try to work with the school administration first—they may be more sympathetic to student concerns than you think. But sometimes you may have to...

**Stage actions.** If your university foodservice director is unwilling to work with you, come up with some creative actions to demonstrate your point. Send letters written on paper plates, create postcards that students can put in suggestion boxes (if your dining hall has them), make up stickers or buttons and encourage people to wear them, hold a rally outside your dining hall or administration building. Please call Public Citizen if you would like other suggestions or have ideas to suggest.

This list does not include every step you should take, or may not work on every campus. Some ideas may work really well at your college, other things may not be applicable. The most important thing is to figure out what works at your campus, and to learn from the process.

**Good Luck! And, please keep in touch with us to share ideas and successes!**

# Do You Know Where Your Food Has Been ?



The Radura  
International Symbol  
for Irradiation

## IRRADIATED FOOD = FILTHY FOOD

Irradiation is the food industry's Band-aid solution to food-borne illnesses caused by bacteria like *E.coli O157:H7*. **What they don't tell you about** are the filthy conditions that put harmful bacteria in our food in the first place, and the health risks of consuming irradiated food!

### FIND OUT MORE!

Come to the next meeting of the <Club Name>  
<Date/Time>  
<Location>

Learn...



- Why irradiating food destroys its nutritional value and wholesomeness.
- What health hazards irradiation creates in food.
- How to keep irradiated foods off of <College's> campus.
- How we can work together to create alternatives for our campus food.

And help us defend your right to...



- Eat healthy, wholesome food at your school that was produced in clean environments.
- Have irradiated food clearly labeled.
- Force the FDA to produce long-term studies of the effects of consuming irradiated food.

---

Jane Doe at jane.doe@college.edu / [xxx] yyy-zzzz

Brought to you by the <Club Name>

<Website>

*Reaching out to students during class is an effective recruitment tactic. You have a captive audience, you often have the endorsement of the professor (which carries weight), and you are breaking up the normal routine of their class. Use the class rap below as a guideline, pass around a sign up sheet and thank the professor for letting you speak.*

## **SAMPLE CLASS RAP/CLUB RAP**

Hey, my name is \_\_\_\_\_ from the \_\_\_\_\_ club. We're working to stop food irradiation, and I'm here to let you know why and how you can help us. For those of you who don't know, food irradiation is a process that zaps foods with huge doses of radiation - equivalent to millions of chest X-rays - in order to destroy bacteria. While this may seem like a good idea, irradiation creates more problems than it solves.

First, irradiation is horrible for food. It destroys essential vitamins and nutrients, essentially turning food into empty calories. It also creates known toxins, like formaldehyde and benzene, as well as new chemicals that do not occur naturally in food, called Unique Radiolytic Products. Research has proven that these chemicals cause many health problems in lab animals. Some examples are cancer, genetic damage, reproductive problems, and internal bleeding.

Second, irradiation masks the disgusting, environmentally damaging, and inhumane conditions in large factory farms and most meatpacking facilities. You probably have heard about the meat recalls on the news because of *E. coli* contamination. The problem begins in the crowded, dirty conditions on giant factory farms - thousands of animals packed tightly in one area - that produce sick animals covered in manure. They are then slaughtered on extremely fast production lines that process 400 cows/hr or 140 chickens/min. Meat often becomes contaminated with feces, vomit, pus, and tumors. Irradiation is really only a Band-aid solution that does nothing to remove these contaminants or improve the conditions for the workers.

Third, irradiation contributes to the globalization of our food supply and hurts local family farmers. Because bacteria is destroyed, the shelf-life of irradiated food is extended and can be shipped longer distances. Large agribusiness corporations then choose to move their operations outside the US, where costs are cheaper but labor and environmental standards are lax. Locally and sustainably produced foods, already at a disadvantage, can't compete with the cheap low-quality imports.

The scariest part of all is that you probably don't know when you're eating irradiated foods. Some food, such as whole produce and meat, has to be labeled; but food served in the dining hall or at campus restaurants doesn't. In fact, irradiated food served in *any* restaurant or institution doesn't have to be labeled. In addition, there is a method for companies to be able to use alternative labeling such as "pasteurization". The word "irradiation" may end up not appearing on the package at all.

Here at <College>, we've been working with the student government to pass a resolution about irradiated foods, and we need your help! There are several things you can do. First, please put your name and contact info on the sign up sheet being passed around so we can keep you updated on our campaign. Second, ask cafeteria staff if your food is irradiated, tell them you don't want it, and fill out a comment card. Third, come to our next meeting at <Time/Place>. And finally, whenever you can, support local farmers by purchasing locally grown foods in co-ops, at farmers markets, or through a CSA (Community Supported Agriculture).

Thanks for letting me speak today. Have a great day!

# **SAMPLE NEWSPAPER OR NEWSLETTER ARTICLE**

## **Irradiated Food? Not on Our Plates!**

For decades, multinational food conglomerates and other corporate interests have been trying to shove a whole host of questionable technologies down our throats—literally. Primarily concerned with making money, these profit driven companies attempt to minimize any doubts or concerns that consumers raise.

Promoted under the guise of food safety, food irradiation is just another tool that the food industry can use to multiply their profits at the expense of our health, worker safety, and the environment. And while we can avoid much of it in supermarkets, we may unknowingly be eating it in processed foods, restaurants, and even the campus dining hall. If you think the food in your dorm cafeteria is bad now, what if it was irradiated? Well, the truth is: it may already be.

### **What is food irradiation?**

Irradiation is a consumer risk. It exposes food to a dose of ionizing radiation that is equivalent to millions of chest x-rays. It is intended to kill bacteria, but that's not all it does. It also depletes vitamins and nutrients, and creates known toxins (like benzene and formaldehyde) and unique new chemicals, many of which the Food and Drug Administration (FDA) has not adequately tested for safety. Recent studies on a class of these chemicals found them to cause genetic damage in rats and human cells and promote cancer development. Research dating to the 1950s has revealed a wide range of problems in animals that ate irradiated foods, including premature death, cancer, stillbirths, genetic damage, organ malfunctions, stunted growth and vitamin deficiencies.

Irradiation merely masks and thereby perpetuates the filthy conditions in meat processing. The meat industry maximizes profits by raising animals in cramped, unhealthy, and inhumane conditions and processing them in plants that are breeding grounds for potentially deadly food-borne pathogens. With up to 140 chickens being slaughtered per minute, and 400 cows being slaughtered per hour, maintaining humane practices and clean meat is virtually impossible. Both animals and workers are victims of numerous accidents and atrocities. Food irradiation only exacerbates these problems by undercutting pressures on food companies to raise animals in healthy environments, clean up contaminated facilities and slow down line-speeds.

Irradiation is a catalyst for the globalization of our food supply, a trend that benefits the largest growers and corporations, but brings with it tremendous negative environmental and social impacts. Irradiation allows long distance shipping of food because it extends shelf-life. But, the longer the food sits, the greater the loss of vitamins. With the recent USDA approval of importing irradiated fruits and vegetables, big agriculture corporations can now grow food in countries with lax environmental and worker safeguards for export to the U.S. and Europe. Family farmers and small-scale food producers will be put out of business by food conglomerates that irradiate cash crops for large profits. In addition, a number of countries that will export irradiated fruits and vegetables to the US do not have any maximum dosage level for irradiated foods. This leads to multiple questions about inspection and accurate labeling. Will we really know that we are eating irradiated produce?

### **Do we know if we're eating irradiated foods?**

Not when eating out! Federal labeling laws do not require irradiated food served in schools or restaurants to be labeled! And, large foodservice distribution companies like SYSCO and Alliant have either begun using or expressed interest in irradiated foods. Therefore, students, faculty, staff and visitors to campus may already be consuming irradiated food without their knowledge.

Federal rules require whole foods that are irradiated and sold in stores – such as apples or potatoes – to display the *radura*, the international symbol for irradiation, and carry the phrase "treated by irradiation." However, processed foods containing irradiated non-meat ingredients - such as applesauce or potato chips - are exempt.

Because dormitory students often are unable to cook most of their foods, we eat more restaurant food, institutional food, and processed foods. Therefore, we may be eating a great deal of irradiated food—more so than many consumers—without our knowledge.

Despite labeling loopholes, the irradiation industry blames labeling for their disappointing sales, and for the past five years has attempted to force the Food and Drug Administration (FDA) to change the regulations for irradiated foods. The food irradiation industry was successful in having Congress insert language in the most recent Farm Bill that opens the door for labeling irradiated food as "pasteurized." By engaging in trickery, the industry believes that it will be able to gain wider consumer acceptance of its products.

### **What can you do?**

#### **On campus**

- Host a food awareness day in your dorm. Get information from [www.citizen.org/cmep](http://www.citizen.org/cmep) or come by the <Club Name> office at <Club Location>.
- Write comments in the suggestion box at the cafeteria.
- Help increase student, faculty, and staff awareness by picking up a petition at <Club Name> office.  
<Club Location>
- Join <Club Name> by coming to our next meeting at <Time and Location> and find out what we are doing to keep food irradiation off campus!

#### **In your community**

- Grocery stores have begun to sell irradiated food. Ask your store managers if they are currently carrying or plan to carry irradiated foods, and ask them to pledge not to. Fill out a comment card. Voice your concerns about irradiation and tell them you won't buy it!
- Restaurants, especially fast food, are the next big target of the food irradiation industry. Irradiated food does not have to be labeled in restaurants! Dairy Queen is already selling irradiated hamburgers. Tell your local restaurants that you do not want to eat irradiated food, and ask them to pledge not to sell it.

#### **To contact the government**

- Call or write to the Secretary of Health and Human Services (HHS) and tell them to uphold consumers' right-to-know if they're eating irradiated food by not allowing alternative labeling (such as "pasteurization") for irradiated foods!  
*Write to Tommy Thompson, Secretary of the Department of Health and Human Services, 200 Independence Ave., SW, Room 615-F, Washington, DC 20201; 202-690-7000*
- Call your federal representative and senators through the Capitol Switchboard: (202) 224-3121 and tell them to strengthen the labeling of irradiated foods by fixing the anti-consumer provisions in the most recent Farm Bill.
- Call or write your state representatives and ask them to introduce a bill calling for a state moratorium on irradiated foods.

# HOW TO SUBMIT LETTERS-TO-THE-EDITOR

Letters-to-the-editor are an important way to educate the public on food irradiation. If people have heard about irradiation, it is predominantly through marketing campaigns or industry-influenced articles. Letters are an essential way to alert them to the rest of the story.

## To Submit a Letter:

- Letters to the editor are a direct response to a news story. In your letter, refer to the recent article published in the paper that you are responding to. You can also write a response to a TV news story by checking on the TV station's Viewer Forum section on their website.
- Use the sample letter and bullet points below as a guide to write your own letter.
- Letters should be 250 words or less. However, some papers have a word length of 150 words. Check with your paper on their word length requirements by calling or looking on their website.
- Refer to a recent article published in the paper or a current relevant issue.
- Sign the letter and print your name, address and phone number. Most papers will call you for verification before publishing the letter.
- Follow the instructions on the editorial page of your local newspaper when submitting your letter.

When your letter is printed in a newspaper, please send us a copy and include the name of the paper, city and state, as well as the date of publication. Please send it to: The Stop Food Irradiation Campaign, c/o Public Citizen, 215 Pennsylvania Avenue SE, Washington, DC 20003.

## SAMPLE LETTER

Dear Editor:

We must not rush to accept food irradiation as a solution to food safety problems. Irradiation merely masks dirty meat while creating nutritionally-deficient food that has not been proven safe to eat.

Irradiation exposes food to a dose of ionizing radiation equivalent to millions of chest x-rays to kill bacteria. However, irradiation disrupts everything in its path, depleting vitamins and causing the creation of new chemicals in the food called "unique radiolytic products"—chemicals that do not naturally occur in food and that the FDA has never studied for safety. One such chemical was recently found to cause genetic damage in rats and human cells.

Filthy conditions at giant "factory farms", slaughterline speeds that are too fast, and limits on the authority of USDA inspectors are the true culprits that have caused more feces-ridden meat to reach consumers. These problems should be addressed at the source, and not compounded with an unnecessary technology.

*Use this sample action alert as a way to get people involved in your campaign, and also as an activity to keep your campaign going while you are waiting for the Student Government to take action. Writing letters to supermarkets (or other targets in your community) is also a good way to make people realize the implications of food irradiation outside of the university setting.*

## **KEEP IRRADIATED FOODS OUT OF SUPERMARKETS!**

### **Find out if irradiated food is in your local supermarkets!**

Depending on what state you are in, irradiated food may already be in your grocery store. Check out [www.citizen.org/cmep/foodsafety/food\\_irrad](http://www.citizen.org/cmep/foodsafety/food_irrad) and click on "Who, What, Where: Stores Known to Sell Irradiated Meat" to find out what supermarkets in your area are selling irradiated food, and how to contact them. (A sample letter is provided below.)

You can also fill out comment cards, talk with store managers, send a letter to their corporate headquarters, and/or flyer outside of a store! (Contact Public Citizen for sample flyers.)

### **If it's not already there, keep it out!**

If your grocery store is not listed as currently carrying irradiated food, ask them to pledge not to carry it in the future! Keep irradiated foods out of your grocery store—write a letter and urge your store not to carry these products. A sample letter and addresses to some chains are provided below.

### **SAMPLE LETTER**

<Supermarket Name>  
<Address>

To <Contact Name>,

I am writing to urge you to stop carrying irradiated meat, and to not carry other irradiated products in the future. As your customer, I demand and deserve fresh, wholesome, safe food that has been grown and processed in clean environments. I do not want my family or my community to be "guinea pigs" for this controversial technology.

