CENTER FOR GENETIC ENGINEERING AND BIOTECHNOLOGY

BARKAT
PHARMACEUTICAL GROUP

CIGB CENTRO DE INGENIERÍA GENÉTICA Y BIOTECNOLOGÍA | BIOCUBA FARMA

BIOCUBAFARMA

CIGB CENTRO DE INGENIERÍA GENÉTICA Y BIOTECNOLOGÍA
CIM Centro de Inmunología Molecular
IFV INSTITUTO FINLAY DE VACUNAS
CNIC CENTRO NACIONAL DE INVESTIGACIONES CIENTÍFICAS
INMUNOENSAYO
CNEURO CENTRO DE NEUROCIENCIAS DE CUBA
COMBIOMED TECNOLOGÍA MÉDICA DIGITAL
CIDEM INVESTIGACIÓN Y DESARROLLO DE MEDICAMENTOS
HISPLACEN HISTOTERAPIA PLACENTARIA
BIOCEN CENTRO NACIONAL DE BIOMEDICAMENTOS
CENPALAB CENTRO NACIONAL PARA LA PRODUCCIÓN DE ANIMALES DE LABORATORIO
NEURONIC Tecnología Médica
aica LABORATORIOS FARMACEUTICOS
Empresa Laboratorio Farmacéutico ROBERTO ESCUDERO
FARMACÉUTICA 8 DE MARZO
MEDILIP LABORATORIO
LBF Laboratorios Farmacéuticos
Pesant
BCFSA NEGOCIOS & INVERSIONES
FARMACUBA
Heber Biotec
CIMAB S.A. ALIANZAS EN BIOFARMA
TecnoSuma INTERNACIONAL
EMCOMED EMPRESA COMERCIALIZADORA Y DISTRIBUIDORA DE MEDICAMENTOS
eti Tecnologías de la Información BioCubaFarma
Industrial Biotecnológico CIGB-MARIEL S.A.
SERVIGEN Empresa de Servicios Generales
ESINES
CAPITAL EMPLEADORA BIOCUBAFARMA
MedSol Empresa Laboratorios

