nextida·GC

EXPLORE
NEW FRONTIERS IN
GLUCOSE CONTROL
SCIENCE

Rousselot
by Darling Ingredients

DID YOU KNOW THAT COLLAGEN HAS UNKNOWN BENEFITS?

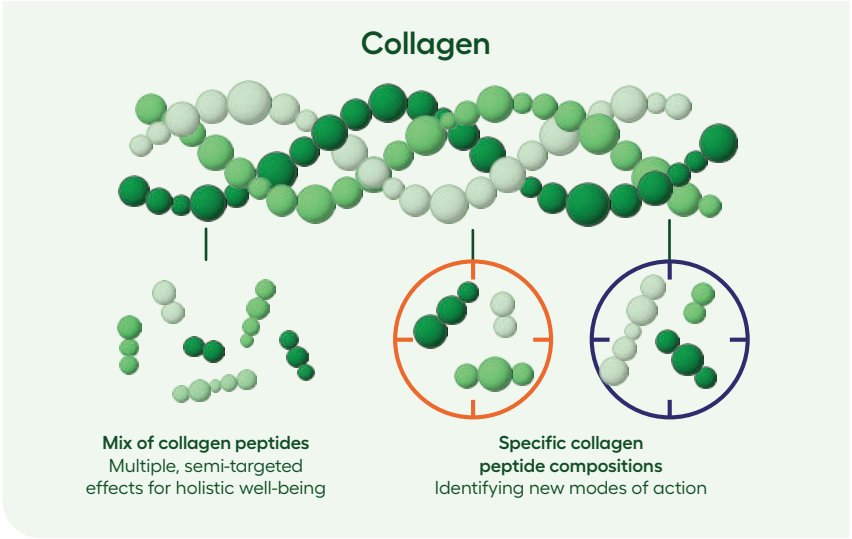
With over 130 years of experience, Rousselot is a pioneer in collagen-based solutions*. Today, Rousselot is focused on decoding the collagen language and identifying its associated unique health benefits.

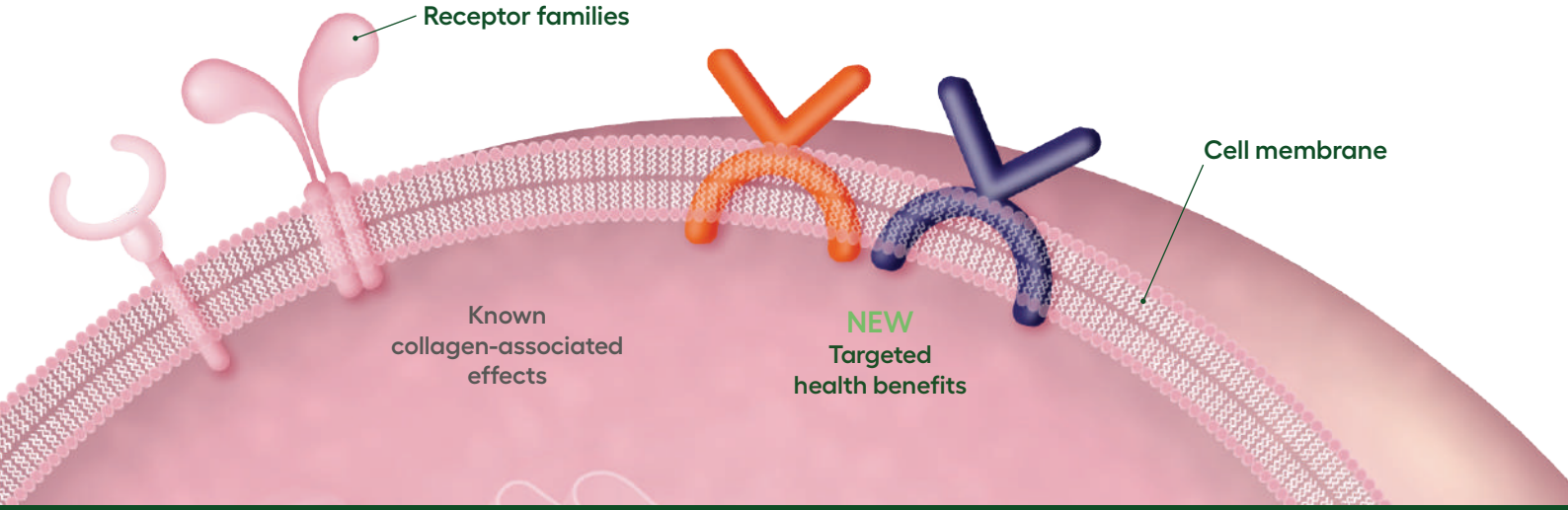
Collagen plays a major structural role in our bodies and **its benefits go well beyond structure and strength**. Collagen peptides navigate the body, transmitting messages involved in numerous physiological functions.