Consumers do not want to eat food that has been exposed to high doses of ionizing radiation, as previous test marketing efforts have shown. In 2001, citing poor sales and low consumer interest, more than 80 grocery stores and meat markets in Florida, California, and Wisconsin pulled irradiated beef products from their shelves.

Irradiated food has not been proven safe to eat! It not only degrades the nutritional content of food, but research has revealed a wide range of health problems in animals that ate irradiated food including premature death, fatal internal bleeding, cancer, reproductive problems, genetic damage, organ malfunctions and nutritional deficiencies.

Furthermore, I adamantly oppose the importation of irradiated fruits and vegetables, and implore you NOT to carry irradiated produce in the future. Imported irradiated fruits and vegetables are both nutritionally deficient and may be grown in questionable environments. In addition, a number of countries that export fruits and vegetables to the US do not have any maximum dosage level for irradiated foods. Therefore, you may end up selling food that may have been irradiated at a dose much higher than the US limit.

If you truly care about the community and aspires to provide quality food, then you should use your chain's buying power to pressure your suppliers to adopt safe, sustainable production practices. Again, I urge you to remove irradiated meat from your stores and to keep irradiated produce out of them as well.

Sincerely,  
<Your Name & Address>

*If your university passes a resolution against irradiated foods, it is important to let your member of Congress know. A university in his or her district that has a stated position against food irradiation might sway his vote on bills and budgetary measures that concern this issues. Use the sample letter below as a guide.*

## **SAMPLE LETTER TO CONGRESSIONAL REPRESENTATIVE**

<Date>

Congress<man/woman> <Name>  
United States House of Representatives  
<Office Number>  
Washington, D.C. 20515

**AND**

Senator <Name>  
United States Senate  
<Office Number>  
Washington, D.C. 20510

Dear Congress<man/woman> / Senator <Name>:

I am writing to you on behalf of the <College> Student Association and <Club Name>, regarding the issue of food irradiation and our concerns with this technology.

Recently, the <College> Student Association and <Club Name> passed the enclosed resolution prohibiting the use of irradiated foods in any of our meal programs at <College>. It is our belief that food irradiation has known and suspected detrimental effects on our food and our health. We are also concerned that food irradiation promotes unnecessary and unacceptable practices in the food industry.

Research has documented that food irradiation depletes vitamins and other essential nutrients in food and creates known and suspected carcinogens, such as benzene and toluene. In addition, irradiation creates a new class of chemicals, called "unique radiolytic products," the effects of which are unknown in humans. We feel that students should not be served nutritionally deficient food of questionable safety.

Food irradiation has been used by irresponsible meat producers as a way to "cover up" dirty meat processing facilities. In many facilities, animals are crowded together, pumped up with hormones and antibiotics, covered in their own excrement, and slaughtered and butchered at astonishingly fast speeds. As a result, meat is often contaminated with feces, vomit, pus, urine, and other carriers of dangerous bacteria. The recent meat recalls, some of which were the largest in U.S. history, are testament to this. The environment in these facilities is both disgusting and inhumane for animals as well as workers, who are often the victims of numerous accidents and atrocities. Rather than clean up their facilities, the meat industry instead turns to food irradiation as a "quick fix." We feel that purchasing irradiated meat perpetuates these cruel and unsanitary conditions. Instead, we choose meat from suppliers who raise, slaughter, and process their animals humanely and safely.

Food irradiation also contributes to the globalization of our food supply. Irradiation conveniently eliminates invasive insects and other "barriers to trade," and extends shelf life dramatically. Multinational food conglomerates can use irradiation as a tool to move

their operations outside the United States, where costs are cheaper and labor and environmental standards more lax. Small family farmers, already suffering from the impacts of NAFTA, will not be able to compete with the flood of cheaper irradiated imports expected to flood the market. In addition, when our food travels hundreds, even thousands, of environmentally unsound miles, our food system becomes increasingly unsustainable and insecure. A locally produced food supply is an essential part of a reliable and sustainable food system.

The <College> Student Association and <Club Name> are striving to provide students with food that is nutritious, safe, locally grown, and environmentally sound. By passing this resolution banning irradiated foods, we have taken a stance against a technology that undermines our beliefs. We hope you will keep our position in mind when you consider relevant policy.

Please do not hesitate to contact us if you have any questions.

Sincerely,

Jane Doe  
President, <Club Name>

Joe Blow  
President, <College> Student Association

*It is important to take the next step and begin working with the Food Services Director of your university. You can use this sample letter to help you initiate your relationship with him or her. It is up to you whether or not you wait until after your Student Government has passed a resolution opposing food irradiation, or begin a dialogue with him or her during the process of passing the resolution. Either way, make sure to follow up with the Food Services Director by phone or e-mail a week or two after you send your letter.*

## **SAMPLE LETTER TO FOOD SERVICE DIRECTOR**

<Date>

Bob Foodservice  
Director, <College> Food Services  
<Mailing Address>

Dear Mr. Foodservice:

On behalf of the <Club Name>, the Student Association of <College>, and of the student body as a whole, we want to convey our concern about irradiated foods and to take an active role in ensuring that the <College> community is not consuming irradiated foods.

In <Month Resolution Passed>, the Student Association passed a resolution opposing food irradiation technology. This resolution also urged the <College> Food Services Director to find out if the foods they purchase are irradiated, to seek alternative food suppliers that do not sell irradiated foods, and to purchase food from local farms and sustainable food producers.

Numerous studies have shown that the food exposed to ionizing radiation may pose serious health threats to individuals who eat it. Irradiation depletes vitamins and other essential nutrients in food, and is a catalyst in their further depletion during cooking and storage. As compared to cooked, non-irradiated food, irradiated food contains substantially fewer nutrients. Even worse, irradiation creates toxins in food such as formaldehyde and benzene, as well as a new class of chemicals—called unique radiolytic products—that do not naturally occur in food and many of which the Food and Drug Administration (FDA) has never studied for safety.

Research dating to the 1950s has revealed a wide range of problems in animals that ate irradiated foods, including premature death, cancer, stillbirths, genetic damage, organ malfunctions, and stunted growth. Additionally, recent German studies found one class of these chemical byproducts, called cyclobutanones, to promote the cancer-development process in rats, and cause genetic and cellular damage in human and rat cells.

Despite analogies used by proponents of irradiation, it is NOT the same process as pasteurization or microwaving, nor does it have the same effect on food. Pasteurization is a different process that uses rapid heating and cooling to kill bacteria. Microwaving uses non-ionizing radiation to excite water molecules to heat food. Both of these technologies have been extensively tested and proven safe. Irradiation has not been adequately tested and has not been proven safe.

Finally, while irradiation destroys much of the bacteria that causes food-borne illness, it does nothing to remove the source of the bacteria—the feces, vomit, pus, tumors, and urine that contaminate food, particularly meat, in many processing facilities.

The Student Association is also concerned with the effect that irradiation technology will have on sustainable, local agriculture in the <Collegetown> community. Irradiation extends the shelf life of food, allowing it to be stored for long periods of time and shipped from distant locations. This puts local family farms, already struggling, at a disadvantage, while benefiting companies that do not use healthy or sustainable methods of food production. In addition, a number of countries that export fruits and vegetables to the U.S. do not have any maximum dosage level for irradiated foods. Therefore, <College> may end up buying food that has been irradiated at a dose much higher than the U.S. limit. We feel very strongly that purchasing the products of local farms and ranches plays a vital role in supporting the <Collegetown> community and economy as well as promoting a sustainable food system.

Students deserve to eat safe, healthy, wholesome, clean food on campus. Irradiated food does not fit these standards. Furthermore, the FDA approval and labeling process of irradiated foods is faulty and does not protect us from this dangerous technology. The government agency relied on a handful of defective studies when it declared irradiation a safe food additive. Also, irradiation was approved on the assumption that irradiated foods would not make up a large percentage of the American diet. Now nearly every category of food, from vegetables to meat, is eligible for irradiation. Most alarmingly, irradiated food served in campus dining halls does not have to be labeled! So students could unwittingly be eating irradiated food.

We understand the difficulty of providing a large number of people on campus with safe, quality food, but do not feel that irradiated food adheres to this goal. With this letter we wish to stimulate collaboration with you on how <College> can better ensure the safety and quality of the food it purchases and provides. If implemented by <College>, the resolution measures will go a long way towards protecting students, faculty, staff, and visitors from potentially harmful compounds in irradiated foods, while promoting a just, sustainable and locally-based food system.

The following is a short list of tasks to help achieve these goals:

- Create a plan for determining which contracted food distributors are selling irradiated foods, and identify which specific products are irradiated.
- Work with the <Club Name> in identifying alternative food distributors that do not sell irradiated foods.
- Establish contracts with local growers and food producers, so that as much food as possible is acquired locally.
- Maintain an open dialogue about the food served on campus with the Student Association, the <Club Name> and the <College> community in general.

We would also like to schedule a meeting with you and members of the Student Association and the <Club Name> to further discuss these issues, and will be contacting you in the near future. We look forward to working with you on these important issues. Thank you for listening to our requests.

Sincerely,

Jane Doe  
President, <Club Name>  
Club Contact Information

Joe Blow  
President, <College> Student Association  
Student Association Contact Information

*This sample bill can be customized to fit your student government process. The purpose of this bill is to require the investigation of campus meals for irradiated foods, and to remove or prevent the use of these foods.*

## SAMPLE STUDENT GOVERNMENT BILL

*Respectfully Submitted to the <STUDENT GOVERNMENT NAME> of the <COLLEGE>*

*<DATE>*

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### A Bill in Support of Keeping Food Safe for All Students

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**Respectfully Submitted by <Group or Individual Name>**

**WHEREAS** Each day, <College> students trust that the foods they eat in cafeterias are wholesome and safe; and

**WHEREAS** The University is charged with the responsibility of ensuring the safety and nutritious quality of foods provided on campus for human consumption; and

**WHEREAS** Research indicates that irradiation treatment depletes food of essential vitamins and other nutrients, aids as a catalyst in the further depletion of nutrients during cooking and storage, and creates known toxins in food, as well as unique radiolytic products, whose health effects on humans are unknown; and

**WHEREAS** The Food and Drug Administration (FDA) has not studied the long-term effects of consuming irradiated food, and bases their acceptance of irradiation on research conducted over twenty years ago that demonstrated inconclusive results on the safety of consuming such food and suggested the need for further research; and

**WHEREAS** Recent research in Germany, using more technologically advanced techniques and equipment, has led to the belief by many scientists, here and abroad, that irradiation byproducts are linked to adverse health effects; and

**WHEREAS** Irradiation perpetuates the production and processing of substandard meat and food products, under unsanitary and inhumane processing conditions, permitting industries involved to “cover up” their poor practices; and

**WHEREAS** Irradiation undermines the efforts of small food growers and producers to provide locally grown and sustainable food, because it extends shelf-life and allows multinational food conglomerates to move food production overseas; and

**WHEREAS** Current federal laws do not require irradiated foods served in schools to be labeled as such, and because schools are increasingly being targeted by the food irradiation industry, there is increasing likelihood that students may consume irradiated foods without their knowledge; and

**WHEREAS** Current federal laws do not require certain irradiated food ingredients to be labeled, there is likelihood that <College> may be unknowingly purchasing irradiated foods; and

**WHEREAS** Universities have historically been the birthplace of numerous activist movements and social changes that have ultimately benefited the greater good; therefore

**LET IT BE RESOLVED** That the Student Association at <College> stand officially opposed to food irradiation and the consumption of irradiated foods; and

**LET IT BE FURTHER RESOLVED** That the Student Association and the <Club Name> work with the food services director to investigate whether <College> is serving irradiated foods, and to research alternatives from local food growers and producers.

**LET IT BE FURTHER RESOLVED** That the Student Association and the <Club Name> work with the food services director to ensure that irradiated foods are no longer purchased or served at <College>.



*As part of your campaign, you could include alternatives to low-quality irradiated food by generating interest in local, sustainable agriculture. We suggest working with the groups below to bring the idea to your school. They can help you set up a program for your school to buy locally produced food, thereby supporting local farmers and providing quality food to students.*

## **FARM TO COLLEGE RESOURCES**

### **BUY LOCALLY AND SUPPORT SUSTAINABLE POLICIES**

The three groups below have joined together to form a collaboration around working with students to encourage their schools to buy food from local farmers (farm to college projects) and to support sustainable agriculture policies. This unique campaign allows students to act locally and see the direct fruits of their work while at the same time working to promote sustainable agriculture policies at the national level.

#### **Community Food Security Coalition**

The Community Food Security Coalition (CFSC) is a national, non-profit coalition of organizations dedicated to food and agriculture issues. CFSC's Farm to College Program organizes workshops and conferences across the United States to: 1) inform people about farm to college projects; and 2) bring together farmers, students, faculty, food service staff, and community groups to address the barriers and opportunities involved in creating a farm to college project.

Contact the Farm to College Program Manager, Kristen Markley, at 570-658-2265 or [kristen@foodsecurity.org](mailto:kristen@foodsecurity.org), if you have questions about starting a farm to college project. CFSC can refer you to resources that may be helpful for getting your project off the ground. CFSC is also compiling a database of farm to college projects around the country so that new and existing projects can learn from each others' efforts. Visit [www.foodsecurity.org](http://www.foodsecurity.org) for additional farm to college resources.

