University of New Hampshire
Nursing

Do We Really Know What's in Our Food?
Dietary Mycotoxin Exposure and Pediatric Crohn's Disease

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Abstract

BACKGROUND: There have been numerous diets and nutritional strategies evaluated over the past several years for their ability to induce remission in Crohn's disease (CD), yet little attention has been given to mycotoxins within the human food supply. Of all the mycotoxins found in food, deoxynivalenol (DON) appears to be the most prevalent and resilient and can be highly damaging to the human gastrointestinal tract.

PURPOSE: The objective of this mixed methods pilot study was to investigate if there is sufficient evidence to support the development and testing of a low mycotoxin diet as a potential treatment modality for CD.

METHOD: A literature review of potential dietary sources of DON contamination was conducted using CINAHL, Medline, PubMed, and the Biological Science Collection databases.

Grain-based and non-grain-based cooking flours were also directly tested for DON using lateral flow and liquid chromatography-mass spectrometry/mass spectrometry (LC-MS/MS) methods. Descriptive statistics were used to quantify chemical testing results.

RESULTS: Wheat and corn flours were found to be routinely contaminated, but not in amounts above regulatory guidelines. Other grain-based crops, soy, coffee, certain seed oils, animal milk, human milk and various water reservoirs have been found to be contaminated intermittently.

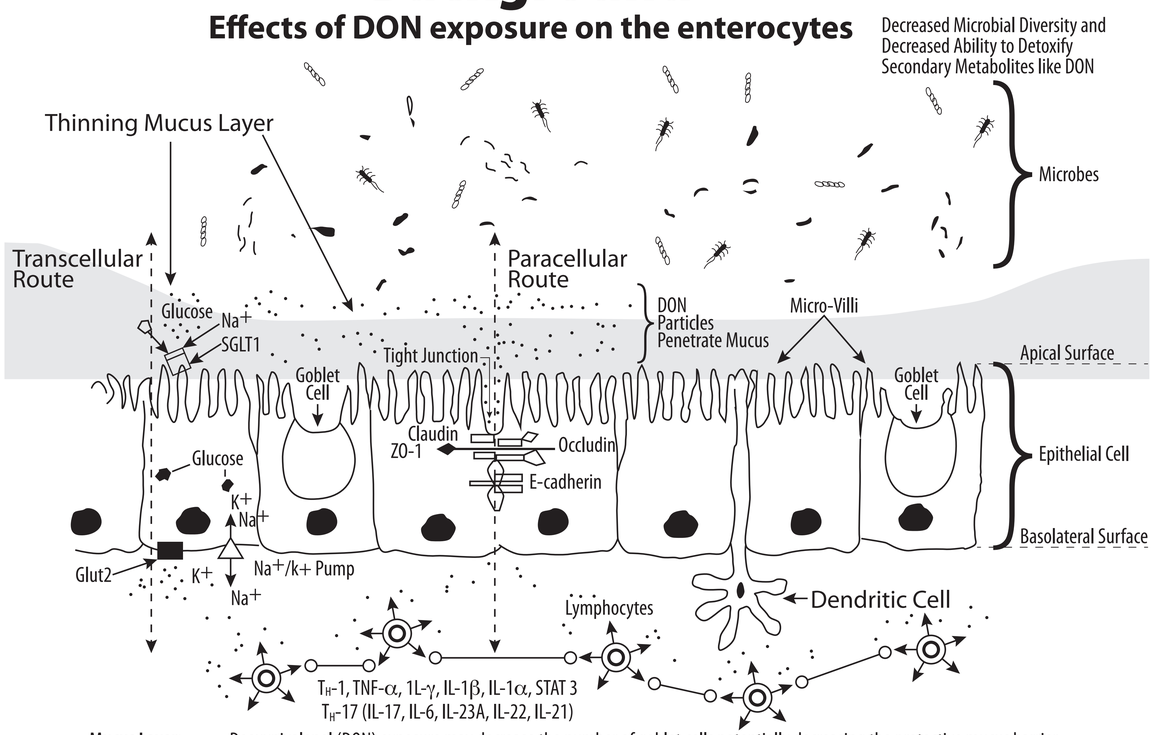
CONCLUSION AND IMPLICATIONS: The cumulative effects of multiple exposures to DON in routinely and intermittently contaminated foods may be having deleterious effects on pediatric CD patients. Direct measurement of foods in a typical child's diet such as cereals, pasta, and pizza, that may contain this mycotoxin is recommended for further investigation. Further nursing research aimed at clarifying the role of mycotoxins like DON in the disease process is needed. The evidence supports the need for development of a low-mycotoxin diet as an alternative to previous dietary interventions in the treatment of pediatric CD.

