NATIONAL RAILROAD PASSENGER CORPORATION

In re: FAST Act Food and Beverage Reform  Docket No. __

PETITION

Submitted to:
Charles W. Moorman IV
President and CEO
National Railroad Passenger Corporation
60 Massachusetts Avenue NE
Washington, DC 20002

Date:
March 1, 2017

Submitted by:
Physicians Committee for Responsible Medicine
5100 Wisconsin Avenue NW, Suite 400
Washington, DC 20016
Fax: (202) 527-7415
INTRODUCTION

The Fixing America’s Surface Transportation Act (“FAST Act”) was signed into law on December 4, 2015. In a section titled, “Food and beverage reform,” the FAST Act requires the National Railroad Passenger Corporation (“Amtrak”) to “develop and begin implementing a plan to eliminate, within 5 years of such date of enactment, the operating loss associated with providing food and beverage service on board Amtrak trains.”\textsuperscript{1} In doing so, Amtrak must consider “product development,”\textsuperscript{2} among other things.

The Physicians Committee for Responsible Medicine is a nonprofit public health organization that advocates for and educates the general public about preventive medicine through proper nutrition. The Physicians Committee is a national organization representing 170,000 medical professionals, scientists, and laypersons, including more than 12,000 physicians. The Physicians Committee offers free nutrition classes throughout the country, conducts research, and advocates for healthier federal food policies.

A substantial body of scientific evidence, analyzed by government agencies and public health organizations, attributes the consumption of processed meat to significantly increased cancer risk. Critically, a 2015 review by the World Health Organization provides further evidence that processed meat products are “carcinogenic to humans.”\textsuperscript{3}

As Amtrak reforms its food and beverage service and develops new food products, now is the perfect time to safeguard passenger health by eliminating processed meat from Amtrak’s food service.

SCIENTIFIC EVIDENCE ESTABLISHES RISKS OF PROCESSED MEAT

The prevailing consensus among government agencies and public health organizations is that consumers should be warned of the dangers of consuming processed meat. Processed meat products, including ham, bacon, pastrami, salami, bologna, liverwurst, bratwurst, sausages, frankfurters, hot dogs, luncheon meats, and, depending on the processing, hamburgers and minced meats,\textsuperscript{4} represent a broad category of meat products that are often prepared and/or preserved by curing, smoking, salting, or adding chemical preservatives, such as nitrites and nitrates.

\textit{World Cancer Research Fund / American Institute for Cancer Research (2007)}

The link between eating processed meat and cancer has been long studied. To establish consensus on the state of evidence supporting links between specific types of food and cancer risk, the World Cancer Research Fund and the American Institute for Cancer Research created a

\textsuperscript{1} 49 U.S.C. § 24321(a).
\textsuperscript{2} 49 U.S.C. § 24321(b)(3).
\textsuperscript{3} Bouvard V, Loomis D, Guyton KZ, et al. Carcinogenicity of consumption of red and processed meat. \textit{Lancet Oncology}. Published online October 26, 2015.
panel that, over a five-year period, studied evidence regarding the extent to which cancer can be prevented through healthy patterns of eating and physical activity and created a comprehensive report based on its findings. Previously, the groups had worked together to create and publish *Food, Nutrition and the Prevention of Cancer: a Global Perspective* (1997), which quickly became the standard in the field and helped raise awareness about the importance of research on this issue.5

The panel’s 2007 report (“WCRF/AICR report”) reviewed all relevant research using the most scientifically valid methodology, provided a comprehensive assessment of the state of evidence linking foods to cancer risk, and provided a set of recommendations on food, nutrition, and physical activity to reduce the risk of cancer.6 The panel consisted of world-renowned scientists, including world leaders in research of the epidemiology and biology of cancer, nutrition, and public health.

To maximize objectivity and transparency, the project was separated into three distinct processes: collection, analysis, and recommendations. First, a task force developed a methodology for reviewing the voluminous amounts of scientific literature. Second, research teams collected and reviewed the material based on the developed methodology. And finally, the expert panel assessed and judged the evidence and agreed on recommendations.