#### **FoodRoutes Network**

FoodRoutes Network (FRN) can provide student groups working to establish and sustain farm-to-college programs with tools, resources and messages that can be used to build awareness campaigns on their college campuses. FRN's mission is to persuade more citizens to vote with their food dollars and their ballots to support sustainable and equitable changes in America's food system. To this end, FRN provides information to consumers about where their food comes from, why they should care, and what actions they can take to support the development of local food systems. An important part of this work includes connecting citizens with information about where they can purchase directly from local producers and increasing public awareness about the benefits of pasture-raised and other sustainable meat, dairy and poultry products.

Contact FRN's Local Food Systems Program Coordinator, Joani Walsh, at 814-349-6000, ext.3 or [joani@foodroutes.org](mailto:joani@foodroutes.org) for more information about the tools and resources FoodRoutes can provide to help you in your farm to college promotion efforts. Also visit [www.foodroutes.org](http://www.foodroutes.org) to learn more about their resources.

#### **The National Campaign for Sustainable Agriculture**

The National Campaign for Sustainable Agriculture is dedicated to shaping public policy that promotes a sustainable food and agriculture system that is economically viable, environmentally sound, socially just, and humane. The Field Organizer, Becky Ceartas, is heading up the student/youth program. She can provide you with information to hold your Congressional representatives accountable through phone calling, letter writing, lobbying, and holding media rallies. Becky, a recent college graduate (2000), can provide advice on how to run a basic campaign or other problems that you are running into with your campus group.

Contact Becky at 845-744-8448 or [becky@sustainableagriculture.net](mailto:becky@sustainableagriculture.net) for more information about how you can get involved with promoting sustainable agriculture policy. Also visit [www.sustainableagriculture.net](http://www.sustainableagriculture.net) to learn more.

**APPENDIX  
OF  
FACT SHEETS**



## Why Oppose Food Irradiation?

### **Irradiation destroys nutrients and creates new chemicals in food.**

- Irradiation disrupts the chemical composition of everything in its path – not just harmful bacteria – and creates chemicals called “unique radiolytic products” some of which do not occur naturally in food.
- The FDA has done no long-term studies on the health effects of eating irradiated food.
- Research dating to the 1950s has revealed a wide range of problems in animals that ate irradiated food, including premature death, a rare form of cancer, stillbirths, genetic damage, organ malfunctions, low weight gain and vitamin deficiencies.
- It destroys essential vitamins and other nutrients in food.
- It can change the flavor, texture and odor of food.

### **Irradiation masks cruel and disgusting conditions in slaughterhouses.**

- Though it destroys food-borne pathogens, it does nothing to remove the carriers of these pathogens - the fecal matter, urine, pus and vomit that contaminate meat in many meatpacking facilities.
- It does nothing to slow down line speeds in plants, which cause contamination of meat, numerous workplace accidents, and atrocities to both humans and animals.
- It perpetuates the filthy conditions in massive factory farms, where animals are crowded together, pumped with antibiotics and hormones, and covered in their own excrement.

### **Irradiation contributes to consolidation and globalization of the food industry and hurts family farms.**

- Irradiation prolongs food shelf-life and destroys so-called “barriers to trade,” such as invasive insects. This will allow agribusiness corporations to move their operations outside the U.S., where costs are cheaper, but labor and environmental standards are often compromised.
- Small family farms and local economies will be put at a tremendous disadvantage because they will not be able to make their prices competitive.

### **Irradiation facilities create air pollution and other environmental threats.**

- “E-beam” irradiation facilities create ground level ozone; a highly toxic pollutant that exacerbates asthma and other lung conditions, and is a precursor to smog.
- “E-beam” irradiation facilities also produce nitrous oxides, which also exacerbate respiratory problems and contribute to acid rain.
- Irradiation facilities that use nuclear material create a nuclear waste stream and put the public and workers in danger.
- Since the 1960s, dozens of accidents have been reported at irradiation facilities. For example, radioactive water has been flushed into the public sewer system, radiation has leaked from facilities, facilities have caught fire, groundwater has been contaminated, and workers have been injured or lost their lives. Most of these accidents were cleaned up with taxpayer money.



# The Top 10 Problems With Irradiated Food

Food irradiation companies, food industry lobbying groups and even federal government officials have insisted for nearly a half-century that Americans who eat irradiated food have nothing to worry about. They say it's nutritious, safe, wholesome and tastes just like regular food. Here are 10 reasons why they're wrong.

1) In legalizing food irradiation, the U.S. Food and Drug Administration (FDA) did not determine a level of radiation to which food can be exposed and still be safe for human consumption, which federal law requires.<sup>1,2</sup>

2) In legalizing food irradiation, the FDA relied on laboratory research that did not meet modern scientific protocols, which federal law requires.<sup>3,4</sup>

3) Research dating to the 1950s has revealed a wide range of problems in animals that ate irradiated foods, including premature death, a rare form of cancer, stillbirths and other reproductive problems, genetic damage, organ malfunctions, stunted growth and vitamin deficiencies.<sup>5,6,7,8</sup>

4) Irradiation masks and encourages filthy conditions in slaughterhouses and food processing plants.<sup>9,10</sup> Irradiation can kill most bacteria in food, but it does nothing to remove the feces, urine, pus and vomit that often contaminates beef, pork, chicken and other meat.

5) Irradiation destroys vitamins, essential

fatty acids and other nutrients in food — sometimes significantly. The process destroys 80 percent of vitamin A in eggs and 48 percent of beta carotene in orange juice, but the FDA nonetheless legalized irradiation for these products.<sup>11,12</sup>

6) Irradiation can change the flavor, odor and texture of food — sometimes disgustingly so. Pork can turn red; beef can smell like a wet dog; fruit and vegetables can become mushy; and eggs can lose their color and become runny.<sup>13,14,15</sup>

7) Irradiation disrupts the chemical composition of everything in its path — not just harmful bacteria, which the food industry often asserts. Scores of new chemicals called “radiolytic products” are formed by irradiation — chemicals that do not naturally occur in food and that the FDA has never studied for safety. One such chemical, called 2-DCB, was recently found to promote the cancer-development process in rats, cause genetic damage in rats, and cause genetic and cellular damage in human and rat cells.<sup>16,17,18,19,20,21</sup>

8) The World Health Organization did not follow its own recommendation to study the toxicity of “radiolytic products” formed in high-dose irradiated food before proposing in Nov. 2000 that the international irradiation dose limit — equal to 330 million chest x-rays — be removed.<sup>22,23</sup>

9) Soon, some irradiation plants may use cesium-137, a highly radioactive waste material left over from the production of nuclear weapons. This material is dangerous and unstable. In 1988, a cesium-137 leak near Atlanta led to a \$40 million, taxpayer-funded cleanup.<sup>24</sup>

10) Because it increases the shelf life of food and utilizes large, centralized facilities, irradiation encourages globalization and consolidation of the food production, distribution and retailing industries. These trends have already forced multitudes of family farmers and ranchers out of business, reduced the diversity of products in the marketplace, disrupted local economies in developing nations, and put American farmers and ranchers at a great economic disadvantage.<sup>25</sup>

## Notes

- <sup>1</sup> U.S. Code of Federal Regulations, Title 21, § 170.22.
- <sup>2</sup> Federal Register, various filings, 1983-2000.
- <sup>3</sup> U.S. Code of Federal Regulations, Title 21, § 170.20.
- <sup>4</sup> Federal Register, various filings, 1983-2000.
- <sup>5</sup> *A Broken Record: How the FDA Legalized — and Continues to Legalize — Food Irradiation Without Testing it for Safety.* Washington, D.C.: Public Citizen, Cancer Prevention Coalition, Global Resource Action Center for the Environment, Oct. 2000.
- <sup>6</sup> Kesavan, P.C., Swaminathan, M.S. “Cytotoxic and mutagenic effects of irradiated substrates and food material.” *Radiation Botany*, 11:253-181, 1971.
- <sup>7</sup> Schubert, J. “Mutagenicity and cytotoxicity of irradiated foods and food components.” *Bulletin of the World Health Organization*, 41:873-904, 1969.
- <sup>8</sup> Spiher, A.T. “Food Irradiation: An FDA Report.” *FDA Papers*, Oct. 1968.
- <sup>9</sup> Nestor, F. and Hauter, W. *The Jungle 2000: Is America’s Meat Fit to Eat?* Washington, D.C.: Government Accountability Project, Public Citizen, Sept. 2000.
- <sup>10</sup> Piccioni, R. “Food irradiation: Contaminating our food.” *The Ecologist*, 18:2:48-55.

- <sup>11</sup> FDA Memorandum, from Kim Morehouse, Ph.D. to William Trotter, Ph.D. April 11, 2000.
- <sup>12</sup> FDA Memorandum, from Antonio Mattia, Ph.D. to William Trotter, Ph.D. Nov. 2, 1999.
- <sup>13</sup> Webb, T. et al. *Food Irradiation: Who Wants It?* Rochester, Vermont: Thorsons Publishers, 1987.
- <sup>14</sup> Huang, S. et al. “Effect of electron beam irradiation on physical, physicochemical and functional properties of liquid egg during frozen storage.” *Poultry Science*, 76:1607-15, 1997.
- <sup>15</sup> Wong, Y.C. et al. “Comparison between irradiated and thermally pasteurized liquid egg white on functional, physical and microbiological properties.” *Poultry Science*, 75:803-808, 1996.
- <sup>16</sup> Murray, D. *Biology of Food Irradiation.* Somerset, England: Research Studies Press Ltd., 1990.
- <sup>17</sup> Op. cit. Note 5.
- <sup>18</sup> Delincee, H. and Pool-Zobel, B. Genotoxic properties of 2-dodecylcyclobutanone, a compound formed on irradiation of food containing fat. *Radiation Physics and Chemistry*, 52: 39-42, 1998.
- <sup>19</sup> Delincee, H. et al. Genotoxicity of 2-dodecylcyclobutanone. Food Irradiation: Fifth German Conference, Karlsruhe, November 11-13, 1998.
- <sup>20</sup> Delincée, H. et al. “Genotoxicity of 2-alkylcyclobutanones, markers for an irradiation treatment in fat-containing food.” (Abstract) Presented at the 12th International Meeting on Radiation Processing, March 25-30, 2001, Avignon, France.
- <sup>21</sup> “Information about the toxicity of 2-alkylcyclobutanones, a group of substances exclusively formed upon irradiation of food containing fat.” International Consultative Group on Food Irradiation.
- <sup>22</sup> *International Consultative Group on Food Irradiation: Review of Data on High Dose (10-70 kGy) Irradiation of Food.* Report of a Consultation, Karlsruhe, 29 August - 2 September 1994. Geneva: World Health Organization, 1994.
- <sup>23</sup> *High-Dose Irradiation: Wholesomeness of Food Irradiated with Doses Above 10 kGy.* Report of a Joint FAO/IAEA/WHO Study Group. Technical Report Series 890. Geneva: World Health Organization, 1999.
- <sup>24</sup> “Last radioactive capsules taken from DeKalb plant.” *Macon Telegraph*, Nov. 20, 1990.
- <sup>25</sup> *A Citizen’s Guide to Fighting Food Irradiation.* Washington, D.C.: Public Citizen’s Critical Mass Energy and Environment Program, 2000.



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## The History of Food Irradiation

Irradiation has nuclear roots – something the food irradiation industry would rather not admit. Irradiation promoters prefer to distance themselves from radiation by using such euphemistic names for the process as “cold pasteurization,” but the two technologies are hardly in the same league.

You can pasteurize milk on your kitchen stove, but you will never be able to irradiate food in your home. Irradiated food is zapped with radiation equivalent of up to 1 billion chest X-rays (depending on the food). The industry would probably prefer that people don't find out about that somewhat alarming statistic.

Food irradiation is one of the nuclear technologies that originated with Dwight Eisenhower's Atoms for Peace Program. Unveiled in 1953, seven years after Hiroshima, the plan for the “peaceful atom” was introduced so that “the miraculous inventiveness of man shall not be dedicated to his death, but consecrated to his life.” The idea was to shift public attention away from the death and destruction of nuclear weapons and to promote other uses for nuclear technology, leaving in place the academic and industrial infrastructure that would allow the weapons program to continue. While most of the schemes spawned by the Atoms for Peace program are long forgotten, including atomic planes, nuclear heart pacemakers and nuclear-powered coffee pots, food irradiation has persisted.

### Adventures in Research

Early research by the U.S. Army, funded by the U.S. Department of Defense, resulted in the Food and Drug Administration's (FDA) 1963 approval of irradiation of can-packed bacon. But the regulation permitting bacon irradiation was withdrawn in 1968 when the FDA decided that the research

on which it had based its approval was flawed. The agency found that there were significant adverse health effects in animals fed irradiated bacon, including decreases in the survival rates of weaned young and greater losses of young animals eating irradiated bacon.

More flawed science occurred between 1971 and 1977, when the Army contracted with Industrial BioTest Ltd. (IBT), once the largest animal testing facility in the U.S., to examine the long-term toxicity of irradiated foods. As early as 1973, Army representatives observed deficiencies in IBT's handling of its work, but the contractual arrangement continued. IBT conducted several studies on the potential carcinogenicity and reproductive damage caused by irradiated food, but government scientists eventually rejected IBT's work because of deficiencies in the research.

IBT's work was further discredited in 1983, when three IBT directors were convicted for, among other things, falsifying test data on a variety of chemicals, including pesticides and pharmaceutical drugs, while conducting research unrelated to irradiation. Incredibly, IBT's research, although discredited, is still used as part of the scientific basis for assurances on food safety.

All the while, the International Atomic Energy Agency (IAEA), a United Nations agency that promotes nuclear technologies, was working on the global acceptance of food irradiation. IAEA in 1959 signed an agreement with the World Health Organization (WHO) giving IAEA “the primary responsibility for encouraging, assisting and coordinating research on, and development and practical application of atomic energy for peaceful uses throughout the world.” As a result, IAEA has had authority over nuclear energy programs and has played a major role in encouraging people to accept irradiated food, including organizing scientific committees that

promote the wholesomeness of irradiated food.