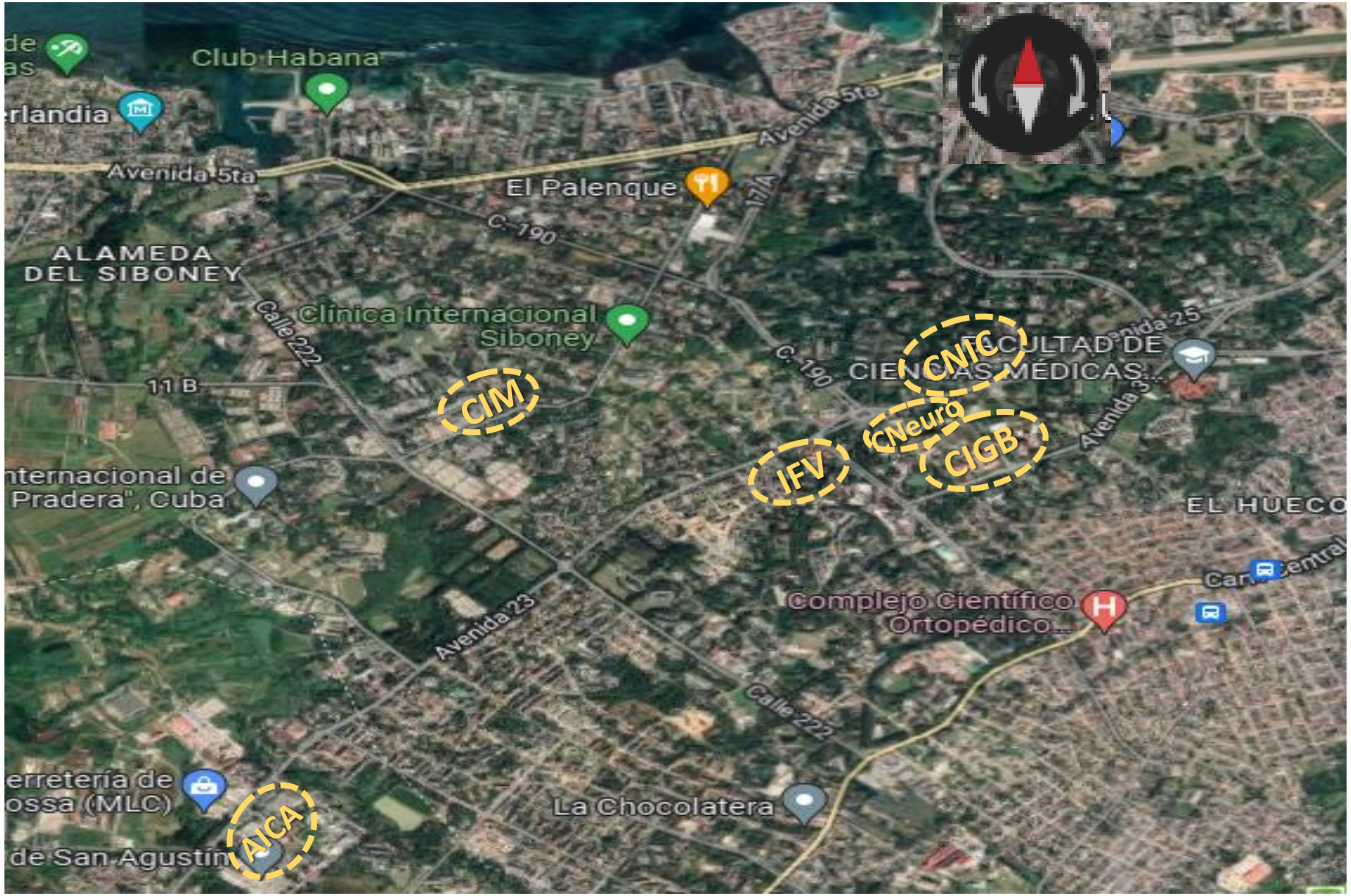
32
Cuban Enterprises

80
Production Lines

+20000
Employees

+40
Exportations to countries

740
Marketing approvals in 53 countries


Club Habana
Avenida 5ta
El Palenque
C. 190
ALAMEDA
DEL SIBONEY
Calle 222
Clínica Internacional
Siboney
11 B
CIM
CNIC
CNeurq
CIGB
IFV
FACULTAD DE
CIENCIAS MÉDICAS
Avenida 25
Avenida 3
EL HUECO
Complejo Científico
Ortopédico
Avenida 23
Calle 222
La Chocolatera
AICA

We focus on key areas of the sectors

BIOMEDICAL

Diagnosis, treatment and prevention of infectious, autoimmune, cardiovascular, cerebrovascular, oncological, dermatological, hematological, neurological and gastrointestinal diseases, diabetes and scarring

VETERINARIAN

Diagnosis, prevention, control and treatment of various infectious diseases, as well as in animal nutrition

AGRICULTURAL

Control of pests and fungal and viral diseases that affect plants

INDUSTRIAL

We have products for use in the food industry

MAIN PRODUCTS

VACCINES

Pentavalent vaccine

Rec. Hepatitis B vaccine

Conjugated Hib vaccine

PRODUCTS

Rec. IFN Alpha-2b

Rec. GCSF (Hebervital)

HeberNasvac

HeberFERON (IFN α and γ)

Heberprot-P

Rec. IFN gamma

Rec. Streptokinase

Proctokinase

Heberon

Diagnostic kits

Jusvinza

Abdala

PRODUCTS

Rec. tick vaccine (GAVAC)