Based on its review of 14 cohort studies and 44 case-control studies investigating processed meat,7 the WCRF/AICR report concluded that consuming processed meat is strongly associated with the specific increased risk of colorectal cancer. This form of cancer is the third most common cancer in men and women separately and the second most common cause of cancer death in men and women combined.8 According to the report, colorectal cancer risk increases on average by 21 percent for every 50 grams of processed meat—approximately the size of a typical hot dog—consumed daily. The WCRF/AICR report cited evidence that consuming processed meat may also contribute to cancers of the esophagus, lung, stomach, and prostate.9

*National Institutes of Health (2009) / National Cancer Institute (2010)*

Two years later, scientists from the National Institutes of Health (“NIH”) published a 10-year study of more than a half-million people that investigated the relationship between meat intake and mortality.10 The study concluded that higher consumption of processed meat leads to an overall increased risk of mortality, cancer mortality, and cardiovascular disease mortality.11 The NIH study confirmed and extended the findings of the WCRF/AICR report that consumption of processed meat and cancer are interrelated. Unlike the WCRF/AICR report, the NIH study evaluated new information to reach its conclusions rather than reviewing existing information. In a cohort of more than a half-million people, the NIH study confirmed the panel’s conclusion that

---

5 WCRF/AICR Second Report at xiv.
6 Id.
7 Id. at 284.
9 WCRF/AICR Second Report at 128.
processed meat consumption is related to cancer. The NIH study attributed the cancer risk from processed meat to heterocyclic amines, polycyclic aromatic hydrocarbons, iron, and saturated fat. However, the NIH study went one step further than the WCRF/AICR report by specifying that higher intake of meat, including processed meat, contributes to cancer mortality.

The NIH study’s lead author, Rashmi Sinha, Ph.D., is deputy branch chief and senior investigator with the National Cancer Institute. According to a 2010 National Cancer Institute report, “Red meat and processed meat are associated with an increased risk of colorectal cancer, and there is also suggested evidence for some other cancers, such as prostate cancer.”

President’s Cancer Panel (2010)
The President’s Cancer Panel’s 2008–2009 annual report on environmental toxins noted that meats, when cured, form dangerous and carcinogenic nitrosamines and N-nitroso compounds. The panel recommended a preventive approach, as opposed to a reactionary approach, to such cancer-causing contaminants. In its executive summary, the panel acknowledged the convincing evidence showing a link between processed meat and cancer.

Centers for Disease Control and Prevention (2010)
The Centers for Disease Control and Prevention acknowledged in a 2010 Morbidity and Mortality Weekly Report that a diet high in processed and red meats increases the risk for colorectal cancer.

Harvard School of Public Health (2011)
Since 2011, the Harvard School of Public Health has recommended replacing red and processed meat with nuts and beans.

American Cancer Society (2012)
The American Cancer Society recommended in its guidelines on nutrition to limit consumption of processed meat, as well as red meat, including bacon, sausage, lunch meats, and hot dogs.

World Health Organization (2015)
The World Health Organization released a report announcing that processed meat products clearly cause cancer. Researchers from around the world examined more than 800 studies looking at the cancer-causing properties of red and processed meat. The authors highlighted a

12 Id. at 569.
meta-analysis that found an 18 percent increased cancer risk per 50 grams of processed meat consumed and ultimately that processed meat products are “carcinogenic to humans.” In addition, the report noted a 17 percent increase in risk for colon cancer per 100 grams of red meat consumed and concluded that such products are “probably carcinogenic to humans.”18 Researchers also observed associations between red and processed meat products and stomach, pancreatic, and prostate cancers. Processing and other cooking methods for meat, including curing, pan-frying, and smoking, produce various carcinogenic chemicals.

The Dietary Guidelines for Americans, a joint collaboration between the Department of Agriculture (“USDA”) and the U.S. Health and Human Services (“HHS”), state that (1) lower intake of processed meat is a characteristic of healthy eating patterns; (2) there is “strong evidence” that the lower intake of processed meat is associated with reduced risk of cardiovascular disease; and (3) there is “moderate evidence” that the lower intake of processed meat is associated with reduced risk of obesity, type 2 diabetes, and some types of cancer.19 Similarly, a review published in the Journal of Internal Medicine in 2016 found that 50 grams of processed meat per day increases the risk for colorectal cancer, pancreatic cancer, death from heart disease, and diabetes by 18, 19, 24, and 32 percent, respectively.20

* * *

Only a small percentage of cancer is inherited, leaving environmental factors, including food and nutrition, as the most important and modifiable.21 It has long been estimated that anywhere from 35 to 60 percent of cancer is attributable to diet.22 Because the intestinal tract is in constant contact with foods, food additives, and the products of digestion, individuals who consume processed meat are at a significantly increased risk of developing colorectal cancer, compared with those who avoid consuming processed meat. The risk increases with increased consumption, as noted above. Accordingly, the WCRF/AICR report recommended that processed meat be eliminated from the diet.23

