

# Polyamines in Foods: Adverse and Beneficial Effects of Polyamine Intake

Euro Global Summit and Expo on Food & Beverages  
June 16-18, 2015 Alicante, Spain

Nihal BUYUKUSLU  
Department of Nutrition and Dietetics,  
Istanbul Medipol University, Turkey  
nbuyukuslu@medipol.edu.tr



## Introduction

- Putrescine (diamine), spermidine (triamine) and spermine (tetraamine) are most abundant polycationic natural amines.
- They are involved in regulation of gene expression, translation, cell proliferation and differentiation, DNA, RNA and protein synthesis in mammal cells.
- They can be supplied by the endogenous synthesis inside the cell or by the intake from exogenous sources.
- The external dietary source provides a larger quantity of polyamines than the endogenous biosynthesis.
- Dietary polyamines are a part of polyamine body pool. Thus, diet can have a role on regulation of polyamine biosynthesis.
- Food is an important source of dietary polyamines.
- Continuous intake of polyamine-rich food gradually increases blood polyamine levels.
- The benefits of diet polyamine can be changed depending on the specific polyamine and disease; they may be harmful, neutral or beneficial.

## Dietary Polyamines in Health and Diseases

### A to Z

- **AGING:** Dietary polyamines have been reported to be beneficial for aging and their levels decline continuously with age.
- **ANTI-INFLAMMATORY PROPERTIES:** Strong anti-inflammatory function of polyamines causes inhibition of chronic inflammation.
- **CELL GROWTH:** Polyamines play a role in cell growth and proliferation in human cell.
- **CHEMOTHERAPEUTIC AGENTS:** Polyamines can be used as a target for potential chemotherapeutic agents.
- **DEMENTING ILLNESSES:** Endogenous polyamine levels are altered in dementing illnesses such as Alzheimer disease and Down syndrome
- **DEVELOPMENT OF SMALL INTESTINAL AND COLONIC MUCOSA:** Dietary luminal polyamines are important local factors for growth and the development of small intestinal and colonic mucosa.
- **DIABETES:** Glycation plays an important role in the genesis of diabetic complications. Spermine and spermidine have been shown to display a significant antiglycation effect at physiological concentration suggesting the role for polyamines in diabetes.
- **HEALING:** Polyamines play an important role in the healing after injury under physiological and various pathological conditions.
- **INTESTINAL PERMEABILITY:** Polyamines play a crucial role in the intestinal permeability which is related to Crohn's disease, Ulcerative colitis and Celiac disease.
- **ISCHEMIC BRAIN DAMAGE:** Polyamines have been implicated in the pathogenesis of ischemic brain damage. Polyamines play an important role in brain development, mature brain function and also in neurodegenerative conditions
- **PAIN CONTROL:** Polyamine-deficient diet seems to be effective as a pain relief treatment for both chronic and acute pain.
- **PANCREATITIS:** Polyamines are also important in diseases such as pancreatitis.
- **SNYDER-ROBINSON SYNDROME:** An inherited human disease, Snyder-Robinson syndrome, an X-linked mental-retardation and developmental disease is caused by an alteration in the *SpmS* gene that encodes spermine synthase.
- **TUMOR DEVELOPMENT:** There is a close relation between polyamine catabolism and tumor development. Polyamines were identified as participating in almost all stages of tumorigenesis.

## Conclusions

- ✓ Epidemiological studies show the close positive or negative correlation between increased polyamine intake and diseases.
- ✓ Their benefits can be changed depending on the specific polyamine and disease; they may be harmful, neutral or beneficial.
- ✓ Considering health and wellness benefits, dietary polyamines seem to be important in human health and diseases, therefore daily dietary intake of polyamines should be carefully evaluated depending on individual requirement.

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