RS Fibre™

A BLEND OF DIGESTION-RESISTANT STARCHES AND OTHER FIBRES

300 G POWDER | NPN80107206 | PAFRST-CN

RS Fibre™ contains two forms of resistant starch type II: green banana flour and potato starch powder. Resistant starch (RS) is defined as a type of starch that is not readily accessible to human enzymes in the upper GI tract; they are metabolized to short chain fatty acids by microbes in the lower GI tract, thus not raising blood glucose levels. Common starches differ from RS in that they are broken down into glucose molecules in the upper GI tract by enzymes produced in the mouth, pancreas and small intestinal brush-border. This glucose is absorbed quickly, resulting in rapid and sometimes dramatic rises in blood glucose. The RS Fibre™ blend delivers 4g of RS along with 3g of regular starch, which is not likely to cause a significant rise in blood glucose.

Estimated average intake of total fibre in the US is 15g/day, and daily RS consumption is estimated at 5g.[5] Fibre intake falls well below the current RDA of 25-30g/day, and even this falls substantially below the 50-100g of fibre estimated to have been ingested daily during much of human evolution.[18] Average US diets may be considered deficient in fibre, an important health promoting dietary element. Raw starches from root vegetables and fruits were likely a significant component of the diet humans evolved on. It may be that while the human GI tract and gluco-regulatory mechanisms are not well-suited for large amounts of highly refined and concentrated sugars and starches, they are better suited for, and may even benefit from, these digestion-resistant starches.

RS FIBRE™ MAY BENEFIT INDIVIDUALS WITH:

- Low fibre, low carbohydrate and/or high fat diets
- Dysbiosis; diarrhea; occasional constipation
- Intestinal permeability; malabsorption syndromes

RESISTANT STARCH BENEFITS

Microbiome effects

Three ingredients in RS Fibre™—two RS and arabinogalactan—are fermentable, which confers them with prebiotic properties. RS is metabolized by colonic bacteria into short chain fatty acids (SCFA), such as propionate, butyrate, acetate and lactate.[4] The fermentation of RS and other fibres results in a lowering of colon pH, which makes this environment unfavourable for many pathogens. Studies with RS supplementation have revealed that RS promotes increases in several bacterial populations (*Bifidobacteria*, *Actinobacteria* and *Bacteroidetes*, *Ruminococcus bromii*, *Eubacterium rectale*) while diminishing populations of detrimental pathogens (*E.coli*, *Pseudomonas*, *firmicutes*).[2-4] An increase in bifidobacteria was shown to reduce endotoxemia caused by lipopolysaccharides (LPS). Absorption of LPS, derived from the membranes of gram-negative bacteria, was found to interfere with insulin sensitivity by increasing inflammation. Since it has been documented in rodents that high-fat diets (42% of total energy) may impair microbial fermentation, while they are often also low in carbohydrates, it makes sense to incorporate RS and/or various fermentable fibres to support microbiome health.[2] RS is composed solely of glucose molecules while other fibres contain a variety of other carbohydrates, such as galactose, galacturonic acid, fructose, mannans, arabinose, xylans and alginates. It is recommended to consume a variety of dietary fibres along with RS, because particular GI bacteria thrive more or less on certain types of fibre, so this approach would support a greater bacterial diversity.[3]

NOTE: *Consider evaluating changes in GI microbial populations in patients that supplement with resistant starch and/or other fibres. One such test is offered by DSL, which employs PCR technology.*

GI health effects:
- Increased stool bulk,[3] improved regularity,[6] stool softening.[11]
- SCFA metabolites resulting from RS consumption provide fuel for enterocytes.
- Studies with RS supplementation have revealed the following benefits on the GI mucosa:
  - Lower fecal pH, reduced ammonia and mutagenic compounds such as cresol and phenol[1,11]
  - Improved absorption of Ca and Mg in the cecum and/or large intestine due to lower pH[1,4]
  - Improved epithelial integrity and absorptive capacity:[1,4] a study using green banana flour showed improvement in small intestinal permeability and reduced fluid loss in persistent diarrhea.[10]
- Increased apoptosis and reduced proliferation of colorectal tumor cell line,[5] reduced colon polyp length[14] and reduced aberrant crypt foci and pro-mutagenic lesions.[4] Many of these effects are believed to be attributed to butyrate.
- Reduction of GI inflammation (decreased inflammatory cytokines, increased IL-10 and T regulatory cells),[4] which may benefit conditions such as Crohn's disease and colitis.

Influence on appetite, glucose, and weight management
- Increased satiety and reduced hunger, likely due to reduced AUC for ghrelin and peptide YY, an effect attributed to SFCA.[2,3] RS intake reduced energy intake at subsequent meal.[4]
- Increased fatty acid oxidation;[2,4,16,17] increased fat mobilization, possibly due to lower insulin levels.[5]
- Reduced fasting insulin,[1,7,8] postprandial insulin,[8] reduced fasting glucose.[12]
- Reduced abdominal fat,[2] lower BMI,[7] reduced hip circumference.[12] These effects may be the result of reduced appetite, increased insulin sensitivity, and enhanced fat oxidation.

Effects on cardiovascular health
- Increased bile acid excretion due to reduced reabsorption and microbial breakdown of bile. This may explain the cholesterol lowering observed in some studies.[3,4]
- Support for normal blood pressure.[12] This may be explained by a decrease in insulin, which is known to elevate blood pressure due to increased water retention and increased sympathetic nervous system activity.

OTHER INGREDIENTS IN RS FIBRE™

Cellulose (from bamboo): an insoluble fibre, typically found in vegetables and whole grains. Cellulose is a polymer of glucose, just like starch, but it is not fermentable in the gut, as it contains molecular linkages that cannot be broken down by human or intestinal microbial digestive enzymes. The main benefit of insoluble fibre is increased stool bulk, which stimulates peristalsis, thus reducing risk of constipation.

Arabinogalactan (derived from the larch tree): a soluble fibre with low viscosity. Arabinogalactan has been consumed by humans for thousands of years and is found in a variety of common vegetables as well as in medicinal herbs.[16] Research supports several beneficial roles for this compound:

- "Larch arabinogalactan decreased the incidence of cold episodes by 23%. Improvements of serum antigen-specific IgG and IgE response to *Streptococcus pneumoniae* and tetanus vaccination suggest a B cell dependent mechanism".[14]

- "Larch arabinogalactan has been shown to increase the production of short-chain fatty acids, principally butyrate and propionate, and has been shown to decrease the generation and absorption of ammonia. Consumption of larch arabinogalactan has a significant effect on enhancing beneficial gut microflora, specifically increasing anaerobes such as *Bifidobacteri*a and *Lactobacillus*".[15]

Medicinal Ingredients (per scoop/10 g):
Banana (*Musa x paradisiaca* - Immature fruit) ..... 4 g
Potato (*Solanum tuberosum* - Tuber) ..... 3 g
Microcrystalline cellulose (Cellulose) (*Bambusa emeiensis* - Stem) ..... 2 g
Arabinogalactan (D-Galacto-Larabinan) (*Larix laricina* - Wood) ..... 1 g
Recommended Dose: Adults: Take 1 scoop (10 g, providing 6.8 g fibre) per day, or as directed by your healthcare professional. Best if mixed into liquid using a blender or shaker bottle. Can also be mixed into food such as yogurt or gluten-free cereal.

REFERENCES
For a list of references cited in this document, please visit: http://catalog.designsforhealth.com/assets/itemresources/PaleoFibreRS_References.pdf