A. Processed Meat and the Risk of Cancer

Processed meat products contain a variety of potentially carcinogenic chemicals, especially when smoked, cured, preserved, grilled, or cooked at high temperatures. These may include nitrates, nitrites, N-nitroso compounds (“NOCs”) such as N-nitrosodimethylamine (“NDMA”), heme iron, heterocyclic amines (“HCAs”), such as 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine (“PhIP”) and 2-amino-3,8-dimethylimidazo[4,5]quinoxaline (“MeIQx”), and polycyclic aromatic

18 Bouvard V. et al. (2015).
23 WCRF/AICR Second Report at 382.
hydrocarbons ("PAHs"), such as benzo[a]pyrene ("BAP"). The associated cancer risks from these chemical components through the consumption of processed meat products have been described for decades. N-nitrosamines and NOCs were identified as carcinogenic substances more than 50 years ago.

Nitrites used in meats as a preservative, as well as a coloring and flavoring agent, can combine with amino acid degradation products during the curing process or during digestion to produce N-nitroso compounds (nitrosamines or nitrosamides). Nitrates, used as preservatives, are converted to nitrites. In addition, processed meat cooked at high temperatures may contain chemical carcinogens, including HCAs and PAHs. Moreover, heme iron, plentiful in red and processed meat, promotes the production of N-nitroso compounds, and its iron content leads to free radical production.

Substantial evidence from cohort and case-control studies indicates that processed meat is a convincing cause of colorectal cancer. Meta-analyses find a 21 percent increased risk per 50-gram serving per day.

**B. Chemicals in Processed Meat that Increase the Risk of Cancer**

**NOCs:** A body of scientific literature concludes that NOCs exhibit mutagenic and carcinogenic activity and are associated with an increased risk of cancer of the esophagus, oral cavity, pharynx, larynx, lung, and colorectum. NOCs are formed as a result of the nitrosation of amines, amides, and amino acids by nitrites and nitrates, which are commonly used as food preservatives in processed meat products. Consumption of processed meat, especially processed red meat, has a dose response consistent with the endogenous formation of NOCs, resulting in increased amounts of these compounds in the gastrointestinal tract. Thus, due to the endogenous and exogenous exposure from NOCs through the consumption of processed meat products, consumers of these products have an increased risk for gastrointestinal cancers, such as colorectal cancer.

---


26 *WCRF/AICR Second Report* at 123.


NOC metabolites (metabolically activated NOCs) may contribute to an increased risk of leukemia as well as colon, stomach, esophagus, and brain cancer by inducing the formation of DNA-adducts and miscoding of noncomplementary bases during polyribonucleotide and polydeoxyribonucleotide synthesis.\(^{31}\) It is important to note that no safe threshold dose, at which tumor formation would not be expected to occur, has been determined for NOCs. Moreover, NOCs that are carcinogenic in animals are commonly considered human carcinogens for regulatory purposes when establishing safety levels.\(^{32}\)

One of the most studied NOCs, NDMA, a nitrosamine present in processed meat products, was listed as a human carcinogen by the State of California in 1987.\(^{33}\) Similarly, the International Agency for Research on Cancer (“IARC”), which is part of the World Health Organization, identified NDMA as a probable and possible human carcinogen.\(^{34}\) HHS identified NDMA as a substance reasonably anticipated to cause cancer.\(^{35}\)

**Heme:** Heme, a red organic pigment, is the iron porphyrin component of hemoproteins, such as hemoglobin and myoglobin.\(^{36}\) Dietary heme forms a highly cytotoxic metabolite that damages the colonic mucosa, resulting in the increased risk of gastric and colon cancer.\(^{37}\) Due to the contribution of heme to NOC formation, the consumption of nitrate and nitrite-rich processed meat products leads to an increased risk for gastrointestinal cancers, such as colorectal cancer. Heme iron, as opposed to inorganic iron, is considered to be a principal determinant of endogenous gastrointestinal N-nitrosation by acting as a nitrosating agent, and, for reasons similar to those applied to NOCs, cannot have a determined safe threshold level.\(^{38}\)

**HCAs:** HCAs have been considered major contributors to mutagenicity of cooked meat products. Therefore, consuming these products poses a public health risk. Through metabolic pathways such as cytochrome-mediated (e.g., CYP1 and CYP2) N-hydroxylation and O-esterification by phase II enzymes, HCA compounds create genotoxic metabolites that are known mutagens and carcinogens.\(^{39}\) HCAs form inside and on the surface of meats from creatine or creatinine, amino


acids, and sugars as a result of exposure to high temperatures through cooking processes, including barbecuing, frying, roasting, and grilling.  