As a result, they can exert a beneficial health effect well beyond its known nutritional value, and even largely exceeding what has already been shown in skin, bone and joint health.

Therefore, Rousselot is going beyond the known by uncovering new modes of action and delivering new targeted health benefits.

Identifying new health benefits mediated by specific collagen peptide compositions





Nextida: Precision where it matters.

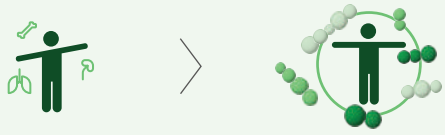
*Upcycled animal-derived collagen solutions

INTRODUCING NEXTIDA, THE INNOVATIVE PLATFORM OF SPECIFIC COLLAGEN PEPTIDE COMPOSITIONS

Mastering our body's natural use of bioactive peptides to restore balance, Rousselot is introducing Nextida, **a new range of specific collagen peptide compositions**. The scientists at Rousselot have identified specific compositions that can **trigger a natural response** and deliver **targeted health benefits**.

The process behind decoding the collagen language is built and backed by science.

1. **Uncover** the link between collagen peptides and human physiology:



2. **Develop** an extensive library of **specific collagen peptide compositions:**

3. **Test different** collagen peptide compositions **in cell models** that mimic a specific mode of action (MOA). **Screen and select** the most effective candidate:

4. **Assess** the candidate in preclinical studies **to confirm the tested MOA and targeted health benefits:**

5. **Perform human clinical** trials to confirm **efficacy and safety:**

The first result of this process is Nextida GC

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Nextida GC: Targeting glucose spikes.

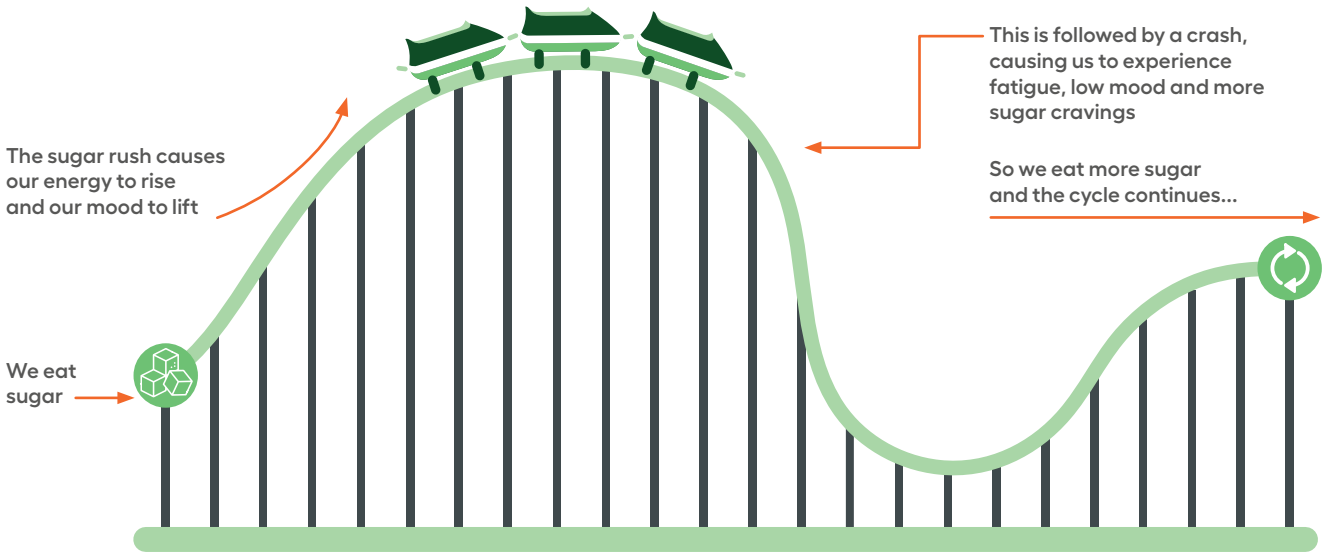
NEXTIDA GC: TARGETING POST-MEAL GLUCOSE SPIKES