Meanwhile, in the 1970s, interest in food irradiation was smoldering elsewhere in the federal bureaucracy. In 1972, NASA employee Jack Sivinski was looking for more work for his team of irradiation biologists. They had been working at NASA investigating irradiation as a method for sterilizing spacecraft to ensure that microbes from Earth did not contaminate Mars. As it turned out, NASA chose another technology for sterilization, but Sivinski saw new possibilities for irradiation.

U.S. policy at the time called for reprocessing spent fuel rods from nuclear power plants to recapture plutonium for use as reactor fuel. Reprocessing also separates out other radioactive elements, including cesium 137, which can be used to irradiate food. The Atomic Energy Commission (which was broken up into two agencies in 1974: the Department of Energy (DOE) and the Nuclear Regulatory Commission) launched the reprocessing program, but President Jimmy Carter ruined Sivinski's plans by banning the reprocessing of plutonium in civilian reactors.

However, Sivinski had his operation moved to the weapons end of DOE, where food irradiation became his major focus. The Byproducts Utilization Program, a program designed to find profitable uses for nuclear waste, was born as a result. Essentially, the government was looking for a convenient way to dispose of nuclear waste. At a House Armed Services Committee hearing in 1983, DOE admitted, "The utilization of these radioactive materials simply reduces our waste handling problem."

Eventually, Sivinski left DOE to work for the major environmental engineering consulting firm CH2M Hill, where he directed the company's irradiation research, under contract to his old office at DOE.

The DOE's scheme to use nuclear waste for food irradiation was severely damaged in 1988 when a serious accident occurred at Radiation Sterilizers in Decatur, Ga., where DOE's cesium 137 was used for irradiation. The water soluble radioactive isotope leaked into a water storage pool, endangering workers and contaminating the facility. Workers carried the radioactivity into their homes and cars. The mess cost \$47 million to clean up, and taxpayers picked up the tab.

The cast of characters promoting food

irradiation includes Martin Welt, president of Radiation Technology, Inc., which had irradiation plants in New Jersey, Virginia, North Carolina and Arkansas. Welt, a much-quoted advocate of irradiation, was convicted on six criminal counts, including conspiracy to defraud the government, lying to the NRC investigators and intentionally violating the Atomic Energy Act. Radiation Technology was cited 32 times for various violations, including throwing radioactive garbage out with regular trash and bypassing an interlock safety device that protected workers.

To say the least, this is a rather frightening example of what could happen if hundreds of irradiation facilities are built.

## Irradiation Today

Food irradiation today remains as closely connected to the nuclear weapons and atomic energy as it did in 1953. The list of advocates for food irradiation has grown to include companies such as Titan, the defense contractor that is using Star Wars technology (in which lasers zap incoming missiles) to irradiate meat. Titan is following in the footsteps of the Atoms for Peace program by using military technology for a civilian purpose. Like earlier promoters of irradiation, Titan is dependent on handouts from the federal government for a hefty chunk of its revenue – 80 percent.

Despite the earlier setbacks, irradiation is being touted more than ever as a way to clean food of contaminants such as pathogens in fecal matter. Currently, it is legal to irradiate fresh meat and most vegetables, fruit and spices, although food irradiation is not extensive. However, the battle lines are being drawn more clearly as industry pushes for the widespread irradiation of food while environmental and food safety groups argue against it. Given the lingering questions over the safety of food irradiation, many say it would be wise to conduct more research before writing a new – and potentially deadly – chapter to food irradiation's history.



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# The Health Problems of Irradiated Foods: What the Research Shows

In the course of legalizing the irradiation of beef, chicken, pork, fruit, vegetables, eggs, juice, spices and sprouting seeds – a process that has spanned nearly 20 years – the U.S. Food and Drug Administration has dismissed and ignored a substantial and growing body of evidence suggesting that irradiated foods may not be safe for human consumption. The following is a sampling of research – much of which was funded by government agencies and performed at major universities – that raise questions about the FDA's assertion that people who eat irradiated foods have nothing to worry about.

## Health Problems in Humans [I]

Fifteen children suffering from severe protein-calorie malnutrition...receiving freshly irradiated wheat developed polyploid cells and certain abnormal cells in increasing number as the duration of feeding increased... Though the biological significance of polyploidy is not clear, its association with malignancy makes it imperative that the wholesomeness of irradiated wheat for human consumption be very carefully assessed.

- Bhaskaram, C., and G. Sadasivan. "Effects of feeding irradiated wheat to malnourished children." *Amer Journ Clin Nutr*, 28:130-135, 1975.

## Health Problems in Humans [II]

[After eating gamma-irradiated potatoes for 14 weeks], it was evident that the haemoglobin values were significantly higher *during* the period than *before*. The values were also significantly higher *during* than *after*. An additional comparison of the values *before* with the values *after* shows that a small effect still remains.

- Jaarma, Maire. "Studies of chemical and enzymatical changes in potato tubers and some higher plants caused by ionizing radiation, including studies on the wholesomeness of  $\gamma$ -irradiated potato tubers and effects on some carbohydrates *in vitro*." Biokemiska institutionen, Kungl. Universitetet i Stockholm, 1967.

## Health Problems in Humans [III]

Ten young men served as test subjects for this study, [and were fed] pork loin which had been ground ... and subjected to gamma radiation... It is apparent...that there may very well be differences in the digestibility of the foodstuffs from irradiated or non-irradiated meat, and in the ability of protein in irradiated or non-irradiated meat to maintain nitrogen balance.

- Plough, I.C. et al. "An evaluation in human beings of the acceptability, digestibility and toxicity of pork sterilized by gamma radiation and stored at room temperature." U.S. Army Medical Nutrition Laboratory, Fitzsimons Army Hospital, Denver. Report No. 204, May 1957.

## Health Problems in Humans [IV]

Thirteen young men served as test subjects, [and were fed] an irradiated food diet...of 8 different food items... The excretion of indophenol-reducing substances was significantly higher ( $p < .005$ ) during the irradiated food periods... Irradiation decreased the thiamine and ascorbic acid content and increased the "browning reaction" derivatives, fat soluble carbonyl compounds, and thiobarbituric acid reactants.

- Bierman, E.D. et al. "Short-term human feeding studies of foods sterilized by gamma radiation and stored at room temperature." U.S. Army Medical Nutrition Laboratory, Fitzsimons Army Hospital, Denver. Report No. 224, July 1958.

## Chromosomal Aberrations in Human Blood Cells [I]

Irradiated sucrose solutions...were extremely toxic to human lymphocytes. Mitoses were inhibited... Degenerated mitoses were observed and the chromosomes were grossly damaged. The chromatin [DNA] material was clumped or the chromosomes appeared shattered or pulverized... In contrast, treatment with unirradiated sucrose at the same concentration had no apparent effect on the mitotic rate and the chromosomes were not visibly damaged.

- Shaw, M.W. and Hayes, E. "Effects of irradiated sucrose on the chromosomes of human lymphocytes in vitro." *Nature*, 211:1254-1255, 1966.

## Chromosomal Aberrations in Human Blood Cells [II]

Leukocyte cultures from four different healthy human males [underwent] a considerable inhibition of mitosis and chromosome fragmentation. [Additional] research would be extremely prudent.

- Kesavan, P.C. and Swaminathan, M.S. "Cytotoxic and radiomimetic activity of irradiated culture medium on human leukocytes." *Current Science*, 16:403-404, 1966.

## A Summary of Problems

Numerous studies have been carried out to ascertain whether cytotoxic effects occur when unirradiated biological test systems are cultured or fed with irradiated media or food. In such studies, adverse physiological (growth retardation and inhibition), cytological (mitotic inhibition and chromosome aberrations) and genetical effects (forward and reverse mutations) have been observed in a wide range of test systems, ranging from bacteriophages to human cells... The available data suggest that [a variety of free radicals] may act as the toxic and mutagenic agents.

- Kesavan, P.C. and Swaminathan, M.S. "Cytotoxic and mutagenic effects of irradiated substrates and food material." *Radiation Botany*, 11:253-281, 1971.

## A Thalidomide Warning [I]

The thalidomide disaster might have been prevented if an easily performed investigation of possible cytotoxic effects in plant cells had been made. It must be acknowledged that any compound causing [cellular] damage must be considered a potential hazard to any living cell or cell system – including man.

- Lofroth, G. "Toxic effects of irradiated foods." *Nature*, 211:302, 1966.

## A Thalidomide Warning [II]

Irradiating can bring about chemical transformations in food and food components resulting in the formation of potential mutagens, particularly hydrogen peroxide and various organic peroxides... It is now realized, especially since the thalidomide episode, that [older testing] protocols do not detect the more subtle population hazards such as mutagens and teratogens... In view of the serious consequences to the human population which could arise from a high level of induced mutations, it is desirable that protocols for irradiated food should include in *vivo tests* on mammals for possible mutagenicity.

- Schubert, J. "Mutagenicity and cytotoxicity of irradiated foods and food components." *Bulletin of the World Health Organization*, 41:873-904, 1969. (Co-sponsored by the U.S. Atomic Energy Commission and Food and Drug Administration)

## A Cancer Warning

An increase in concentration of a mutagen in food by irradiation will increase the incidence of cancer... It will take four to six decades to demonstrate a statistically significant increase in cancer due to mutagens introduced into food by irradiation... When food irradiation is finally prohibited, several decades worth of people with increased cancer incidence will be in the pipeline.

- Tritsch, G.L. "Food Irradiation." *Nutrition*, 16:698-701, 2000.

## Unique, Toxic Chemicals Formed in Irradiated Food Containing Fat [I]

When food containing fat is treated by ionizing radiation, a group of 2-alkylcyclobutanones is formed... To date, there is no evidence that the cyclobutanones occur in unirradiated food... *In vitro* experiments using rat and human colon cells indicate that 2-dodecylcyclobutanone (2-DCB)...is clearly cytotoxic and genotoxic... [M]ore experiments than these preliminary ones are required.

- Delincee, H. and Pool-Zobel, B. "Genotoxic properties of 2-dodecylcyclobutanone, a compound formed on irradiation of food containing fat." *Radiation Physics and Chemistry*, 52:39-42, 1998. (Co-sponsored by the International Consultative Group on Food Irradiation.)

## **Unique, Toxic Chemicals Formed in Irradiated Food Containing Fat [II]**

In this study, *in vivo* experiments were conducted on rats, which received two different doses of 2-DCB by way of pharyngeal probe... Slight but significant DNA damage was observed in the experimental group that received the higher concentration of 2-DCB (14.9 mg/kg body weight). Further studies are needed to clarify the relevance of these results to an evaluation of risk from the consumption of irradiated foods.

- Delincée, H. et al. "Genotoxicity of 2-dodecylcyclobutanone." Food Irradiation: Fifth German Conference, Report BFE-R-99-01, Federal Nutrition Research Institute, Karlsruhe, Germany, 1998.

## **Unique, Toxic Chemicals Formed in Irradiated Food Containing Fat [III]**

To date, there is no evidence that 2-alkylcyclobutanones [2-ACB's] occur in unirradiated food, and therefore, it is advisable to determine the toxicological potential... [Human colon tumor cells were incubated with 2-tetradecylcyclobutanone, one particular ACB.] After prolonged incubation times, (1-2 days) at higher concentrations (>50iM), cytotoxicity did appear.

- Delincée, H. et al. "Genotoxicity of 2-alkylcyclobutanones, markers for an irradiation treatment in fat-containing food – Part I: Cyto- and genotoxic potential of 2- tetradecylcyclobutanone." *Radiation Physics and Chemistry*, 63:431-435, 2002.

## **Unique, Toxic Chemicals Formed in Irradiated Food Containing Fat [IV]**

[U]sing an experimental colon carcinogenesis model in rats, 2-ACB's [2-alkylcyclobutanones], when tested at a high concentration, potentiate the effect of an inducing carcinogen on the long term. This was revealed by the increase of colonic neoplastic lesions and the development of a higher number of colon tumours with larger size... This suggests that, in this experiment, 2-ACB's, although they do not induce carcinogenesis, *per se*, rather promote the colonic carcinogenesis process. Finally, it was shown that small fractions of 2-ACB's had been stored in rat adipose tissues and excreted in faeces of the treated rats. This indicates that most of the 2-ACB's is metabolically transformed or stored in other organs...[I]n our opinion further investigations...will help to elucidate a possible risk associated with the consumption of irradiated fat-containing foods.

- Marchioni, E. et al. "Toxicological study to assess the risk associated with consumption of irradiated fat-containing food." (Summary) International Consultative Group on Food Irradiation, Dec. 2001.

## **Radioactivity in Organs and Excrement of Rats**

Considerable amounts of radioactivity were present in the liver, kidney, stomach, gastrointestinal tract, and blood serum of rats [fed irradiated sucrose solutions]... Radioactivity was present in urine and feces samples.

- De, A.K. et al. "Biochemical effects of irradiated sucrose solutions in the rat." *Radiation Research*, 37:202-215, 1969.

## **Fatal Internal Bleeding in Rats [I]**

A significant number of rats consuming irradiated beef died from internal hemorrhage within 46 days, the first death of a male rat coming on the 11th day of feeding. This rat became sluggish on the 8th day of the regimen and started refusing food. He continued [to be] morbid during the next two days, did not eat any food, lost weight and appeared anemic. He was found dead on the 11th day. Post-mortem examination showed hemothorax, the blood had not clotted; there was bleeding also in the epididymis.