Aim

- Identify foods regularly contaminated with DON.
- Review all diets currently used to treat pediatric Crohn's disease (CD) that decrease inflammatory laboratory markers and induce remission.
- Describe the link between mycotoxin exposure and intestinal health.

Background

Effects of DON exposure on the enterocytes



Mucus Layer: Deoxynivalenol (DON) exposure may decrease the number of goblet cells potentially decreasing the protective mucus barrier.

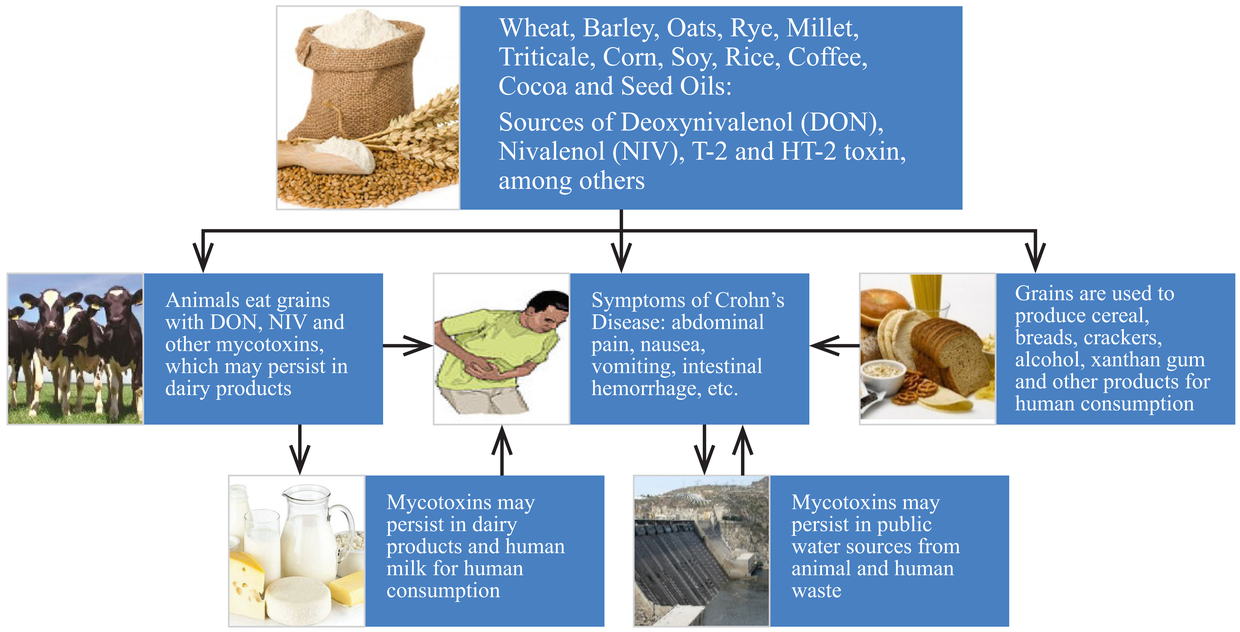
Paracellular Route: Tight Junction disruption and increased permeability leading to:
- Increased translocation of mycotoxins, pathogenic bacteria, viruses, food antigens, etc.
- Stimulation of immune defenses and lymphocytes

Trancellular Route: Impairment of glucose and other nutrient uptake.

Lymphocytes: Lymphocytes respond to DON and other foreign antigens by producing inflammatory cytokines.

Results

Gonya's Conceptual Model for the Low Mycotoxin Diet



Discussion and Conclusions

- Children are at risk for more frequent exposures to DON through foods like cereals, breads, pasta, cakes, snack foods, etc. which can have an additive effect.
- Smaller body size places children at higher risk than adults for intake over the tolerable daily intake. Pediatric CD patients may be at an even higher risk than healthy children.
- Direct measurement of mycotoxin content in foods in a typical child's diet such as cereals, bread, pasta, and pizza is recommended for further investigation.
- The evidence supports that reducing dietary mycotoxin exposure in young patients with already compromised GI function is warranted.
- Further nursing research aimed at clarifying the role of mycotoxins like DON in exacerbating the disease process is also needed.
- The low-mycotoxin diet looks promising as a nutritious and more diverse alternative to previous dietary approaches used in the treatment of pediatric Crohn's disease.