One of the most common health concerns that interests global consumers is blood glucose management.[1-5]

Glucose is a critical source of energy for every cell in the human body. Following a meal (especially those rich in refined sugars and carbohydrates) large amounts of glucose rapidly enter the blood stream and are subsequently taken up by cells to be used as fuel. If large amounts of carbohydrates are consumed, this mechanism can result in the feeling of a **'sugar high'** caused by the spike in blood glucose concentration. While this high can make us feel happy and energized, it is inevitably followed by a **'sugar crash'** where tiredness and sluggishness creep in as glucose levels decrease.[6,7]

These 'highs and lows' caused by blood glucose spikes are often compared to a rollercoaster due to the effect they can have on our mood and energy.[6,7,8]

The glucose rollercoaster



High variability in blood glucose levels can lead to:

- Fatigue[6,8]
- Mood and sleep disturbances[7,9,10]
- Food cravings & hunger[7,11]
- Stress[10]

WHY THE CAUSE FOR WORRY?

Modern lifestyles and diets are characterized by the increased consumption of processed and high-sugar density foods, combined with insufficient sleep and physical inactivity.[12,13]

A study showed that up to 80% of healthy participants experienced an **excessive glucose spike** after a meal of breakfast cereals and milk.[14]

In addition, chaotic schedules push meal times late into the evening, a practice that has been linked to a worsened hyperglycemic state in healthy individuals.[12] Together, these factors **disrupt our natural regulatory mechanisms**, making it harder for the body to maintain optimal glucose levels.

Scientific studies showed that high variability in blood glucose levels after a meal can lead to cravings and overeating which again induces glucose spikes and subsequent crashes.[7,11] This cycle can lead to hunger[7,11], fatigue[6], mood[6,7,10] and sleep disturbances[7,9] and stress.[10]

Maintaining balanced glucose levels is so important that our bodies have a natural way for managing these fluctuations **through the secretion of incretin hormones, glucagon-like peptide-1 (GLP-1) and gastric inhibitory polypeptide (GIP).[15]**

These hormones are indispensable for the moderation of glucose absorption and utilization (Figure 1). When food enters our digestive system, nutrients bind to L and K-cell receptors in the intestine, inducing the release of these hormones.[15] Together, **GLP-1 and GIP increase insulin secretion to stimulate glucose uptake into the cells, and signal the stomach to slow down gastric emptying, inducing satiety.**[15,16] As a result of this process, known as the incretin effect, glucose is more gradually diffused into the blood stream, lowering the glucose spike.

