

# Effect of dietary supplements on type 2 diabetes

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<b>Registration date</b> 09/11/2022	<b>Overall study status</b> Completed	<input type="checkbox"/> Protocol
<b>Last Edited</b> 10/02/2026	<b>Condition category</b> Nutritional, Metabolic, Endocrine	<input type="checkbox"/> Statistical analysis plan
		<input checked="" type="checkbox"/> Results
		<input type="checkbox"/> Individual participant data

## Plain English summary of protocol

### Background and study aims

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by high blood sugar, insulin resistance and chronic inflammation. Several studies have reported gut microbiome dysbiosis (gut bacteria disruption) as a factor in the rapid progression of insulin resistance in T2DM. Probiotic-containing formulations have been reported as useful in the management of T2DM. BiotiQuest™ Sugar Shift (SS) is a symbiotic formulation rationally designed for the conversion of glucose and fructose to support the restoration of the human gut microbiota, the modulation of intestinal glucose, and the production of anti-inflammatory metabolites and therefore to help stabilize blood glucose, improve insulin resistance, and reduce inflammation. The aim of this study is to evaluate the effectiveness of SS at reducing T2DM biomarkers, blood sugar, HbA1c, insulin levels, insulin resistance and inflammation.

### Who can participate?

Patients diagnosed with T2DM, between 30 and 65 years old, with body mass index (BMI) between 28-40 kg/m<sup>2</sup> at the enrollment visit, who attended the diabetes-specialized consultations of the Hermanos Ameijeiras Hospital

### What does the study involve?

Patients are randomly allocated to consume SS or placebo daily, two capsules per day, 12 hours apart. Patients visit the clinic for evaluation, sample collection and administration of capsules four times during the 12-week study. The variables measured during each visit are age, sex, BMI, blood pressure, and history of COVID-19 infection. Fecal samples are collected at the beginning and the end of the study, and blood samples are collected during each visit to the clinic.

### What are the possible benefits and risks of participating?

All patients receive the standard of care and private consultations with the attending physician. Benefits to the patient include monthly health monitoring and nutritional clinical counseling as well as guidance for a healthy daily routine.

### Where is the study run from?

Hospital Hermanos Ameijeiras (Cuba)

When is the study starting and how long is it expected to run for?  
May 2020 to October 2022

Who is funding the study?  
The BioCollective, LLC, (USA)

Who is the main contact?  
1. Martha R. Carlin  
2. Raul J. Cano, rcano@calpoly.edu

## Contact information

**Type(s)**  
Scientific

**Contact name**  
Prof Raul Cano

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1854 Castillo Court  
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## Additional identifiers

**Clinical Trials Information System (CTIS)**  
Nil known

**ClinicalTrials.gov (NCT)**  
Nil known

**Protocol serial number**  
HHA\_CCF\_000030

## Study information

**Scientific Title**  
Clinical study on the effect of BiotiQuest™ Sugar Shift and Kesto Mix dietary supplements on the treatment of type 2 diabetes mellitus

**Acronym**  
SST2DM

## Study objectives

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by hyperglycemia, insulin resistance and chronic inflammation. Several studies have reported gut microbiome dysbiosis as a factor in the rapid progression of insulin resistance in T2DM which accounts for about 90% of all diabetes cases worldwide. Probiotics, prebiotics, symbiotics, and postbiotics benefit metabolic disease management, especially obesity and type 2 diabetes mellitus. BiotiQuest™ Sugar Shift (SS) is a symbiotic formulation rationally designed for the conversion of glucose and fructose to support the restoration of the human gut microbiota, the modulation of intestinal glucose, and the production of anti-inflammatory metabolites and therefore stabilize blood glucose, improve insulin resistance, and reduce inflammation.

## Ethics approval required

Old ethics approval format

## Ethics approval(s)

Approved 22/06/2021, Comité de Ética de la Investigación Científica (Ethics Committee For Scientific Investigation, Hospital Clínico Quirúrgico Hermanos Ameijeiras, San Lázaro 701 esq. Belascoain, Centro Habana, CP 10300. La Habana, Cuba; +53 (0) 78761000; hha@infomed.sld.cu), ref: not provided

## Study design

Randomized double-blind placebo-controlled trial

## Primary study design

Interventional

## Study type(s)

Treatment

## Health condition(s) or problem(s) studied

Type 2 diabetes mellitus

## Interventions

The included patients are assigned to two treatment groups by randomization:

