

---

## Interest of Fibregum™ for Renal Health

---

### Protein in food

Protein continues to be a growth opportunity for the food and beverages industry. Attracted by the protein's health halo, consumers are particularly concerned by the protein content in food products. The "high protein" claim is a stronger and stronger marketing benefit to trigger a purchasing act as it is associated with 'satiety' and 'everyday energy'.

This current trend of "high protein" continues to have an impact in the major regions of Europe, North America and Asia. The "high in protein" claim was ranked in the top 10 health claims in 2016, with 11% of the new products launched with this positioning.



In Europe, in 2016, 14% of all new products launched claim high protein content. In North America, in 2016, 27% of new products

make a high protein claim. The top category for tracked launches is dairy (20%), with milk and whey protein (25%) being the most tracked protein ingredient.

Consumers are increasingly looking for ways to advance their health, including weight loss, boosting immunity, increasing energy, building/maintaining muscle and healthy cells, and even improving appearance (hair, skin, nails)—all benefits of protein and all opportunities for protein-rich products.

### But a high protein diet can pose a health risk

Healthy diet is based on the balanced intake of each essential nutrient.

Giving priority to one of them can conduct to substantial secondary effects which can be worse than the original problem.

High protein diets impact metabolism and raise the concern that it may alter renal function and health.

Animal derived proteins are a rich source of purines. Excessive consumption of these proteins increases serum concentrations of uric acid that could lead to hypertension and renal function disorders, like gout. Recently in Europe, studies have been conducted on healthy subjects with a high protein diet.

High protein consumption has been found, under various conditions, to lead to various metabolic alterations: glomerular hyperfiltration\* and hyperemia\*; increased proteinuria\*; diuresis\*, natriuresis\*, and kaliuresis\* with associated blood pressure changes; increased risk for nephrolithiasis\*.

If those metabolic changes present no risk for healthy people during acute consumption, what could be the effects on a long term chronic consumption? Hariharan *et al.* 2015<sup>1</sup> showed that the new western diet rich in protein, and poor in fibers plays a strong role in chronic diseases including chronic kidney diseases.



Chronic Kidney Disease (CKD) is defined as either kidney damage or a decline in renal function as determined by decreased glomerular filtration rate (GFR). It is estimated that 1 in 9 adults in the United States meet this criteria, while an additional 1 in 9 adults are at increased risk for CKD<sup>14</sup>.

Unfortunately, Chronic Kidney Disease is underdiagnosed and undertreated. Most kidney diseases do not have symptoms until later in their course and are detected only when they are chronic. They are thus difficult to precisely diagnose. However, the prevalence of early stages of chronic kidney disease in the general population is high (approximately 11% of adults). Because the disease goes undetected until it is well advanced, it is known as a "silent disease".

Coresh *et al.* in 2005<sup>2</sup> published an interesting epidemiologic study about the Chronic Kidney Diseases prevalence in US adults from 1999 to 2000. The researchers concluded that the analysis of CKD within the most recent NHANES\* (1999 to 2000) indicates three remarkable features:

- First, the awareness of CKD is low: people with early CKD do not feel ill and they do not notice any symptoms. A gender disparity also exists as women are less apt to feel having kidney disease than men.
- Second, the burden of CKD stays high but has not increased substantially in nearly a decade, even though the incidence of End Stage Renal Disease (ESRD) has risen by 50% during that interval.
- Finally, whites and blacks share approximately the same prevalence of CKD overall despite the fourfold greater incidence of End-Stage-Renal-Disease in the black population.

Moreover, as demonstrated by Coresh *et al.* and confirmed by Muntner in 2002<sup>3</sup>, kidney diseases or renal insufficiency could be correlated with numerous irreversible

troubles, such as cardiovascular disease-related or all-cause-related death.