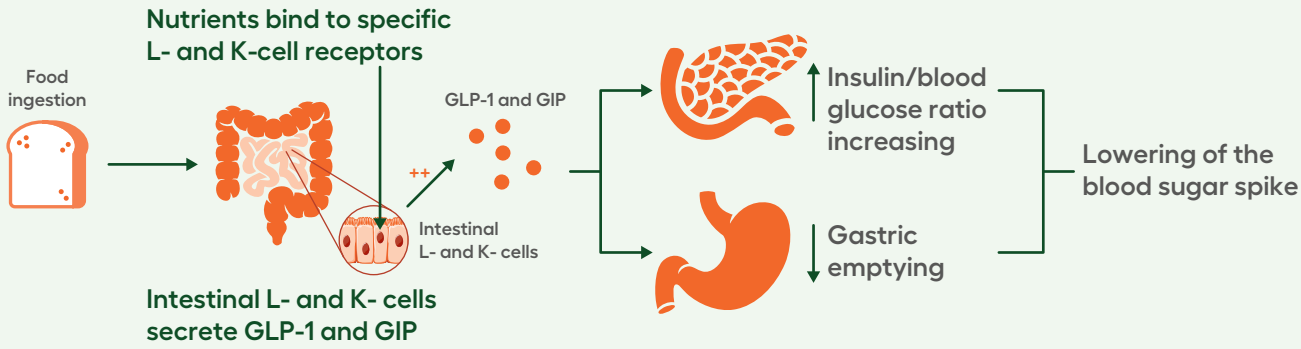


Figure 1: Food intake stimulates entero-endocrine cells (L and K cells) to secrete incretin hormones (GLP-1 and GIP)

PUTTING THE BRAKES ON THE GLUCOSE ROLLERCOASTER

Nextida GC: Developed to enhance natural modes of action

With the creation of Nextida GC, we are stepping up this natural glucose mediating action.

To mimic human gastrointestinal digestion, all peptide compositions developed using the Nextida platform were digested *in vitro* before undergoing screening in an *in vitro* entero-endocrine intestinal cell model. **Nextida GC was selected from this comprehensive library of specific collagen peptide compositions due to its ability to enhance natural GLP-1 secretion** (Figure 2).[17]

Nextida GC collagen peptides delivered an increase in GLP-1 secretion when preclinically tested *in vitro*

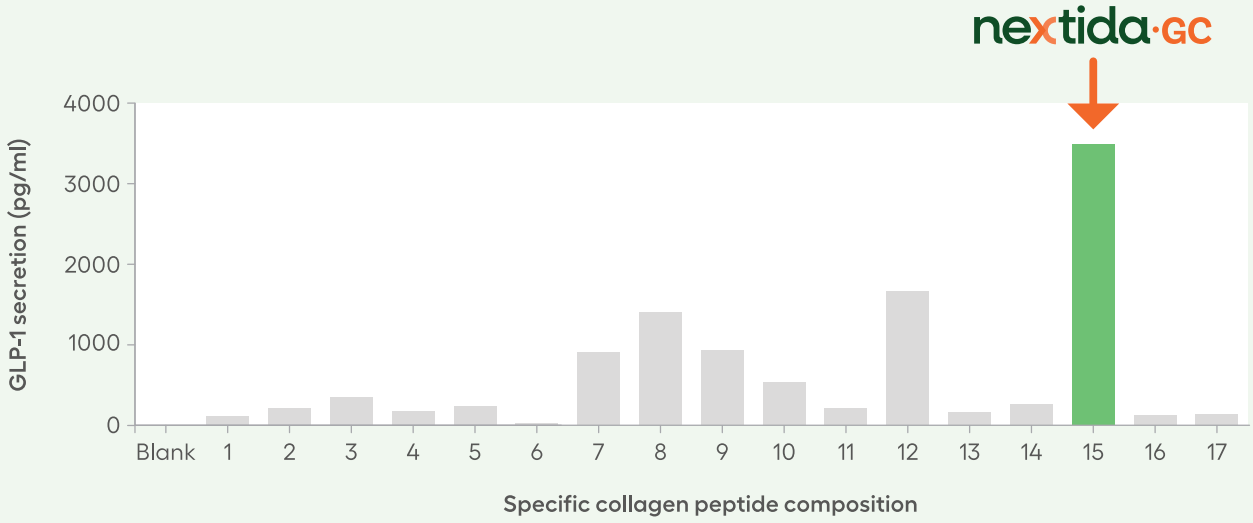


Figure 2: *In vitro* screening of a proprietary library of specific collagen peptide compositions for their ability to enhance natural GLP-1 secretion in murine, gastrointestinal enteroendocrine, STC-1 cells. All collagen peptide compositions were digested *in vitro* using the INFOGEST digestion protocol.