Bionematicide

Acuabio

1981

Casa 149

1982

CIB

1986

CIGB

1989

CIGB Cam

1990

CIGB SS

1991

HeberBiotech

2003

ChangHeber

2016

LukangHeber

2019

I+D Center Yongzhou

2019

Liof-Pharma

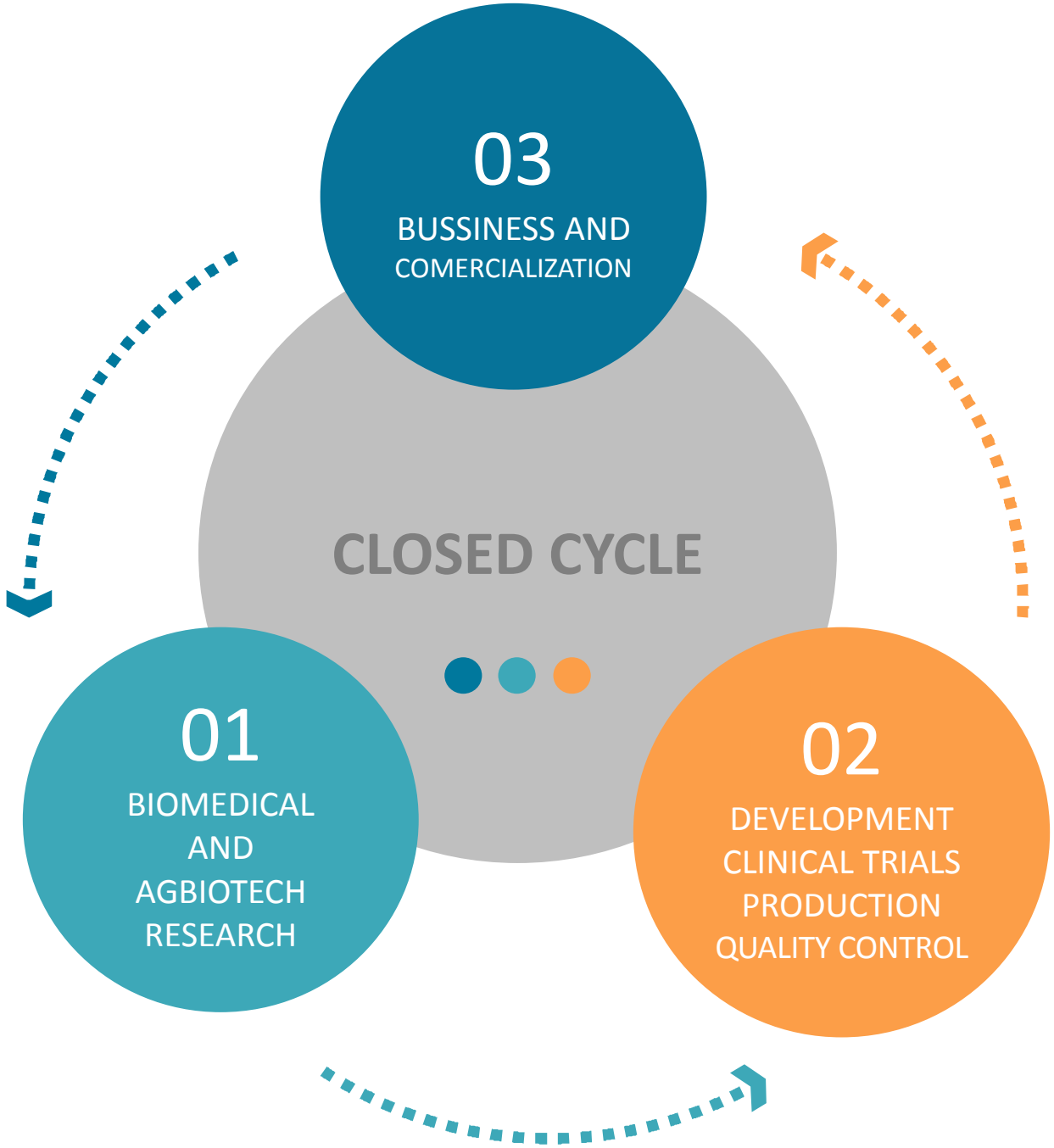
2021

CIGB Mariel

CENTER FOR GENETIC ENGINEERING AND BIOTECHNOLOGY

It is dedicated to scientific research and innovation, development, production and marketing of **products, applications, medicines and vaccines** with high added value, for the biomedical, veterinary, agricultural, aquacultural and industrial sectors, for **one health.**