- Metta, V.C. et al. "Vitamin K deficiency in rats induced by feeding of irradiated beef." *Journal of Nutrition*, 69:18-21, 1959. (Co-sponsored by the Surgeon General of the U.S. Army)

## **Fatal Internal Bleeding in Rats [II]**

Hemorrhagic death had occurred in all males fed irradiated diets by day 34... There is evidence to suggest that inefficient absorption of vitamins, i.e. vitamin K, from the intestinal tract may contribute to a deficiency state.

- Mellette, S.J. and Leone, L.A. "Influence of age, sex, strain of rat and fat soluble vitamins on hemorrhagic syndromes in rats fed irradiated beef." *Federation Proceedings*, 19:1045-1048, 1960. (Co-sponsored by the Surgeon General of the U.S. Army)

## **Fatal Vitamin E Deficiency in Rats**

A considerable number of the second litter of the experimental group [of rats that ate irradiated beef] died... Symptoms observed were marked edema of the face, ruffled hair coat, general incoordination, spastic hopping gait, and sometimes complete loss of movement with dragging of the hind quarters. Those pups most severely affected often became completely prostrated a short time before death... In no case were these symptoms

noted in the control group... The probability [is that the pups] were suffering from the characteristic muscular dystrophy syndrome (commonly referred to as nutritional muscular dystrophy) known to result from a marginal vitamin E intake.

- Poling, C.E. et al. "Growth, reproduction, survival and histopathology of rats fed beef irradiated with electrons." *Food Res*, 20:193-214, 1955.

## **Prenatal Deaths in Mice [I]**

Freshly irradiated diets produced elevated levels of early deaths in [mice fetuses]... The increase in early deaths would suggest that the diet when irradiated has some mutagenic potential.

- Anderson, D. et al. "Irradiated laboratory animal diets: Dominant lethal studies in the mouse." *Mutation Research*, 80:333-345, 1981.

## **Prenatal Deaths in Mice [II]**

Feeding of mice for two months before mating with 50 percent of the standard complete diet irradiated with [gamma rays] provokes a significant increase of embryonal deaths,... probably to be interpreted as a dominant lethal mutation associated with gross chromosomal aberrations, such as breaks repeatedly found to be induced by irradiated materials.

- Moutschen-Dahmen, M. et al. "Pre-implantation death of mouse eggs caused by irradiated food." *Inter Journ Rad Biol*, 18:201-216, 1970.

## **Chromosomal Aberrations in Monkeys**

The increased incidence of cells with numerical aberrations in animals which received a diet containing freshly irradiated wheat...must be considered significant.... Also, the disappearance of these cells, following the replacement of freshly irradiated wheat with unirradiated wheat, clearly indicates that the appearance of the abnormal cells was due to the ingestion of freshly irradiated wheat.

- Vijayalaxmi. "Cytogenetic studies in monkeys fed irradiated wheat." *Toxicology* 9:181-184, 1978.

## **Chromosomal Aberrations and Blood Disorder in Rats; Mutations in Mice**

[A]n increase of chromosomal aberrations which was significant at the 5 percent level [was observed]... [Later experiments] demonstrated beyond a doubt that this effect is real, and running experiments also indicate an increase of intrauterine foetal death, possibly dominant lethal mutations in the mouse... [A] 15-20 percent decrease of the absolute lymphocyte numbers in the peripheral blood of the rat [was observed]... [T]he lymphopenia produced by irradiated food increased with increasing age of the rats.

- Lofroth, G. et al. "Biological effects of irradiated food. II: Chemical and biological studies of compounds distilled from irradiated food." *Arkiv. Zool.* 18:529-547, 1966.

## **Chromosomal Aberrations in Mice**

Feeding of freshly irradiated wheat resulted in significantly increased incidence of polyploidy cells in bone marrow, aneuploid cells in testis, reduction in number of spermatogonia...as well as a higher mutagenic index... [S]ome toxic substance(s) may be formed during irradiation.

- Vijayalaxmi. "Genetic effects of feeding irradiated wheat to mice." *Canadian Journal of Genetics and Cytology*, 18:231-238, 1976.

## **Chromosomal Aberrations in Rats**

Feeding irradiated wheat to rats was associated with an increase in the number of polyploid cells in the bone-marrow... Irrespective of the protein content in the diet, animals which received irradiated wheat had polyploid cells in their bone-marrow.

- Vijayalaxmi and G. Sadasivan. "Chromosomal aberrations in rats fed irradiated wheat." *Inter Journ Rad Biol*, 27:135-142, 1975.

## **Chromosomal Aberrations in Hamsters**

The proportion of [bone marrow] cells with polyploidy increased between 4 to 5 times the control level... When feeding of the irradiated diet stopped, the proportion of polyploid cells returned to the control level.

- Renner, H.W. "Chromosome studies on bone marrow cells of chinese hamsters fed a radiosterilized diet." *Toxicology*, 8:213-222, 1977.

## **Genetic Damage in Rats**

Well-fed rats, when switched over to a diet of irradiated wheat, showed a higher mutagenic index than those given unirradiated wheat.

- Vijayalaxmi and K.V. Rao. "Dominant lethal mutations in rats fed on irradiated wheat." *Inter Journ Rad Biol*, 29:93-98, 1976.

## **Immune Dysfunction in Rats**

Rats given diets containing freshly irradiated wheat showed significantly lower mean antibody titres to four different antigens, decreased numbers of antibody-forming cells in the spleen and rosette-forming lymphocytes... [T]he consumption of irradiated wheat is associated with changes in the immune status of the animal.

- Vijayalaxmi. "Immune response in rats given irradiated wheat." *British Journal of Nutrition*, 40:535-541, 1978.

## **Immune Dysfunction in Hamsters**

The irradiated fish diet has apparently caused an even greater immunological response than unirradiated fish... [T]he possibility of a mutagen remaining undetected must be considered.

- Renner, H.W. et al. "An investigation of the genetic toxicology of irradiated foodstuffs using short-term test systems. III – *In vivo* tests in small rodents and in *Drosophila melanogaster*." *Food Chemistry and Toxicology*, 20:867-878, 1982.

## **Reproductive Dysfunction, Cancer, Stunted Growth in Mammals**

A careful analysis by FDA of all [Army] data present (including 31 looseleaf notebooks of animal feeding test results) showed significant adverse effects produced in animals fed irradiated food... What were these adverse effects?... A decrease of 20.7 percent in surviving weaned rats... A 32.3 percent decrease in surviving progeny of dogs... Dogs weighing 11.3 percent less than animals on the control diets... Carcinomas of the pituitary gland, a particularly disturbing finding since this is an extremely rare type of malignant tumor.

- Spiher, A.T. "Food irradiation: An FDA report." *FDA Papers*, Oct. 1968.

## **Reproductive Dysfunction in Rats [I]**

Very high losses of litter in the [first] and [second] generations [80 and 85 percent, respectively] in spite of a high fertility rate and normal size of litter in all dietary groups caused at first great difficulty. The suspicion that the animals had obtained too little vitamin E was certified correct.

- Reichelt, D. et al. "Long-term animal feeding study for testing the wholesomeness of an irradiated diet with a high content of free radicals." Federal Research Institute for Food Preservation, Institute for Radiation Technology, Karlsruhe, Germany, 1972.

## **Reproductive Dysfunction in Rats [II]**

An impairment in the fertility of the male and an increased mortality in litters, which [researchers] believed was due to vitamin E destruction.

- DaCosta, E. and Levenson, S.M. "Effect of diet exposed to capacitron irradiation on the growth and fertility of the albino rat." U.S. Army Medical Nutrition Laboratory, Fitzsimons Army Hospital, Denver. Report No. 89, 1951. Cited in Kraybill, H.F. and Huber, T.E. "The wholesomeness of irradiated food and its military implications." Paper to be presented at 63<sup>rd</sup> Annual Convention, Association of Military Surgeons, United States of America, Hotel Statler, Washington, D.C., Nov. 12-14, 1956.

## **Reproductive Dysfunction in Mice [I]**

Cytogenic examinations of the developing spermatogonia in 30 mice of each group revealed that cytogenetic abnormalities were significantly more frequent in the group fed irradiated flour than in the control group... [T]he incidence of litters [with non-viable offspring] was significantly higher in the group fed irradiated flour... [O]n the average the losses [of young mice] were about 35% higher in the test group than in the controls. The life span of mice fed irradiated flour was slightly shorter than in the control mice.

- Bugyaki, L., A.R. Deschreider, J. Moutschen, M. Moutschen-Dahmen, A. Thijs, and A. Lafontaine. "Do irradiated foodstuffs have a radiomimetic effect? II. Trials with mice fed wheat meal irradiated at 5 Mrad." *Atompraxis* 14:112-118, 1968.

## **Reproductive Dysfunction in Mice [II]**

The mice raised on the irradiated diet exhibited some impairment in lactational performance.

- Luckey, T.D. et al. "Nutritional adequacy of a semi-synthetic diet sterilized by steam or cathode rays." *Food Research*, 20(2):180, 1955. Cited in Kraybill, H.F. "Problems in food processing by ionizing radiations with special reference to wholesomeness studies on irradiated foods." Paper to be presented at Fifth Annual Conference sponsored by Pennsylvania Public Health Association, Pennsylvania Health Council, Medical Society of Pennsylvania, Pennsylvania Department of Health, held at Pennsylvania State University, University Park, Pennsylvania, August 21, 1956.

## Reproductive Dysfunction in Fruit Flies

The production of *Drosophila* offspring in cultures containing gamma irradiated chicken meat was much lower... The production...was not increased by changing the basal medium or by adding a vitamin supplement.

- Raltech Scientific Services Inc., Madison, Wisconsin. "Final Report: Evaluation of the mutagenicity of irradiated sterilized chicken by the sex-linked recessive lethal test in *Drosophila melanogaster*." Contract DAMD 17-76-C-6047, submitted to U.S. Army Medical Research and Development Command, Fort Detrick, Frederick, Maryland. June 15, 1979.

## Mutations in Fruit Flies [I]

An increase in the rate of mutation has been found in *Drosophila melanogaster* reared on a basic medium that was irradiated with a sterilizing dose (150,000 rads) of cobalt-60 gamma rays... Visible changes were two to six times more frequent in the irradiated series than in the controls,...[such as] half-thorax, vestigial wings and incurved wings.

- Swaminathan, M.S. et al. "Mutations: Incidence in *Drosophila melanogaster* reared on irradiated medium." *Science*, 141:637-638, 1963.

## Mutations in Fruit Flies [II]

[S]everal experimental variables in culture medium may be associated with increased mutation frequencies in *Drosophila*; namely irradiated whole food... The increased mutation frequencies associated with flies cultured on aged food implies that the [toxic products] are long lived.

- Rinehart, R.R. and Ratty, F.J. "Mutation in *Drosophila melanogaster* cultured on irradiated whole food or food components." *Intern Journ Rad Biol*, 12(4):347-354, 1967.

## Mutations in Fruit Flies [III]

There was an approximate twofold increase in sex-linked recessive lethality [in *Drosophila melanogaster* cultured in irradiated medium]. This increase can be attributed largely to an increase in gonial mutants.

- Rinehart, R.R. and Ratty, F.J. "Mutation in *Drosophila melanogaster* cultured on irradiated food." *Genetics*, 52(6):1119-1126, 1965.

## Mutations in Fruit Flies [IV]

[A] small but constant increase in sex-linked and autosomal recessive lethal frequencies [was observed in *Drosophila melanogaster* cultured in irradiated medium]... A linear relationship of dose and effect was obtained with regard to dominant lethals.

- Kesavan, P.C. and Swaminathan, M.S. "Mutagenic effects of irradiated culture media in *Drosophila melanogaster*." *Indian Journal of Genetics*, 29:173-183, 1969. Cited in Kesavan, P.C. and Swaminathan, M.S. "Cytotoxic and mutagenic effects of irradiated substrates and food material." *Radiation Botany*, 11:253-281, 1971.

## Stunted Growth of Rats

In general, the irradiated foods produced a depressed growth rate... The effect of the radiation variable is significant... Higher intake coupled with the lower growth rates of rats on the rations containing irradiated carrots resulted in a lower [food] efficiency.

- Tinsley, I.J. et al. "The growth, reproduction, longevity, and histopathology of rats fed gamma-irradiated carrots." *Toxicology and Applied Pharmacology*, 16:306-317, 1970.

## Mutations in Salmonella

Groups of Swiss albino mice (SPF) fed with normal and gamma-irradiated food at doses of 0.75, 1.5, and 3.0 Mrad, were injected intraperitoneally with *Salmonella typhimurium* TA 1530 for the host mediated assay test of mutagenesis. The results indicate that there is a significant increase in mutation frequency induced by the 3 Mrad sterilized food.

- Johnston-Arthur T., M. Brena-Valle, K. Turanitz, R. Hruby, and G. Stehlik. "Mutagenicity of irradiated food in the host mediated assay system." *Studia Biophysica*, (Berlin), 50:137-141, 1975.



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# The Great Vitamin Robbery

## What Irradiation Does to the Nutrients in Your Food

### The Crime

A central goal of modern society is a healthy and well-nourished population. In pursuing this aim, the U.S. government spends hundreds of millions of dollars a year telling Americans what we should eat in order to get all the vitamins and other essential nutrients needed to be healthy.

At the same time, however, U.S. government officials have given their wholehearted support to an industry that literally robs food of its vitamin content. Does the left hand know what the right hand is doing?