NEXTIDA GC: PRE-CLINICAL AND CLINICAL RESULTS

Nextida GC intake before a meal triggered the natural release of GLP-1

A Pre-clinical study: Nextida GC enhanced natural GLP-1 secretion

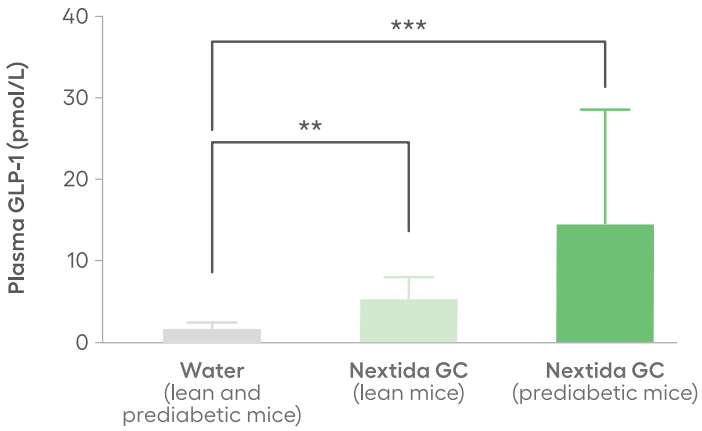


Figure 3A: Influence of Nextida GC on natural GLP-1 secretion in lean and prediabetic mice compared to water. **p<0.01,***p<0.001.

Once identified, the Nextida GC composition was **preclinically tested** for its ability to enhance natural GLP-1 secretion in C57BL6/J mice. Figure 3A demonstrates that oral supplementation with Nextida GC at 4 g/kg **significantly enhanced natural GLP-1 secretion** in lean and prediabetic mice. The latter group was selected to better understand the effect in mice characterized by a dysregulated glucose metabolism.[17]

B Clinical study: Nextida GC enhanced natural GLP-1 secretion in a healthy population

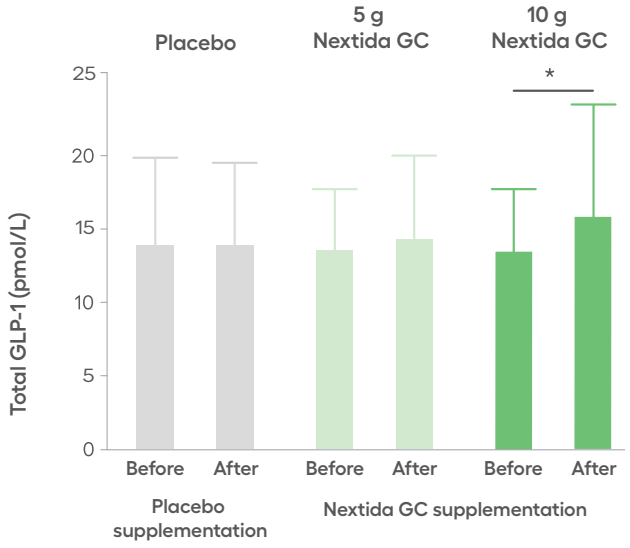


Figure 3B: Nextida GC supplementation triggered total GLP-1 release before the meal in a healthy population.Total GLP-1 levels are measured in the blood of participants before and after the oral intake of Nextida GC *p<0.05

The triggering effect of Nextida GC on GLP-1 natural release was also tested in healthy humans (normoglycemic and prediabetic). The results in Figure 3B show that consumption of **10 g of Nextida GC significantly increased total GLP-1 levels** in healthy volunteers. A trend towards elevated GLP-1 levels was observed when participants ingested 5 g of Nextida GC.

Nextida GC lowered the blood glucose spike

Researchers then investigated if this increased GLP-1 secretion could have a physiological effect in mice by testing the influence of Nextida GC on glucose spikes following an oral glucose load. Figure 4 shows that oral intake of 4 g/kg of Nextida GC 45 minutes before the oral glucose load **significantly lowered glucose levels after oral glucose** load in lean, normoglycemic (Figure 4A) and obese, prediabetic (Figure 4B) mice.[17]