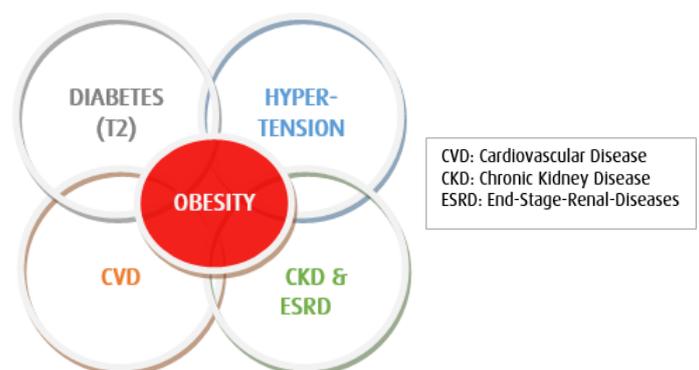
This data suggests a real need to be attentive about protein, especially in high amounts as it may be harmful to kidneys, as the "silent disease" progresses.

## High protein diet and obesity

As pinpointed by Friedman AN. in 2004<sup>4</sup>, high protein weight loss diets have existed in the United States for decades, and their popularity has recently surged as obesity has become more common.

However, the advantages of rapid weight loss associated with a high protein diet may pose a potential health threat. In fact, obesity and diabetes have been identified as contributors to the development and progression of Chronic Kidney Disease and cardiovascular diseases as suggested by Maric-Bilkan C. in 2013<sup>5</sup> and Wyka in 2015<sup>6</sup>.

According to Maric-Bilkan C., there exists a kind of clustering of the risk factors for obesity-related renal disease: the presence of one or more of these risk factors multiplies the overall risk for disease development and progression.



Clustering of risk factors for obesity-related renal disease (Maric-Bilkan C.)

Obesity, type 2 diabetes (T2DM), hypertension (HT) and cardiovascular disease (CVD) are all risk factors for chronic kidney disease (CKD) and end-stage renal disease (ESRD).

## The kidney health benefits of Fibregum™

**Fibregum™** is an all-natural, GMO-free source of soluble dietary fiber, carefully obtained from selected acacia gum sap exuded from the stems and branches of acacia trees. Fibregum™ provides a guaranteed minimum of 90% soluble dietary fiber on a dry weight basis (AOAC 985.29 method). Fibregum™ is a non-digestible, high molecular weight carbohydrate composed of a proteinaceous core (1-3% of the dry matter), a polysaccharidic fraction (95% of the dry matter), and minerals (magnesium, potassium, calcium, and sodium). Fibregum™ has a very complex structure with an average molecular weight ranging from 300 to 800 kDa (kilodalton).

**Acacia gum is largely used since centuries for its numerous properties. Since 1996, several studies were conducted to highlight the benefit of this soluble fiber on renal function and kidney health.**



We know that a high protein diet can raise blood uric acid levels leading to a condition commonly known as gout. Osman *et al.* 2011<sup>7</sup> demonstrated that the consumption of 50 g/day of acacia gum for 120 days ameliorated the health status of the gout suffering subjects.

Additional studies have been carried out to show how introducing acacia fiber to the diet may improve kidney health. In 2008, Ali *et al.*<sup>8</sup> conducted a clinical trial on 36 patients suffering of chronic renal failure. The consumption of 50 g/day of acacia gum during three consecutive months led to the improvement of the kidney health status with urea excretion.

In 2002, Jonassen *et al.*<sup>9</sup> exposed in their article the role of LipoPolysaccharides (LPS) in the development of renal failure, inducing pro-inflammatory cytokine release. They also described how acute renal failure is a frequent complication to the systemic inflammatory response syndrome. The anti-inflammatory property of Fibregum™ against these cytokines has been recently assessed. An *in vitro* experiment demonstrated acacia gum's ability to improve leaky gut syndrome (Daguet *et al.* 2015<sup>10</sup>, Daguet *et al.* 2015<sup>11</sup>).

Recent investigations have confirmed Fibregum™ acacia gum is a butyrogenic fiber (Daguet *et al.* 2015), a key contributor of proper renal health. An experiment carried out in 2005 by Matsumoto<sup>12</sup> and his team showed that increasing dietary supplementation of acacia gum increased systemic levels of butyrate, inhibiting the effect of a pro-fibrotic protein known to be a key mediator of progressive renal disease.