Extensive research dating to the 1950s has found that irradiation destroys between 2 percent and 95 percent of the vitamin content in food. At the moment, very few irradiated products are on sale in grocery stores. However, with its approval of the irradiation of fruits, vegetables, poultry, pork, beef, eggs, juice and sprouting seeds, the Food and Drug Administration is allowing the irradiation of foods that comprise nearly half of the human diet. If the FDA goes forward with plans to approve the irradiation of ready-to-eat foods and shellfish, *most* of our food supply could be irradiated.

The potential scale of The Great Vitamin Robbery would then be truly staggering: *up to 95 percent of certain vitamins in more than half of the food consumed in the U.S. could be lost.*

### How Irradiation Zaps Vitamins

Today, it is legal to irradiate food with radiation doses between 1 and 30 kiloGray —

the equivalent of 33 million to 1 billion chest x-rays. Among the chemicals formed by exposure to radiation are hundreds — or perhaps thousands — of unique radiolytic products and free radicals that have never been completely identified, much less adequately evaluated for safety.

What researchers do know is that free radicals are thug chemicals — just one can initiate tens of thousands of chain reactions that can have serious health effects. These range from destroying cell membranes and disrupting crucial processes in the body, to re-programming DNA and forming mutant cells. Research has also shown that these free radicals break down and destroy vitamins.<sup>1</sup>

### And It Keeps on Zapping

The irradiation industry frequently argues that vitamin losses due to canning, freezing, drying, storing and cooking are unavoidable and happen to all food anyway. Irradiation, however, will not replace any of these decontamination and preservation techniques — it will be yet another nutrient-depleting process that food will undergo before it reaches your plate. Moreover, irradiation is qualitatively and quantitatively different from these other treatments: Vitamins continue being destroyed, long after the irradiation “treatment” has taken place.

Unlike heat sterilization, for example, irradiation results in the formation of new chemicals that remain in food and continue to react during storage and cooking. These chemicals have been shown to destroy vitamins at a

higher rate during storage than other treatments. What's more, cooking accelerates this process even further. This is of particular concern, as one of the main reasons that the food industry is so enthusiastic about irradiation is because it helps extend shelf life. Food items could be kept on shelves for weeks or months and shipped even longer distances without spoilage, resulting in major savings for the food industry. So, the very way that the industry intends to make use of irradiation means an even higher rate of vitamin loss.

## The Ugly Details

Vitamins are essential to human health and life itself. They support bodily functions, protect cells and tissues, prevent deficiency diseases and can help prevent other diseases such as cancer and heart disease.

Research has shown that *all* vitamins can and do suffer substantial losses due to irradiation. For example: 91 percent of vitamin B<sub>6</sub> in irradiated beef stored for 15 months and 33 percent of vitamin B<sub>12</sub> in meat can be lost.<sup>2,3</sup>

The five vitamins profiled below are the most sensitive to radiation "treatments."<sup>4</sup> They are also among the vitamins that many people are *already* not getting enough of. Up to one in five people, for instance, get inadequate supplies of vitamins A, C and E.<sup>5</sup> Where research has been conducted, information is provided on the synergetic effects of irradiation (irradiation plus storage plus cooking), as this indicates what the vitamin value of a food will be at the point that really matters — when it is actually consumed.

## Vitamin A / Beta-Carotene

- **Recommended Daily Intake:** Men, 1000 micrograms; Women, 800 micrograms.<sup>6</sup>
- **Sensitivity to irradiation:** High/Medium: 4-50 percent loss
- **Why do you need it?** For good vision, healthy skin and healthy cells and tissues; to fight infection; to aid bone growth. It may also help fight cancer and heart disease.
- **What happens if you don't get enough of it?** Deficiency may lead to higher suscepti-

bility to infection and poorer eyesight. Ultimately, deficiency can result in death.

- **Where can you get it?** Eggs, meat and fish. Also present in the form of a precursor called beta-carotene in plants, which your body converts to vitamin A. Sources are carrots, pumpkin, potatoes, winter squashes, cantaloupe, pink grapefruit, apricots and most dark green, leafy vegetables.
- **Can its food sources legally be irradiated?** Yes
- **What the research says:** Irradiated liver lost 4 percent more vitamin A than unirradiated liver after one week; after two weeks, the irradiated meat had lost 18 percent more than the non-irradiation meat.<sup>7</sup> Irradiated potatoes lost 50 percent of their beta-carotene content after six months in storage.<sup>8</sup> Up to 80 percent of the vitamin A in irradiated eggs is lost after one month of storage.<sup>9</sup> Research is not available on possible additional accelerated loss during cooking.

## Vitamin B<sub>1</sub> (Thiamine)

- **Recommended Daily Intake:** Men, 1.5 micrograms; Women, 1.1 micrograms
- **Sensitivity to irradiation:** High: 11-95 percent loss.
- **Why do you need it?** Helps cells convert carbohydrates into energy; essential for the functioning of the heart, muscles and nervous system.
- **What happens if you don't get enough of it?** A deficiency can cause weakness, fatigue, psychosis, and nerve damage.
- **Where can you get it?** Fortified breads, cereals, pasta, whole grains, lean meats, fish, dried beans, peas, and soybeans.
- **Can its food sources legally be irradiated?** Yes
- **What the research says:** Vitamin B<sub>1</sub> loss in unirradiated rolled oats is 0 percent during storage (3 months) and 8 percent during cooking — a total loss of 8 percent. For irradiated rolled oats, 37 percent is lost during treatment; another 18 percent is lost during storage; and a further 19 percent is

lost during cooking — a total loss of 74 percent. These kind of synergetic losses were found to be typical for a range of foods.<sup>10</sup> Even with using low temperatures during irradiation to try to minimize nutrient loss, chicken still lost between 11 and 45 percent of its B<sub>1</sub> content.<sup>11</sup> Results for haddock, beef, turkey, ham, bacon, peaches and beets showed losses of 70-95 percent.<sup>12</sup>

## Vitamin C

- **Recommended Daily Intake:** Men, 45-60 micrograms; Women, 45-60 micrograms
- **Sensitivity to irradiation:** High: 20-90 percent loss.
- **Why do you need it?** For healthy gums, teeth, bones and muscles; to help heal wounds and fight infection; to act as an antioxidant to protect cells. It may also reduce the risk of heart disease, cancer and cataracts.
- **What happens if you don't get enough of it?** Can lead to fatigue, anorexia, muscular pain and greater susceptibility to infection and stress. Deficiency can lead to scurvy.
- **Where can you get it?** Green peppers, citrus fruits, strawberries, tomatoes, broccoli, greens, potatoes, and cantaloupe. Most other fruits and vegetables contain some vitamin C; fish and milk contain small amounts.
- **Can its food sources legally be irradiated?** Yes
- **What the research says:** Irradiation has been shown to destroy 13 percent of the vitamin C in orange juice. One-third of vitamin C in potatoes is destroyed.<sup>13</sup> After 40 days of storage, lemons lost 90 percent of vitamin C.<sup>14</sup>

## Vitamin E

- **Recommended Daily Intake:** Men, 10 micrograms; Women, 8 micrograms
- **Sensitivity to irradiation:** High: 17-91 percent loss
- **Why do you need it?** It is a powerful antioxidant that helps protect body tissues and cells. It may also help fight heart dis-

ease, cancer, Alzheimer's, cataracts and improve the immune system.

- **What happens if you don't get enough of it?** Vitamin E deficiency can cause a progressive neural degeneration syndrome involving reduced reflexes, decreased sensation and ataxia. If not treated soon enough, then the debilitation is irreversible. It may also be linked with depression and infertility.
- **Where can you get it?** Wheat germ, corn, nuts, seeds, olives, spinach, asparagus, and other green leafy vegetables and vegetable oils.
- **Can its food sources legally be irradiated?** Yes
- **What the research says:** Vitamin E loss in unirradiated hazelnuts is 4 percent after 3 months of storage, and a further 29 percent during cooking — a total loss of 33 percent. For irradiated hazelnuts, 17 percent is lost during treatment, 25 percent is lost during storage, and a further 49 percent is lost during cooking — a total loss of 91 percent. This kind of synergetic loss was found to be typical for a range of foods.<sup>15</sup>

## Vitamin K

- **Recommended Daily Intake:** Men, 65-80 micrograms; Women, 55-65 micrograms
- **Sensitivity to irradiation:** Medium
- **Why do you need it?** Known as the "clotting" vitamin — without it, blood will not clot. It may also help maintain strong bones.
- **What happens if you don't get enough of it?** May lead to improper coagulation of the blood and hemorrhaging.
- **Where can you get it?** Cabbage, cauliflower, green leafy vegetables, cereals, soybean, and other vegetables. Also made by the bacteria that line the gastrointestinal tract.
- **Can its food sources legally be irradiated?** Yes
- **What the research says:** A study to assess the effects of vitamin K deficiency in rats caused by feeding irradiated beef resulted in the death of 70 percent of the male rats.<sup>16</sup>

## WANTED:

### *Who are the guilty parties behind The Great Vitamin Robbery?*

#### The Food Industry...

...which wants to cut its costs and increase its profits. Many corporate, factory-style farms use dirty handling practices. Meat is regularly contaminated by feces, urine, pus and vomit. Rather than cleaning up food factories and hiring more food inspectors, the industry wants a quick and cheap fix.

#### The Nuclear Industry...

...which is keen to find new markets for their outmoded technology. The list of advocates for food irradiation includes companies such as the Titan Corp., the defense contractor that is using linear accelerators originally designed for the "Star Wars" program to irradiate food. Titan is dependent on handouts from the federal government for a hefty chunk of its revenue — 80 percent.

#### The FDA...

...which has failed in its responsibility to demonstrate that irradiation is needed, beneficial, safe and ethical. Beyond the fact that the FDA has ignored irrefutable evidence that irradiation destroys vitamins and other nutrients, the agency has failed to conduct the required 100-fold safety tests, and has ignored numerous studies indicating that irradiated foods contain hazardous chemicals. Instead, the agency has based its support for the industry primarily on seven poorly conducted studies dating back to the 1960s.

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## Notes

- <sup>1</sup>Diehl, J.F. "Combined effects of irradiation, storage and cooking on the Vitamin E and Vitamin B<sub>1</sub> levels of foods." Presented at the 33rd Annual Meeting of the American Institute of Nutrition, 1969.
- <sup>2</sup>Urbain, W.M. *Advanced Food Research*, 24:155-227, 1978. Cited in Murray, D.R., *Biology of Food Irradiation*, Somerset, England: Research Studies Press, 1990.
- <sup>3</sup>Webb, T. and Lang, T. *Food Irradiation - The Facts*. Rochester, Vermont: Thorsons Publishing Group, 1987.
- <sup>4</sup>Kilcast, D. "Effect of radiation on vitamins." *Food Chemistry*, 49:157-164, 1994. Ranking of vitamin sensitivity to radiation: High: C, B<sub>1</sub>, E, A; Medium: beta-carotene and K; Low: D, B<sub>2</sub>, B<sub>6</sub>, B<sub>12</sub>, B<sub>5</sub>, Folic acid, Pantothenic Acid, B<sub>10</sub>, Choline.
- <sup>5</sup>United States National Health and Nutritional Examination Survey (NHANES III, 1988-94), cited in Song W.O. and Kerver J.M. "Nutritional contribution of eggs to American diets." *Journal of American Nutrition*, 19 (5 Suppl):556S-562S, 2000.
- <sup>6</sup>Data for Recommended Daily Intake, vitamin functions and food sources cross-referenced from MEDLINEplus Encyclopedia, [www.nlm.nih.gov](http://www.nlm.nih.gov); and the Vitamin and Mineral Guide, [www.thriveonline.com](http://www.thriveonline.com).
- <sup>7</sup>Diehl, J.F. "Vitamin A in irradiated foodstuffs." *Zeitschrift fuer Lebensmittel-Untersuchung und Forschung*, 168:29-31, 1979. Cited in Stevenson, M.H., "Nutritional and other implications of irradiating meat." *Proceedings of the Nutrition Society*, 53:317-325, 1994.
- <sup>8</sup>Janave, M. T. and Thomas, P. "Influence of post-harvest storage of potato carotenoids." *Potato Research*, 22:365-9, 1979. Cited in Kilcast, 1994.
- <sup>9</sup>FDA Memorandum from Kim M. Morehouse (Division of Product Manufacture and Use) to William Trotter (Division of Product Policy), April 11, 2000.
- <sup>10</sup>Diehl, 1969.
- <sup>11</sup>Hanis, T. et al. "Poultry meat irradiation: effect of temperature on chemical changes and inactivation of microorganisms." *Journal of Food Protection*, 1989. Cited in Kilcast, 1994.
- <sup>12</sup>Ziporin, Z. Z. et al. U.S. Army Medical Nutrition Laboratory. April 1957.
- <sup>13</sup>Gibbs, Gary. *The Food That Would Last Forever*. Garden City Park, New York: Avery Publishing Group, 1993.
- <sup>14</sup>Maxie, E.C. et al. *Radiation Botany*, 405-411, 1964. Cited in Murray, 1990.
- <sup>15</sup>Diehl, 1969.
- <sup>16</sup>Metta, V.C. et al. "Vitamin K deficiency in rats induced by feeding of irradiated beef." *Journal of Nutrition*, 69:18-21, 1959. (Co-sponsored by the Surgeon General of the U.S. Army)

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# Why is the FDA Ignoring Toxic Chemicals in Irradiated Food?

Since their work began in 1998, government researchers in Germany have made some alarming discoveries about unique chemicals formed in food when it is “treated” with radiation.

Cyclobutanones – which do not occur naturally in any food – were shown to promote cancer development and cause genetic damage in rats. The chemicals have also been shown to cause genetic and cellular damage to human and rat cells.