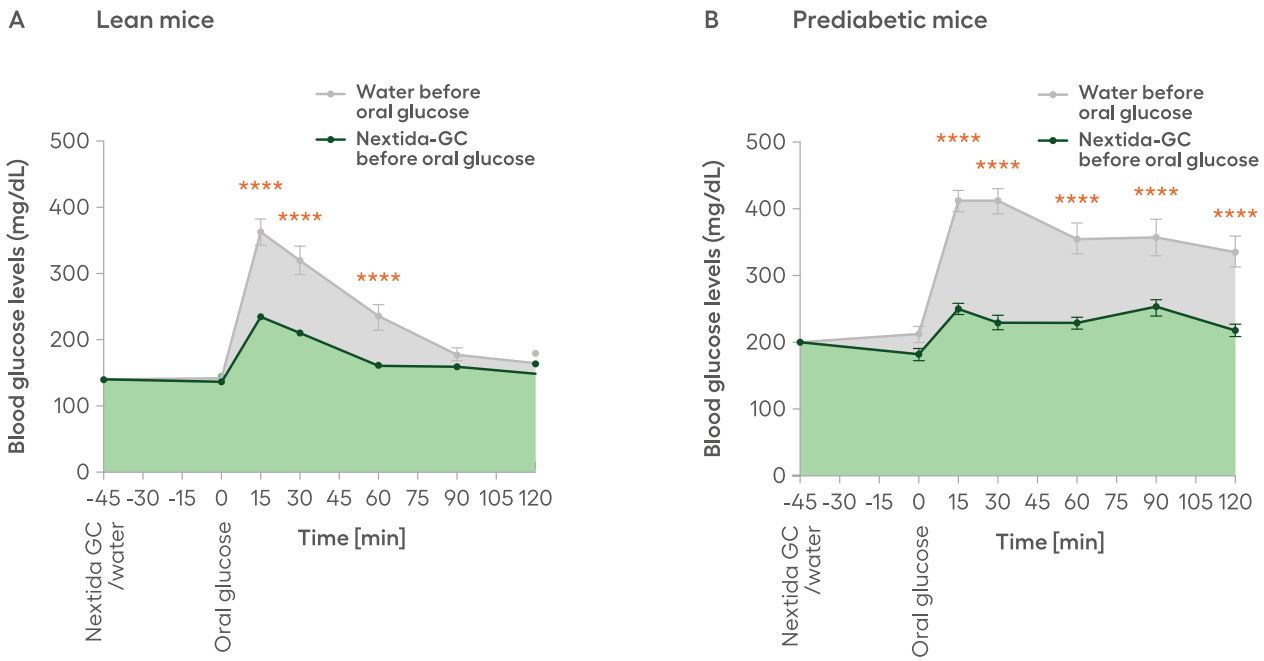


Figure 4: Oral supplementation of Nextida GC 45 min before an oral glucose load reduced the glucose spikes in lean, normoglycemic (A) and obese, prediabetic (B) mice. ****p<0.0001 at a given timepoint.