HCAs detected in cooked processed meat products that are suspected of increasing cancer risk include 2-amino-3-methylimidazo[4,5-f]quinoline.  

The HCA 2-amino-3,4,8-trimethylimidazo[4,5]quinoxaline, MeIQx, and PhIP are specifically linked to an increased risk for colorectal cancer. The State of California has identified PhIP and MeIQx as known human carcinogens since 1994, and the IARC labeled them as possible human carcinogens in 1993. Because there are no known safe levels of exposure, PhIP, MeIQx, and any other likely genotoxic compounds should be avoided as much as possible.

**PAHs:** Studied for decades, PAHs have also been found to contribute to mutagenic and carcinogenic activity. Processed meat products contain precursors to PAHs, creating PAHs when animal fat drips onto a heated surface and burns. Processed meat products are thereby of concern due to the routine use of high temperature cooking methods to prepare such foods. Through a process of metabolic activation by cytochrome P450 enzymes and/or peroxidases, PAHs become reactive intermediates with carcinogenic potential. PAH exposure results in genotoxic markers such as DNA adducts, chromosome aberrations, sister chromatid exchanges, ras oncogene over expression, and impacts on cellular pathways. PAHs generally exist in complex mixtures, making it difficult to pinpoint the relative contribution of any individual PAH to carcinogenic effects.

One of the most prevalent and readily identifiable carcinogenic PAHs is BAP. Since the 1930s, BAP has been studied for its carcinogenic effect. BAP was listed as a known carcinogen by the

---


47 See IARC: *Polycyclic Aromatic Hydrocarbons*, § 5.4, August 2006.


49 Ding et al. (2006). *Effects of Polycyclic Aromatic Hydrocarbons (PAHs) on Vascular Endothelial Growth Factor Induction through Phosphatidylinositol 3-Kinase/AP-1-dependent HIF-1α-Independent Pathway*. J. BIOL. CHEM. 281(14);9093-9100, 9099.

50 See IARC (2007). *Overall Evaluations of Carcinogenicity to Humans*.

State of California in 1987 and was upgraded to this status by the IARC in 2007. HHS has identified BAP and PAHs as substances reasonably anticipated to cause cancer. Because there is no known safe level of exposure for BAP or other genotoxic PAHs, they should be avoided as much as possible.

C. Processed Meat and the Risk of Cardiovascular Disease

Cardiovascular disease (“CVD”) is the number-one killer of Americans. Nearly a quarter of CVD deaths are avoidable, and dietary intervention is a major factor for prevention. The sodium and saturated fat content of processed meat products contribute to the risk of heart disease.

The 2009 NIH study of more than a half-million people concluded that the group that consumed the highest amount of processed meat was subject to an increased risk of death from cardiovascular disease. The study based this conclusion, in part, on the consequential elevated blood pressure that is positively associated with higher consumption of processed meat. By reducing the total consumption of processed meat from 22.6 grams per 1,000 calories to 1.6 grams per 1,000 calories, cardiovascular disease mortality could be reduced by 20 percent in women. Thus, the NIH study supports reducing processed meat consumption to reduce the risk of cardiovascular disease mortality.

In the European Prospective Investigation into Cancer and Nutrition (“EPIC”), which followed 448,568 men and women, researchers found a strong correlation between consuming processed meat products and risk of dying from CVD. Those consuming more than 160 grams per day of processed meat products had a 30 percent increased risk of death from CVD, compared with those who consumed 10 to 20 grams per day.

Results from the Health Professionals Follow-up Study (“HPFS”) and the Nurses’ Health Study (“NHS”) indicate that eating just one serving of a processed or unprocessed red meat product a day increases risk of death from diseases such as cancer and heart disease. These studies tracked the diets of 37,698 men from the HPFS and 83,644 women from the NHS for up to 28 years. All participants were free of CVD and cancer at the start of the study. Risk of death increased by 20 percent for those consuming processed meat products, and for those who had one serving of a red meat product a day, the mortality rate increased by 13 percent.

54 Id. at 169.
57 Id. at 567.
58 Id. at 569.
CONCLUSION

In the face of incontrovertible evidence that passengers are put at risk of cancer as a result of continuing exposure to processed meat, Amtrak should eliminate processed meat from its menus.

The Physicians Committee requests a substantive response within 180 calendar days.

Respectfully submitted,

Neal D. Barnard, M.D., President
Physicians Committee for Responsible Medicine