Even though many irradiated foods that can legally be sold to the public could contain cyclobutanones – including eggs, beef, pork, chicken, lamb, mangoes and papayas – the U.S. Food and Drug Administration has done nothing to alert Americans about these toxic chemicals. And, the FDA is actively considering irradiation for ready-to-eat foods and seafood, in which cyclobutanones have also been discovered.

Because cyclobutanones are byproducts of fats that occur in hundreds of types of food, the potential hazards of these chemicals is great.

While the FDA sits on its hands, Americans could be unwittingly ingesting these toxic chemicals. The risk is there. But where is the FDA?

The revelations about cyclobutanones are both ironic and dangerous.

The irony is these chemicals are so easily detected and remain in food for so long that they are commonly used as “chemical markers” to determine whether food has been exposed to ionizing radiation.<sup>1</sup> This is a good thing if you’re a government official inspecting a crate of imported mangoes.

The danger is that FDA has never done a formal analysis of the potential health hazards of cyclobutanones – even though they were first discovered in irradiated foods in 1971.<sup>2</sup> Meanwhile, the FDA has legalized irradiation for many major food groups, including fruit, vegetables, beef, pork, poultry and eggs. This is a bad thing if you’re a parent concerned about what your children eat.

Today, people throughout the country could be eating irradiated foods that contain cyclobutanones

without their informed consent.

Though irradiated whole foods sold in stores – such as apples, carrots and pork chops – must be labeled “Treated by Irradiation” or “Treated with Radiation,” there is no such requirement for most irradiated ingredients, such as spices used in canned soup, and vegetables used in frozen dinners.

Nor is there such a requirement for irradiated foods served in restaurants, schools, hospitals, nursing homes, day-care centers and other institutional settings.

The situation could get worse. As of spring 2002, the FDA was considering irradiation for molluscan shellfish, such as clams, oysters and mussels; crustacean shellfish, such as shrimp, crabs and lobsters; and – most significantly – ready-to-eat foods, such as canned and frozen foods, deli meat, baby food, pre-cut salads, snack foods, sauces and condiments.

The ready-to-eat food proposal is so worrisome because these foods comprise 37 percent of the typical American's diet, according to the National Food Processors Association, which filed the request with the FDA.<sup>3</sup>

More worrisome still, high-ranking FDA officials admit that they have not compiled a list of foods defined as "ready-to-eat." One agency official said the category could include virtually "anything."<sup>4</sup> Such uncertainty would make it virtually impossible for consumers to know whether the foods they're eating contain the types of fats from which cyclobutanones are formed.

## Communication Breakdown

Consumers would be at an even greater disadvantage if the FDA approves an industry-backed proposal to allow irradiated foods to be labeled "electronically pasteurized" or "cold pasteurized."

The FDA is considering these euphemisms even though 98 percent of people who have written the FDA on the issue said they want the current labeling law maintained, and even though participants in FDA focus groups unanimously opposed these phrases, calling them "sneaky," "misleading" and "a fake."

## Under the Microscope

Research into the potential toxicity of cyclobutanones came to light in 1998. Henry Delincée of Germany's Federal Research Center for Nutrition found that a specific cyclobutanone called 2-DCB caused genetic and cellular damage to human and rat colon cells.<sup>5</sup>

In three subsequent experiments, Delincée and his colleagues found that 2-DCB caused genetic damage in rats<sup>6</sup>; that related chemicals called 2-TCB and 2-TDCB caused genetic and cellular damage in human cell cultures<sup>7</sup>; and – most disturbing of all – that cyclobutanones promoted cancer development in rats.<sup>8</sup>

Concluded Delincée: "The results urge caution, and should provide impetus for further studies."

By all accounts, FDA officials do not seem to be taking Delincée's advice.

Case in point: In March 2000, several FDA staffers – including a high-ranking food safety official – attended an international conference at which Delincée's findings were discussed.<sup>9</sup> Nonetheless, the FDA three months later legalized irradiation for eggs,<sup>10</sup> in which cyclobutanones were first discovered eight years earlier.<sup>11</sup>

## Europe Takes It Seriously

Meanwhile, the FDA's counterparts in Europe are treating the matter far more cautiously.

In spring 2002, the 15-member European Union

succeeded in delaying an international proposal by the Codex Alimentarius Commission (which sets food safety standards for more than 160 nations) to allow any food to be irradiated at any dose – no matter how high.

And, the EU has delayed its own proposal to allow irradiation for shrimp, frog legs, cereal grains, egg whites and other foods, until ongoing experiments into the toxicity of cyclobutanones are completed.

This approach to policy-making, known as the precautionary principle, is more prevalent in Europe than in the U.S., where government officials are much more inclined make political decisions before all the facts are in.

## Righting the Wrongs

In the interest of protecting the public health, we have called on the FDA to:

- ♦ Analyze the cyclobutanone levels of all foods that the FDA has legalized or has under consideration for irradiation;
- ♦ Refrain from legalizing irradiation for any additional foods until comprehensive, published, peer-reviewed research is conducted into the potential health hazards of cyclobutanones; and
- ♦ Convene public hearings to thoroughly explore and educate consumers about the potential health hazards of cyclobutanones.

## Notes

- <sup>1</sup> Stevenson, M.H. "Identification of irradiated foods." *Food Tech*, 48:141-144, 1994.
- <sup>2</sup> LeTellier, P.R. and Nawar, W.W. "2-alkylcyclobutanones from the radiolysis of triglycerides." *Lipids*, 7: 75-76, 1972.
- <sup>3</sup> FDA Food Additive Petition 9M4697, Docket No. 99F-5522.
- <sup>4</sup> Personal communication with Laura Tarantino, Deputy Director, FDA Office of Premarket Approval, June 27, 2001.
- <sup>5</sup> Delincée, H. and Pool-Zobel, B. "Genotoxic properties of 2-dodecylcyclobutanone, a compound formed on irradiation of food containing fat." *Rad Phys and Chem*, 52:39-42, 1998.
- <sup>6</sup> Delincée, H. et al. "Genotoxicity of 2-dodecylcyclobutanone." *Food Irradiation: 5th German Conference*, Karlsruhe, Nov. 1998.
- <sup>7</sup> Delincée, H. et al. "Genotoxicity of 2-alkylcyclobutanones." (Abstract) 12th International Meeting on Radiation Processing, March 25-30, 2001, Avignon, France.
- <sup>8</sup> Marchioni, Eric et al. "Information about the potential toxicity of 2-alkylcyclobutanones." *International Consultative Group on Food Irradiation*, Dec. 2001.
- <sup>9</sup> Annual Report on Activities: 17th Meeting of the International Consultative Group on Food Irradiation. Geneva, Nov. 2000.
- <sup>10</sup> 65 Federal Register 45280, July 21, 2000.
- <sup>11</sup> Crone, A.V.J. et al. "Synthesis, characterization and use of 2-tetradecylcyclobutanone together with other cyclobutanones as markers for irradiated liquid whole egg." *Jour Sci Food Agric*, 62:361-367, 1993.



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# Why Vegetarians and Vegans Should Worry About Food Irradiation

Vegetarians and vegans may wonder, “Why should I care about food irradiation if it’s mainly being done to meat?” The answer is: The issue is not nearly as simple as it may seem.

Irradiation directly and indirectly affects the lives of people who refrain from consuming animal products in many ways, regardless of why they choose to do so. The problems associated with irradiation extend far beyond the immediate concerns about what this process does to food.

From perpetuating factory farming and globalization, to threatening environmental sustainability and social justice, food irradiation is an emerging danger that should be on the radar screen of everyone concerned not only about how food is grown and processed, but about environmental, economic and social conditions as well.

## **Health: The Ugly Truth About Irradiation**

The dose of ionizing radiation used to “treat” food is incomprehensibly high — the equivalent of up to 1 *billion* chest x-rays. While irradiation may kill harmful microorganisms and extend the shelf-life of food, the process has numerous negative side-effects that have been dismissed and ignored by the food industry and the federal government alike.

Irradiation results in the formation of benzene, methyl ethyl ketone and other chemicals known or suspected to cause cancer and birth defects. Irradiation also creates toxic chemicals called cyclobutanones, which do not occur naturally in any food on Earth, and which recently were

linked to cancer development.

Irradiation also destroys vitamins and essential fatty acids, and breaks down proteins and carbohydrates. And, perhaps most alarming, the long-term effects of eating irradiated food have never been assessed.

## **Globalization: Fruit and Vegetables Are Next in the Cross-Hairs**

In the spring of 2000, the U.S. Department of Agriculture proposed legalizing irradiation for imported fruit and vegetables, ostensibly to prevent the further invasion of non-native fruit flies and other insects.

Just as the overall goals of irradiation may seem beneficial on the surface, there is far more to the story of irradiating imported

produce than meets the eye.

As it is, fully one-third of our fruit and vegetables are imported — mainly because labor is cheaper and environmental laws are more lax in developing nations. The catastrophic effects on the U.S. agriculture industry — particularly on family farmers and farming communities — have been well documented.

Multinational corporations such as Philip Morris/Kraft and Green Giant want to move even more food production outside of the U.S. This would further compromise the safety and wholesomeness of our food and encourage more corporate control over food production and distribution, making a safe, sustainable and secure food supply an unlikely future.

With irradiation as another tool at their disposal, multinational corporations are redoubling their efforts to convert indigenous farming communities in developing nations into cash croplands, and boost exports to North America, Europe and Japan. Brazil, for instance, is being groomed to become “the fruit-basket of the world.”

### **Animal Rights and Factory Farming: Perpetuating the Problem**

The meat industry maximizes profits by raising animals in cramped, inhumane conditions and then “processing” them in filthy plants that are breeding grounds for *E. coli*, *Salmonella*, *Listeria* and other potentially deadly food-borne pathogens. With up to 90 chickens being slaughtered per minute, and 300 cows being slaughtered per hour, maintaining humane practices is virtually impossible.

Food irradiation would only exacerbate these problems. Pressures on food companies to clean contaminated facilities and slow down line-speeds to make slaughtering more humane would be eased. And, by making irradiation a regulatory standard, companies could protect themselves from liability.

### **Environment and Sustainability: More Radiation**

Many people choose a vegetarian or vegan diet because meat production causes massive environmental damage. Among the major problems are excess nitrogen, phosphorus and ammonia in the soil and water caused by animal excrement; erosion and soil infertility caused by grazing; and the overdependence on water, grain, petroleum, pesticides and drugs to breed animals for food. Irradiation would perpetuate these problems by allowing the meat industry to maintain the status quo.

Additionally, irradiation facilities that use gamma radiation encourage the production of deadly cobalt-60, and result in yet more radioactive waste. Irradiation is another polluting industry that hides behind the guise of public health.

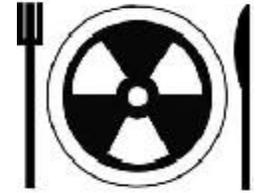
### **The Big Picture**

Food and nuclear industry executives, along with federal government officials, are simultaneously trying to encourage the public acceptance and ignorance of irradiation. This campaign knows no boundaries. Regardless of what one chooses to eat or not to eat, misinformation — especially as it relates to an issue as universal as our food supply — should not go unanswered.

Because of their political and economic sensibilities, vegetarians and vegans have an even greater burden than the general population to engage a system that is bent on making food irradiation — a vestige of Cold War nuclear hysteria — a social norm. Any effort to reform an industry gone haywire must include an effort to ban the use of ionizing radiation to “treat” food. The clock is ticking. By the time the health, environmental and economic effects manifest, it very well may be too late.



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# Irradiation and International Trade: Increasing Corporate Control Over the Global Food Supply

Around the globe, multinational corporations such as Philip Morris/Kraft, Del Monte foods, and even Mitsubishi are planning to use irradiation to increase their global reach. Why? Irradiation doubles or triples the shelf life of food products, kills invasive insects on fruits and vegetables, and masks the contamination that is the result of industrialized meat production.

Multinational food corporations are interested in growing more fruits and vegetables in the developing world – where labor is cheap and agricultural chemicals are, in many cases, virtually unregulated. Irradiation not only allows food to be shipped over longer distances due to increased shelf life, it also kills insects and other invasive species that are considered “barriers to trade.”

Irradiation is also promoted as a replacement for methyl bromide, a fumigant used to control insects, weeds and pathogens on more than 100 crops, which is being phased out because it depletes the ozone layer and causes other environmental damage.

Countries such as Mexico, Israel, Hungary, South Africa, and China are planning to use irradiation on agricultural products. Likewise, the U.S., France and the Netherlands – the three highest-value agricultural exporters in the world – are planning to use irradiation for many types of food.

The meat industry is also promoting irradiation as a way to kill the bacteria remaining on meat. Animals live in disgusting, crowded condi-

tions and are butchered in dirty meat processing plants – sometimes while they’re still alive – with fast-moving and inhumane slaughterlines. Instead of ensuring that meat is free of feces, urine, pus and vomit, meat companies want to mask these unhygienic conditions by using irradiation to kill food-borne pathogens.

Irradiation advances the industrialization of our food supply, thus enabling large corporations to gain more command and control over the entire world’s food supply. To maximize their profits, multinational meat companies including Cargill/Excel, IBP and Tyson are using their influence in international trade negotiations to promote irradiation.

Family farmers and small food producers cannot compete with corporate farms, where workers are under-paid and exploited. Industrialized corporate food operations also treat the soil and water as commodities available to exploit for the purpose of making a profit.

Trade agreements that promote global food trade increase the pressure on small food producers. As a result, independent farmers are losing their land and are forced to move to cities, where they live in poverty and are often coerced into working in sweatshops – if they are able to find work at all.

## **Irradiated Food = Unsafe and Nutritionally Deficient Food**

Irradiation blasts food with the equivalent radiation of hundreds of millions of chest X-rays.