To the test: Nextida GC in human studies

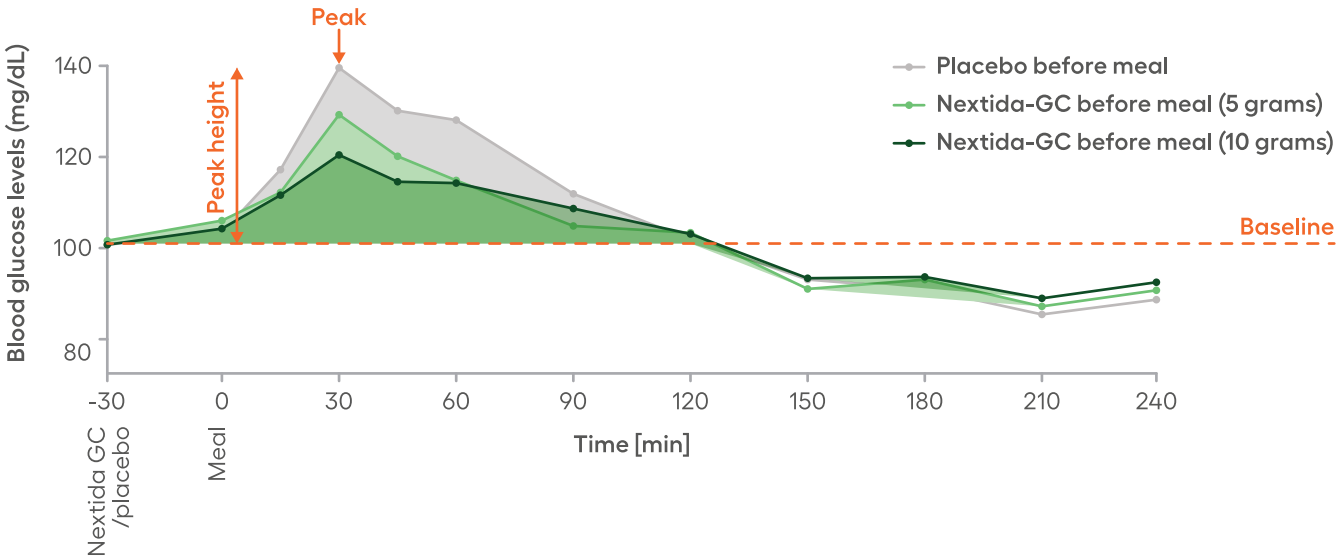
To explore the possible impact of Nextida GC on post meal blood glucose levels in humans, Rousselot scientists established a **first clinical trial** involving 16 healthy individuals, some of whom were normoglycemic while others were prediabetic. Results showed that **Nextida GC lowered glucose spikes after a meal** (Figure 5A), when taken orally 30 minutes before the meal. [17] The area under the curve (shaded area) of Figure 5A illustrates that the amount of glucose present in the body is lowered by oral intake of either 5- or 10-grams of Nextida GC compared to the placebo. [17]

Quantifying the area under the curve reveals that a 5- or 10-gram dose of Nextida GC **significantly lowered glucose levels present in the blood after a meal by 43% and 40% respectively** (Figure 5B). [17] Another indication of the positive effect of Nextida GC became apparent when researchers assessed the maximum amount of glucose present in the body at a given time point, indicated by the glucose peak in Figure 5A. Oral supplementation with Nextida GC showed a **significant decrease in glucose peak height of 31% and 39% respectively** following supplementation with 5- or 10-grams of Nextida GC, 30 min before a meal (Figure 5C).[17]

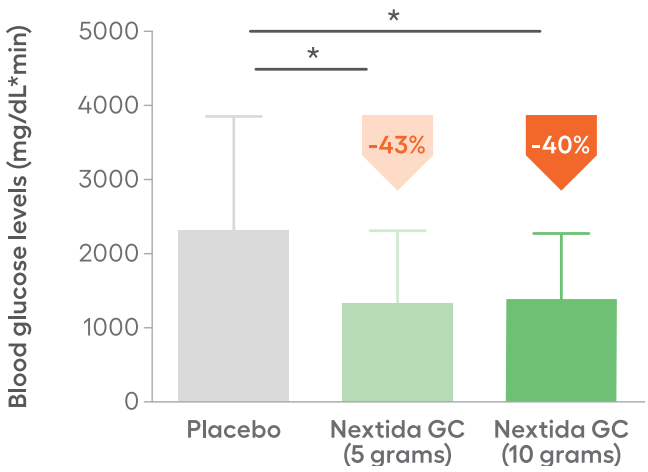
NEXTIDA GC: ASSESSING EFFICACY IN HUMANS

Nextida GC lowered the post meal blood glucose spike by an average of 42% in humans