We could hypothesize that Fibregum™'s butyrogenic nature and its ability to improve gut impermeability are key components of the product's ability to improve renal function. Consuming acacia gum while on a high protein diet would have a beneficial effect and improve renal function.<sup>13</sup>

## Conclusion

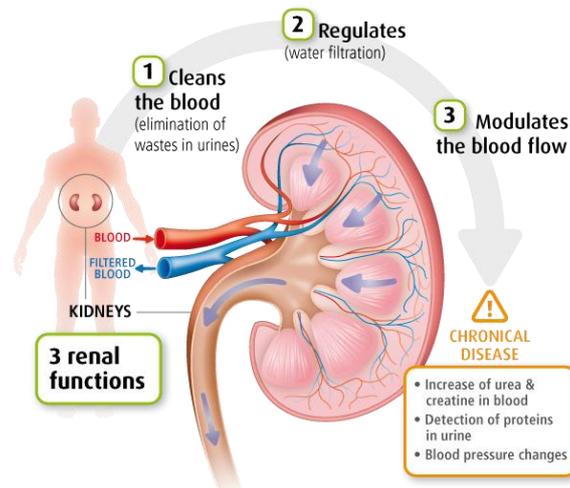
High protein consumption can be associated with increased risk of the development of silent renal failure in healthy people. For obese, type 2 diabetics and hypertensive people, a high protein diet could lead to serious damage.

Acacia gum's unique molecular structure and the benefits generated by its digestion present a helpful solution for the wholesome consumption of high amounts of proteins. Combining Fibregum™ with a high protein diet increases the health benefits to the consumer and lowers the potential risk factors associated with renal disease.



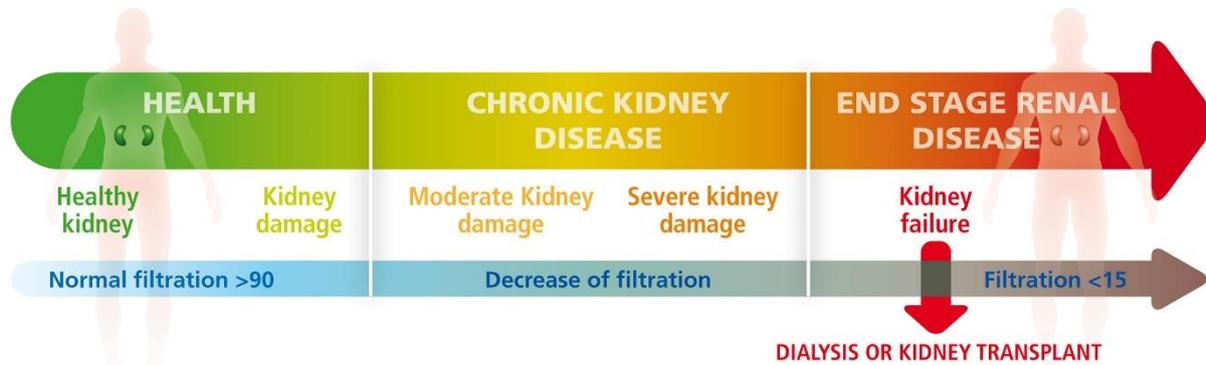
*Although NEXIRA has used diligent care to ensure that the information provided herein is accurate and up to date, NEXIRA makes no representation or warranty of the accuracy, reliability, or completeness of the information. This document only contains scientific and technical information for business to business use. Country or region-specific information should also be considered when labelling or advertising to final consumers. This publication does not constitute or provide scientific or medical advice, diagnosis, or treatment and is distributed without warranty of any kind, either expressly or implied. In no event shall NEXIRA be liable for any damages arising from the reader's reliance upon, or use of, these materials. The reader shall be solely responsible for any interpretation or use of the material contained herein.*

## Renal function in a few words...



Kidney is a vital human organ. Thanks to the filtration and urine excretion, kidney is in charge of the blood filtration.

