

THE IMPACT OF ACRYLAMIDE ON HUMAN HEALTH: WHAT YOU NEED TO KNOW

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Abstract. *Acrylamide is a chemical that forms naturally in starchy foods during high-heat cooking. Since it was first found in food in 2002, it has raised health concerns due to its probable classification as a human carcinogen and its potential effects on the nervous and reproductive systems. This article looks at where acrylamide comes from, its metabolic pathway, and what current science says about its health risks. It also offers practical tips for lowering acrylamide intake through changes in diet and lifestyle.*

Keywords: *acrylamide; toxicity; glycidamide; health risks; food; public health.*

1. Introduction

Acrylamide is an organic compound that appears in carbohydrate-rich foods cooked at high temperatures, especially when frying, roasting, or baking. Common sources include potato chips, bread, breakfast cereals, and coffee. In addition to dietary sources, acrylamide is found in cigarette smoke. Its widespread presence and possible health risks, including nerve damage and cancer, have made it an important topic in public health research. Its widespread presence and potential health risks, including neurotoxicity and carcinogenicity, acrylamide has become a focus of public health research. This article covers what acrylamide is, how it forms, where it is found, and what current evidence says about its effects on human health.

2. Methods

This article is a narrative review based on secondary sources. It summarizes findings from scientific literature, including peer-reviewed studies, reports from government agencies (FDA, IARC, EFSA, NCI), and systematic reviews. The selection focused on studies that include both animal and human data, prioritizing those published in well-known journals or trusted public health platforms.

3. Results

3.1 Sources and Formation of Acrylamide

- **Primary sources:** Fried and baked starchy foods (potatoes, bread, cereals, roasted coffee).
- **Non-dietary source:** Cigarette smoke.
- **Formation mechanism:** Occurs through the Maillard reaction at temperatures above 120°C.

3.2 Metabolism and Toxicology

- **Absorption:** Through food ingestion or inhalation.
- **Metabolism:** In the liver, acrylamide is converted into glycidamide — a genotoxic metabolite capable of binding to DNA.

3.3 Health Risks

a) Carcinogenicity

- Classified as a **Group 2A carcinogen** by IARC (probably carcinogenic to humans).
- **Animal studies** show a higher rate of tumor incidence.

- **Human studies** are inconclusive but suggest possible links to cancers (e.g., kidney, endometrial, ovarian).

b) Neurotoxicity

- Seen in occupational settings.
- Symptoms: muscle weakness, numbness, motor dysfunction.
- Unlikely at dietary exposure levels.

c) Reproductive and Developmental Toxicity

- **Animal evidence** show sperm damage and developmental delays.
- Effects occur at higher exposure levels than those from typical food intake.

d) Metabolic Effects

- Glycidamide may:
 - Increase blood glucose levels.
 - Elevate cholesterol and triglycerides.
 - Raise blood pressure.
- These disruptions could lead to **obesity, insulin resistance, and cardiovascular disease.**

4. Discussion

4.1 Interpretation of Findings

While animal studies provide strong evidence of acrylamide's harmful effects, human studies remain limited and not definitive. Still, metabolic changes observed in early research suggest need for caution, especially for those populations, who consume a lot of fried or processed foods.

4.2 Practical Recommendations for Reducing Exposure

1. **Choose darker roasted coffee** – Acrylamide breaks down during longer roasting.
2. **Avoid overcooking starchy foods** – Cook to a golden yellow, not dark brown.
3. **Store potatoes correctly** – Do not refrigerate to avoid higher sugar levels.
4. **Use alternative cooking methods** – Boiling and steaming don't produce acrylamide.
5. **Limit processed snacks**- processed food have higher sugar levels
6. **Avoid smoking** – A major source of non-dietary acrylamide exposure.

4.3 Implications for Public Health

Due to acrylamide's wide occurrence and potential risks, raising public awareness and dietary modifications can help as effective preventive strategies. Regulatory monitoring and further research are needed to clarify safe exposure levels and long-term effects on humans.

5. Conclusion

Acrylamide is a common byproduct found in many heat-processed foods and cigarette smoke. Although the health risks to humans are still under investigation, its classification as a probable carcinogen and findings from animal studies support a cautious approach. Reducing exposure is wise through straightforward dietary and lifestyle choices. Moderate coffee drinking is safe as part of a balanced diet. Public education and continued research are essential for managing health risks linked to acrylamide.

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