Group A (study or experimental): Sugar Shift (SS)

Group B (control): placebo

Assignment to treatment groups is carried out using epidemiological analysis from tabulated data. Participants consume SS or placebo daily, two capsules per day, 12 hours apart. Patients visit the clinic for evaluation, sample collection and administration of capsules four times during the 12-week study. The foil packaging containing the capsules is distributed every 28 days over the 12-week study period after blood sample collection for clinical determination. The "test substance", SS, is manufactured by BlisterPak Pro, LLC in Lafayette, Colorado™. Each capsule contains 96 mg (18 billion CFU) of a bacterial consortium of eight strains of GRAS-classified bacteria that include *Bacillus subtilis* de111™, *Bifidobacterium bifidum*, *Bifidobacterium longum*, *Lactobacillus paracasei*, *Lactobacillus plantarum* TBC0036, *Lactobacillus reuteri*, *Leuconostoc mesenteroides* TBC0037, and *Pediococcus acidilactici*. Each capsule contains 370 mg of prebiotics and fillers consisting of inulin, microcrystalline cellulose, D-mannitol, and stearic acid. The placebo capsules were manufactured by BlisterPak Pro, LLC in Lafayette, Colorado™. Each capsule contains 370 mg of prebiotics and fillers consisting of inulin, microcrystalline cellulose, D-mannitol, and stearic acid.

## Intervention Type

Supplement

## Primary outcome(s)

Hemoglobin A1c (Hb-A1c) (%) determined in K3EDTA blood collection tubes at the beginning of the study (Day 1) and the last day (Day 84)

## Key secondary outcome(s)

1. Fasting blood glucose (FBG) determined in serum samples every 28 days (day 1, day 28, day 56 and day 84)
2. Postprandial glucose (2 hours) determined in serum samples every 28 days (day 1, day 28, day 56 and day 84)
3. Cholesterol determined in serum samples at the beginning of the study (Day 1) and the last day (Day 84)
4. Triglycerides determined in serum samples at the beginning of the study (Day 1) and the last day (Day 84)
5. HDLc determined in serum samples at the beginning of the study (Day 1) and the last day (Day 84)
6. LDLc determined in serum samples at the beginning of the study (Day 1) and the last day (Day 84)
7. Insulin determined in serum samples at the beginning of the study (Day 1) and the last day (Day 84)
8. Creatinine determined in serum samples at the beginning of the study (Day 1) and the last day (Day 84)
9. LPS: Endotoxin units / mL determined in serum samples at the beginning of the study (Day 1) and the last day (Day 84)
10. Microbiome analysis: 16S amplicon sequencing determined in fecal samples at the beginning of the study (Day 1) and the last day (Day 84)

## Completion date

07/10/2022

## Eligibility

### Key inclusion criteria

1. Patients diagnosed with T2DM
2. Between 30 and 65 years old
3. Body mass index (BMI) between 28-40 kg/m<sup>2</sup> at baseline
4. Attended the diabetes specialized consultations of the Hermanos Ameijeiras Hospital
5. Gave their consent to participate in the study

### Participant type(s)

Patient

### Healthy volunteers allowed

No

### Age group

Adult

**Sex**

All

**Total final enrolment**

64

**Key exclusion criteria**

1. Chronic kidney disease
2. Onco-proliferative diseases
3. Pregnant women

**Date of first enrolment**

01/08/2022

**Date of final enrolment**

04/08/2022

**Locations****Countries of recruitment**

Cuba

**Study participating centre**

Hospital Clínico Quirúrgico Hermanos Ameijeiras

Calle, # 701 San Lazaro

La Habana

Cuba

10400

**Sponsor information****Organisation**

The BioCollective, LLC

**Funder(s)****Funder type**

Industry

**Funder Name**

The BioCollective, LLC

# Results and Publications

## Individual participant data (IPD) sharing plan

The anonymised datasets generated during and/or analysed during the current study will be available upon request from Raul J. Cano, PhD (rcano@calpoly.edu). A portion of these data will be made available as supplementary material in a forthcoming publication

## IPD sharing plan summary

Available on request, Published as a supplement to the results publication

## Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Results article</a>		30/06/2023	11/07/2023	Yes	No
<a href="#">Results article</a>		07/12/2024	10/02/2026	Yes	No
<a href="#">Participant information sheet</a>	Participant information sheet	11/11/2025	11/11/2025	No	Yes