## Different stages of kidney disease:



## Index

CKD: Chronic Kidney Disease

GFR: Glomerular Filtration Rate

Glomerular hyperfiltration: Excessive production of pro-urine by the glomeruli

Hyperemia: Excess of blood

Proteinuria: Excess of serum proteins in the urine

Diuresis: Extra urine production

Natriuresis: Excessive excretion of sodium in the urine

NHANES: National Health and Nutrition Examination Survey

Kaliuresis: Excessive excretion of potassium in the urine

Nephrolithiasis: Kidney stone disease, also known as urolithiasis. Formation of solid piece of material (kidney stone) in the urinary tract

Butyrogenic fiber: Fiber that stimulate butyrate production

Butyrate: Short-chain fatty acid that feeds the colon cells

## References

- <sup>1</sup> Hariharan D, Vellanki K, Kramer H., The Western Diet and Chronic Kidney Disease., *Curr Hypertens Rep.* 2015 Mar;17(3):16.
  - <sup>2</sup> Coresh J, Byrd-Holt D, Astor BC, Briggs JP, Eggers PW, Lacher DA, Hostetter TH., Chronic kidney disease awareness, prevalence, and trends among U.S. adults, 1999 to 2000., *J Am Soc Nephrol.* 2005 Jan;16(1):180-8.
  - <sup>3</sup> Muntner P, He J, Hamm L, Loria C, Whelton PK., Renal insufficiency and subsequent death resulting from cardiovascular disease in the United States., *J Am Soc Nephrol.* 2002 Mar;13(3):745-53.
  - <sup>4</sup> Friedman AN., High-protein diets: potential effects on the kidney in renal health and disease. *Am J Kidney Dis.* 2004 Dec;44(6):950-62.
  - <sup>5</sup> Maric-Bilkan C., Obesity and diabetic kidney disease. *Med Clin North Am.* 2013 Jan;97(1):59-74.
  - <sup>6</sup> Wyka J, Malczyk E, Misiarz M, Złoteńka-Synowiec M, Całyniuk B, Baczyńska S., Assessment of food intakes for women adopting the high protein Dukan diet. *Rocz Panstw Zakl Hig.* 2015;66(2):137-42.
  - <sup>7</sup> M.E. Osman, I.M. Abu Zeid and F.A. Adam, Gum Arabic: A Reducing Agent of Uric Acid and a Supportive Treatment of Gout, Gum Arabic, RCS publishing, 2012.
  - <sup>8</sup> Ali AA, Ali KE, Fadlalla AE, Khalid KE., The effects of gum arabic oral treatment on the metabolic profile of chronic renal failure patients under regular haemodialysis in Central Sudan. *Nat Prod Res.* 2008 Jan 10;22(1):12-21.
  - <sup>9</sup> Jonassen TE, Graebe M, Promeneur D, Nielsen S, Christensen S, Olsen NV, Lipopolysaccharide-induced acute renal failure in conscious rats: effects of specific phosphodiesterase type 3 and 4 inhibition. *J Pharmacol Exp Ther.* 2002 Oct;303(1):364-74.
  - <sup>10</sup> David Daguet, Iris Pinheiro, An Verhelst, Sam Possemiers, Massimo Marzorati, Acacia gum improves the gut barrier functionality in vitro. *Agro FOOD Industry Hi Tech - vol 26(4) - July/August 2015: 29-33.*
  - <sup>11</sup> Daguet D., Pinheiro I., Verhelst A., Possemiers S., and Marzorati M., Arabinogalactan and fructooligosaccharides improve the gut barrier function in distinct areas of the colon in the Simulator of the Human Intestinal Microbial Ecosystem. *J.Funct. Foods,* 2016;20:369-79.
  - <sup>12</sup> Matsumoto N, Riley S, Fraser D, Al-Assaf S, Ishimura E, Wolever T, Phillips GO, Phillips AO., Butyrate modulates TGF-beta1 generation and function: potential renal benefit for Acacia(sen) SUPERGUM (gum arabic), *Kidney Int.* 2006 Jan;69(2):257-65.
  - <sup>13</sup> Al Suleimani YM, Al Za'abi M, Ramkumar A, Al Mahruqi AS, Tageldin MH, Nemmar A, Ali BH., Influence of treatment with gum acacia on renal vascular responses in a rat model of chronic kidney disease., *Eur Rev Med Pharmacol Sci.* 2015;19(3):498-506.
  - <sup>14</sup> Martin WF *et al.* *Dietary protein intake and renal function.* *Nutr. Metab (Lond)* 2005; 2:25.
-