A Total healthy population: normoglycemic and prediabetic



B Nextida GC lowered the glucose spike



C Nextida GC reduced the height of the glucose peak

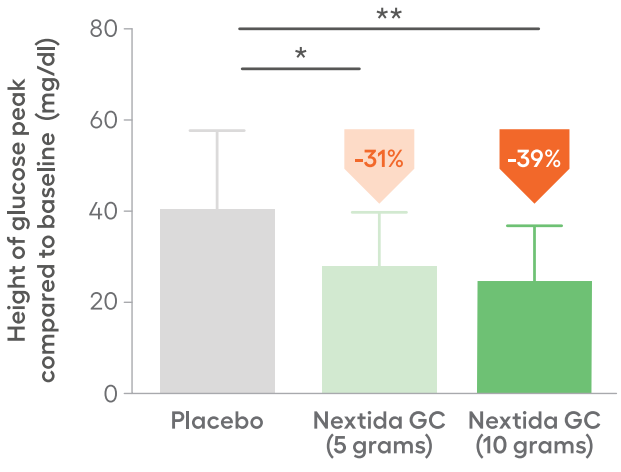


Figure 5: Oral supplementation with either 5- or 10-grams of Nextida GC 30 min before a complex meal (110g white toast, 20g butter and 43g strawberry jam).
*p<0.05, **p<0.01 lowered the blood glucose spike (iAUC 0-180 min) and the glucose peak in a healthy population (A, B and C).

STEP OFF THE GLUCOSE ROLLERCOASTER AND KEEP A STEADY PATH WITH NEXTIDA GC

Maintaining balanced glucose levels is an essential stop on the road to an overall healthy lifestyle – no matter our health status.

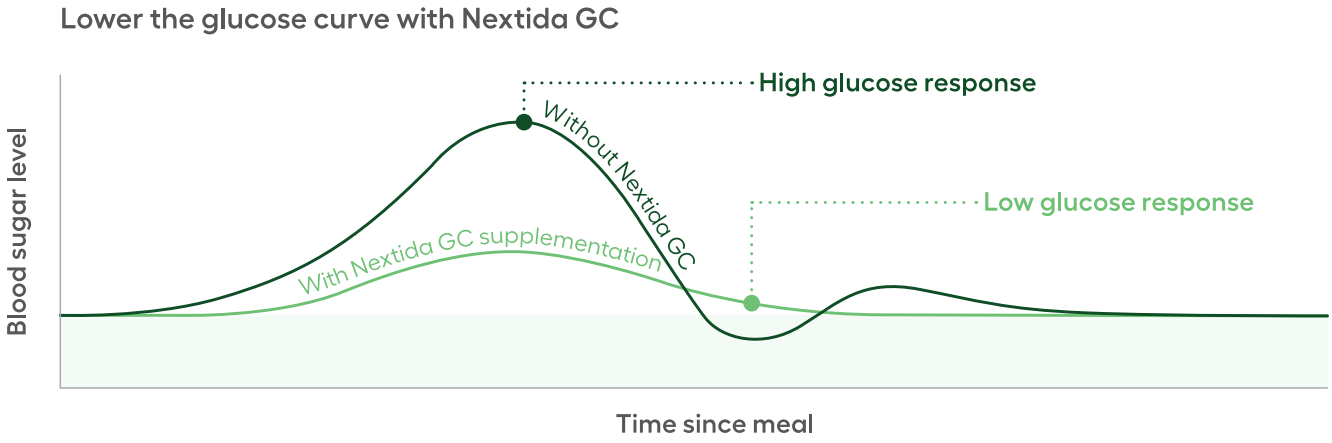


Figure 6: Illustration of post-meal glucose spike, with and without Nextida GC supplementation.

Learn more about the glucose control supplement market and the opportunities unlocked by Nextida GC in our marketing insights brochure. Scan QR code to download.

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Contact our experts for more information

Visit nextida.com

Nextida: Precision where it matters.

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At Rousselot, we know collagen.

With 130 years of experience pioneering science-backed solutions, Rousselot is a trusted world leader in collagen-based solutions. Today, we have taken our understanding of the collagen molecule a step further, decoding collagen's hidden messages to identify previously unknown health benefits, and open new market opportunities.

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Whatever product development project you have in mind, we're here to support your vision with:

- Transparency
- Full traceability
- High standards of quality and safety
- Committed to the environment and to our clients
- Global support and expert advice

Your Rousselot sales contact information

About Rousselot Health & Nutrition

As Rousselot's strategic segment dedicated to health and nutrition, we are committed to developing innovative ingredients answering today's demand for solutions offering proven efficacy, full safety, and premium quality.

Our customers can rely on best-in-class products backed by trusted science, as well as on our expert support in formulation, product development, and regulatory advice. Our range of products includes Peptan®, Peptinex®, ProTake®, Colartix® and now Nextida™ for a healthier tomorrow.

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