These high levels of radiation initiate a complex sequence of reactions that literally rip apart the molecular structure of the food. This process creates new and unidentified chemicals that have not been proven safe. One such chemical, known as 2-DCB, has been shown to cause cellular and/or genetic damage in rats and in human cell cultures. This chemical has never been found naturally in any food on Earth. Ironically, it is a well-known “marker” for determining whether food has been irradiated.

Irradiated food is also depleted of its nutritional content. For instance – according to the FDA’s own scientists – irradiation destroys up to 80 percent of the vitamin A in eggs and half of the beta-carotene in orange juice. This problem is compounded by lengthened shelf life, because as food sits in storage, its nutritional content declines. If irradiated foods are stored longer and shipped further from the farm, these foods will arrive at the dinner table with nearly no nutritional value. Everyone will be eating plastic food.

## New Laws Provide Cover

More than 140 nations will soon be allowed to irradiate food (at any dose), trade it “freely” with any other country (whether they want to import it or not), and serve it to people who might not know that the food they’re eating could make them sicker than the pathogens that irradiation is intended to kill.

The Codex Alimentarius Commission, created in 1961, is an unaccountable international body that creates global standards for globalized food trade. Under the innocuous-sounding policy of “harmonization,” the Codex Commission – whose members are neither elected nor subject to removal by citizens – has been instrumental in breaking down trade “barriers” to promote “free” trade in agricultural products. Under harmonization, England, for example, would not be allowed to block food imports from France if its own food safety laws are stricter.

In the case of food irradiation, it’s the United States that’s trying to lower the standards of countries that have banned or strictly limited the production, sale and/or importation of irradiated food, such as Japan and most member nations of the European Union.

The International Consultative Group on Food Irradiation (ICGFI) is another secretive body of decision-makers that is promoting the use of food irradiation. Like Codex, ICGFI meets behind closed doors and has undemocratically chosen leaders, many of whom work within or have close ties with private industry.

On Nov. 3, 2000, ICGFI decided in a private meeting in Geneva that any food could be safely irradiated at any dose – without studying, much less identifying, the chemical compounds formed by high-dose irradiation. This decision now goes to the Codex, which could adopt it as the official global standard within two years.

Adding yet another layer of undemocratic behavior to the pile, ICGFI, which has 46 member nations (including the U.S., Brazil, South Korea, and China, all of which are proponents of irradiation), helps set food safety standards for the World Trade Organization, which has more than 140 member nations.

Tellingly, ICGFI approved high-dose irradiation with only 24 of 46 member nations represented at the meeting.

## The Big Picture

Globalization of food safety and food quality standards means that citizens will have little control over the food they eat. Global agribusinesses will exert their influence on these international bodies, as they will be the only ones that can afford to play on the international stage. In the name of promoting free trade, hard-fought consumer protections will either be weakened or eliminated entirely.

Some countries, fearful that their consumers might be forced to eat irradiated, genetically modified and other harmful foods, have called for the implementation of the “precautionary principle” as a way to protect their sovereignty over food safety issues. Thus far, however, the United States has opposed this policy, arguing that it would impede free trade.



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# Endangered Family Farms: How Food Irradiation Threatens American Agriculture

## The Big Picture

The irradiation of the world's food supply is on the agenda of governments and transnational corporations alike. Irradiation can drastically extend the shelf life of food, kill invasive insects, and mask the contamination of meat products. This facilitates international trade in food and leads to higher profits for large, industrialized food producers. Family farmers and small-scale producers, on the other hand, will be left out in the cold as irradiation tarnishes the image of their products and threatens their livelihood.

Giant agribusiness companies want to grow more fruits and vegetables in the developing world, where labor is cheap and environmental regulations are weak or non-existent. Zapping this food with ionizing radiation would kill the invasive insects that are considered "barriers to trade" and allow food to be shipped over long distances because it increases food's shelf life.

This could devastate U.S. farmers as production is shifted overseas and cheap imports flood the U.S. markets. The economic disasters for American agriculture caused by the North American Free Trade Agreement (NAFTA) pale in comparison to what could happen if the globalized agriculture system envisioned by the World Trade Organization comes to pass.

The system the WTO is working to create can't happen without irradiation. In fact, a high ranking U.S. Department of Agriculture official has said that food irradiation is "absolutely necessary" for global trade in food as envisioned in trade agreements.

Food irradiation also advances the consolidation of the food system, and increases control of the world's food supply by large corporations. It allows big agribusiness to ship food further and mask the contamination of meat caused by large scale animal operations and unsanitary processing plants. Family farmers and small producers can't compete with overseas production and the large factory farms that drive prices below their cost of production. Irradiation is a vital tool for the corporate giants who depend on production in the developing world and on factory farms to make their profits.

There are already 33 countries where irradiated food is available. For example, Brazil currently already has several irradiation facilities with another 21 in the planning stages, as well as the most lenient food irradiation regulations in the world. Currently, eight types of food are irradiated for commercial use in Brazil, including wheat, grains, flour, and some beans. The irradiation industry wants to irradiate tropical fruits grown in Brazil for export to the U.S. and Europe.

## **So What is Food Irradiation?**

Irradiation blasts food with radiation equivalent to hundreds of millions of chest X-rays. These high levels of energy initiate a complex sequence of reactions that, in addition to killing bacteria, literally rip apart the molecular structure of the food. This process creates new and unidentified chemicals that have not been adequately studied as safe to consume.

One of these new chemicals, called 2-DCB, has been shown to cause cellular and genetic damage in rats and in human cells. The chemical has never been found naturally in any food on earth. Ironically, it is a well-known “marker” for determining if a food was irradiated.

The nutritional content of irradiated food also suffers. For instance – according to Food and Drug Administration scientists – irradiation destroys up to 80 percent of the vitamin A in eggs and half of the beta-carotene in orange juice. If irradiated foods are stored longer and shipped further from the farm, these foods will arrive at the dinner table with significantly diminished nutritional value.

## **Low Sales and Labeling**

Despite elaborate marketing campaigns by the food irradiation industry, the public has consistently rejected their products. Test-marketing of irradiated ground beef in New York, California, Florida, and Wisconsin have failed, with well over 100 grocery stores pulling the products off of their shelves in 2001.

Currently, federal rules require whole foods sold in stores – such as apples, potatoes and ground beef – to be labeled “Treated by Irradiation” and carry the international symbol for irradiation, the radura. But there are numerous loopholes. Processed foods containing irradiated non-meat ingredients are exempt, as are irradiated foods served in restaurants, schools, nursing homes and hospitals.

Due to weak sales, the irradiation industry has spent several years pressuring the federal government to change labeling regulations to allow the phrase “electronic pasteurization.” Consumer surveys have repeatedly shown that people prefer current labeling requirements and that associating pasteurization with irradiation could result in public mistrust of pasteurized dairy products.

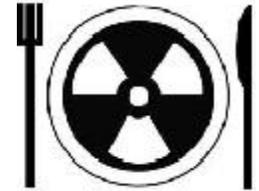
## **What Can We Do About Food Irradiation?**

Family farmers and small producers should not have to compete with corporate giants who rely on cheap labor, environmentally damaging methods, and irradiation to produce food. Without working together to support sustainable local agricultural systems and fight technologies that enable the globalization of our food supply, we will lose our family farmers.

The first thing we can do to stop the global spread of food irradiation is to not buy irradiated products here at home. Ask your local grocery store and restaurants if they sell irradiated food and tell them you don’t want it. Also let your elected officials know that you want them to strengthen consumers’ right to know by protecting the labeling requirements for irradiated food. Your voice is important!

**Public Citizen has a campaign to stop food irradiation. If you would like to get involved or learn more about the issue, please contact us!**

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## Genetically Engineered and Irradiated Foods: The FDA's Twin Failures

The decisions to legalize genetically engineered and irradiated food are prime examples of how the U.S. Food and Drug Administration has allowed corporate America to dictate what consumers eat, rather than protecting public health.

In neither case did the FDA demonstrate that these foods are safe for human consumption. On the contrary, the FDA ignored extensive research showing that irradiated food contains birth defect- and cancer-causing chemicals. For genetically modified organisms (GMOs), the agency did not require any safety testing whatsoever.

To compound these flaws, the FDA failed to consider the impact that eating GMOs and irradiated foods could have on the human diet. The agency wrongly assumed that neither would comprise a large portion of our food intake. However, upwards of 60 percent of our food contains GMOs. And with the pending approval of irradiation for ready-to-eat foods such as frozen dinners and luncheon meats, more than half of our food supply could legally be irradiated.

The FDA operates under a federal mandate to ensure the safety of new foods and the technologies that are used to produce them. Instead, in these two instances, the agency has bowed to pressure from multinational agribusiness corporations that are striving to cut costs and increase profits under the guise of improving food safety.

### Following the FDA's Fumbles

Both genetic engineering and irradiation are considered "additives" under the 1958 Food Additives Amendment to the Food, Drug and Cosmetic Act. This federal law requires companies seeking to introduce a new food additive to first gain approval from the FDA.

Before granting approval, the FDA is required to establish "a reasonable certainty in the minds of competent scientists that the substance is not harmful under the intended conditions of use." However, it is widely acknowledged that it is impossible to be absolutely certain that any substance is absolutely harmless.

Moreover, the FDA must establish a 100-fold safety factor before legalizing an additive. This means the agency must determine the highest level of exposure to which animals are unharmed, and then divide that level by 100. Disregarding its own rules, the agency never established a safety factor for irradiated food or GMOs.

Furthermore, the agency's own guidelines, "Toxicological Principles for the Safety Assessment of Direct Food Additives and Color Additives Used in Food," describe in explicit detail a battery of toxicity tests that must be conducted on proposed food additives. In yet another failure, the agency did not follow these principles before legalizing GMOs and irradiated food.

While hundreds of studies have been conducted on irradiated food, FDA officials claim only seven of the selected 441 studies they analyzed were "properly conducted, fully adequate by 1980 toxicological standards, and able to stand alone in support of safety." With the shaky assurance of just seven studies, which have subsequently been shown to be inadequate, the FDA approved irradiated food for public consumption.

The FDA gave the green light to GMOs by bestowing them the status of Generally Recognized As Safe (GRAS). Translation: The agency did not require any testing of GMOs before approving their sale to the American public. Companies can volunteer the results of their studies to the FDA, but the agency is not obliged to establish the

safety of genetically modified foods.

As for irradiated foods, the good news is that specific approvals must be granted for each type of food proposed for irradiation. The bad news is that the FDA has granted approvals—without following its own safety rules—for beef, pork, poultry, fruit, vegetables, mushrooms, juice, eggs, sprouting seeds and spices.

## FDA Misinformation

Although the FDA and the U.S. Department of Agriculture currently require irradiated food to be labeled as such, the food industry is leading a campaign to allow the use of the misleading and meaningless euphemisms “cold pasteurized” and “electronically pasteurized.” Although consumers have rejected these phrases as deceptive and sneaky, the FDA has yet to rule them out.

The FDA does not allow companies to claim their products are “GMO free” unless they can verify that the products do not contain any GMO components, a complicated feat. And, as genetically engineered foods are not labeled as such in the U.S., there is no way for consumers to be informed of exactly what they are eating.

## FDA Guesswork

In preparation for its first major approval of irradiated food, the FDA stated in 1980 that it never expected irradiated foods to comprise more than 10 percent of the American diet. However, having approved the irradiation of many staple items, the FDA is permitting a large portion of our food supply to be irradiated. This amount will grow to more than half of our food supply if the agency legalizes irradiation for ready-to-eat foods, which the National Food Processors Association estimates to comprise 37 percent of the typical American’s diet.

Since genetically engineered corn comprises more than 60 percent of all corn grown in the U.S., GMO products can be found in everything from cereals and breads, to veggie burgers. Between the heavy-handed influence of the biotech industry on government, the threat of genetically modified pollen drifting across crops, and the lack of labeling for genetically engineered food, all of our food could contain GMOs and we would be none the wiser.

## The Corporate Hoax

As a thinly veiled public-relations ploy, the irradiation industry is marketing itself as a solution

to world hunger. Like other inappropriate high-tech solutions proposed in the past, this is an industry pipe dream.

Irradiation destroys a large proportion of the nutrients in food, a problem that is compounded as food sits out its increased shelf life. Cooking escalates the problem further still. The end result is empty-calorie food that could actually increase nutritional deficiencies. This is hardly a recipe for feeding the world.

Furthermore, irradiating food will further industrialize and consolidate the world’s food production, distribution and marketing industries. Rather than growing their own food, farmers in developing countries will plant mono-culture cash crops that devastate the ecology and provide them with no food of their own and little money with which to buy any.

Genetically engineered crops do not stand to feed the world either, as they typically produce lower yields than traditionally bred plants. And as many genetically engineered plants require more pesticides, soil fertility and the success of future crops are compromised. Rather than feeding the world, GMOs make farmers slaves to the biotech seed and pesticide industries.

Moreover, both genetically engineered and irradiated foods are more expensive in economic and environmental terms than traditionally grown foods. In all regards, they pose a nightmare to sustainable development and economic stability.

The world hunger crisis not a problem of food production, but rather a problem of food access. The spread of genetically engineered and irradiated food would widen the gap between rich and poor by increasing the disproportionate distribution of the world’s wealth, and the indiscriminate exploitation of the world’s resources.

The close cooperation of the FDA and large corporations on the issues of genetically modified and irradiated food endangers the health of the American public. Moreover, due to the power and influence of the U.S. government and corporate America, their endorsement of these inappropriate technologies could spell disaster for the health and prosperity of the entire world.



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