EXPANDING PROBIOTIC POSSIBILITIES

MUNISPORE™

MuniSpore delivers support for the immune system starting in the gut, crowding out bacterial pathogens and providing antioxidant activity.

What is MuniSpore™?

MuniSpore is the probiotic strain *Bacillus clausii* CSI08, a soil-based microorganism. Species of *Bacillus* are among the most widespread microorganisms in nature and have a long history of safe use, with *B. clausii* shown to be present in whole grain products and fermented foods and beverages.[1,2] The beneficial effects of the probiotic *B. clausii* have been attributed to its ability to positively influence microbial populations and immune function.[3,4,5,6]

Supporting Immune Health

The human body carries nearly 100 trillion bacteria in the gut...that's more than 10 times the total number of human cells in the entire body. Probiotics are those "good" bacteria that help keep the intestines healthy and assist in digestion and nutrient absorption. Researchers are also finding evidence that certain bacteria in the gut influence the development of aspects of the immune system. In fact, about 70% of the immune system is housed in the gut.

The health benefits of the probiotic *Bacillus clausii* include:

- Crowds out bacterial pathogens and maintains healthy gut flora[7]
- Supports the normal immune reaction of intestinal cells[3,4,8]
- Supports the body's natural repair system through antioxidant activity[9]
- Can persist in the GI tract, increase its numbers and then re-sporulate[10]

Antioxidant Activity and Immune Health

Oxidants are reactive molecules that are produced inside the body that damage other healthy cells like proteins, DNA, and lipids. This damage, called oxidative stress, affects the immune system and is often the cause of inflammation, illness, and various negative health conditions. Antioxidants can scavenge these reactive molecules and minimize cellular damage, supporting the body's natural repair mechanism. The consumption of probiotics, such as *Lactobacilli*, has been shown to increase antioxidant activity in the body.[11,12]

Total antioxidant capacity (TAC) demonstrates a material's ability to counteract oxidative stress-induced damage in cells. The TAC level of the probiotic MuniSpore is significantly higher than that of a well-known *Lactobacillus* probiotic strain.

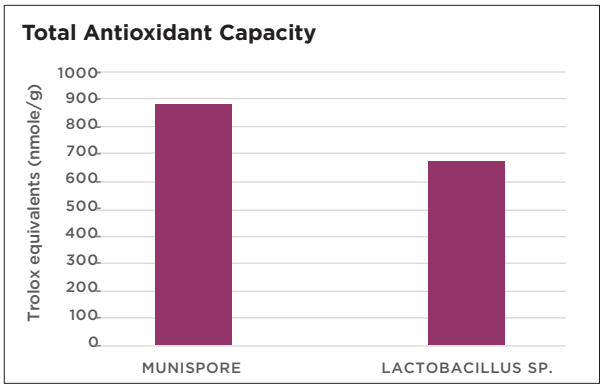

Figure 1. Total antioxidant capacity of MuniSpore® vs. well-known strain of *Lactobacillus*. Trolox equivalents is a measurement of how much antioxidant activity is present.

The antioxidant activity of MuniSpore suggests the mechanism of action for the immune function support exhibited by this probiotic strain.

Deerland™ Probiotics & Enzymes

MUNISPORE™

QUALITY CERTIFICATIONS
- Kosher
- GRAS Status

PRODUCT APPLICATIONS:
- Supplement Capsules, Tablets and Bulk Powder Blends
- Stick Packs
- Gummies
- Food and Beverage

INDUSTRY APPLICATIONS:
- Immune Health
- Digestive Health

Stability Advantage: Spore Forming Probiotics

Spore forming bacteria are a diverse group of very hardy bacteria, characterized by their ability to form endospores to protect themselves in varying conditions such as high temperatures and the acidic environment of the gut.

Bacillus clausii has the ability to form spores that protect the microbes from harsh conditions until they enter an environment ripe for germination, such as the GI tract. This means that MuniSpore remains viable under a wide temperature range and doesn't require refrigeration. It also survives passage through the acidic environment of the GI tract.[13]

Because MuniSpore remains viable under a wide temperature and pH range, the probiotic is ideal for use in supplements, foods and beverages.

Science Backed for Safety and Efficacy

More than 20 studies have been performed to confirm the safety and probiotic characteristics of MuniSpore *Bacillus clausii* CSI08. A full genome sequencing confirmed the strain contained no plasmids, antibiotic resistant or deleterious genes. The genome sequence of MuniSpore has been uploaded to GenBank, the National Institutes of Health genetic sequence database.

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