Personnel: 1600
Facilities: 70 000 m^2

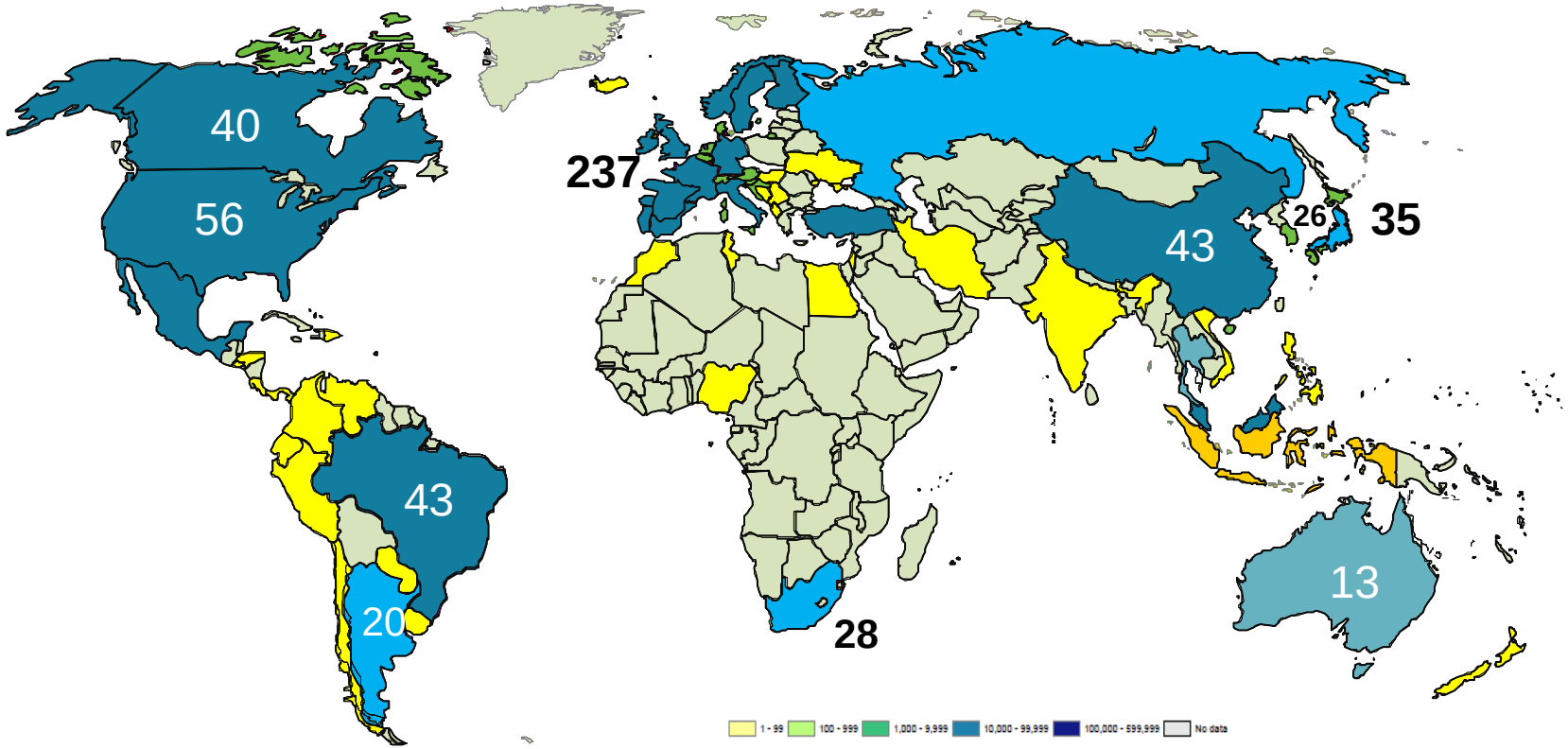


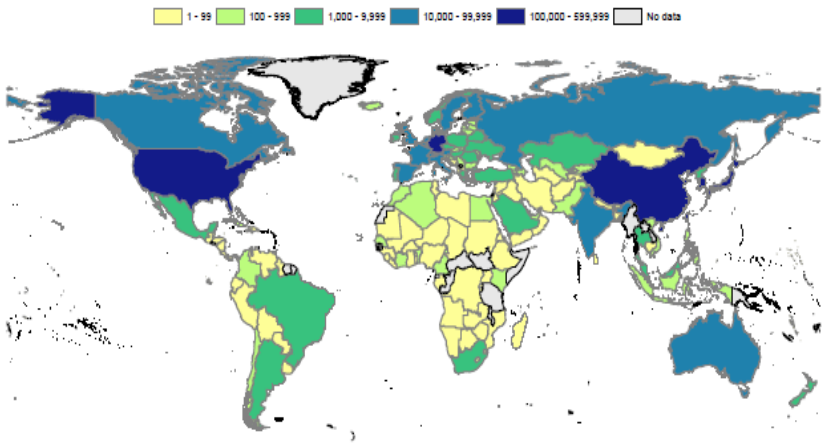
International Patent Status

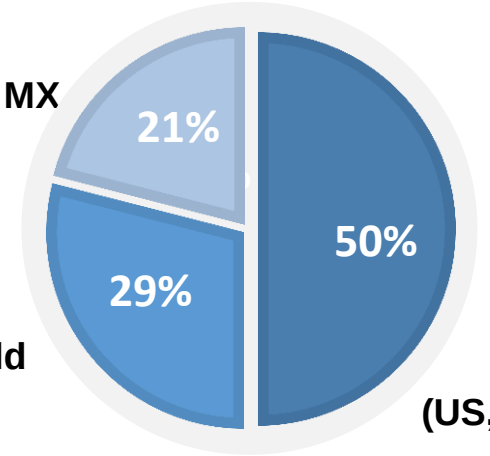
62 Inventions

768 Applications and total patents

75% Patents granted





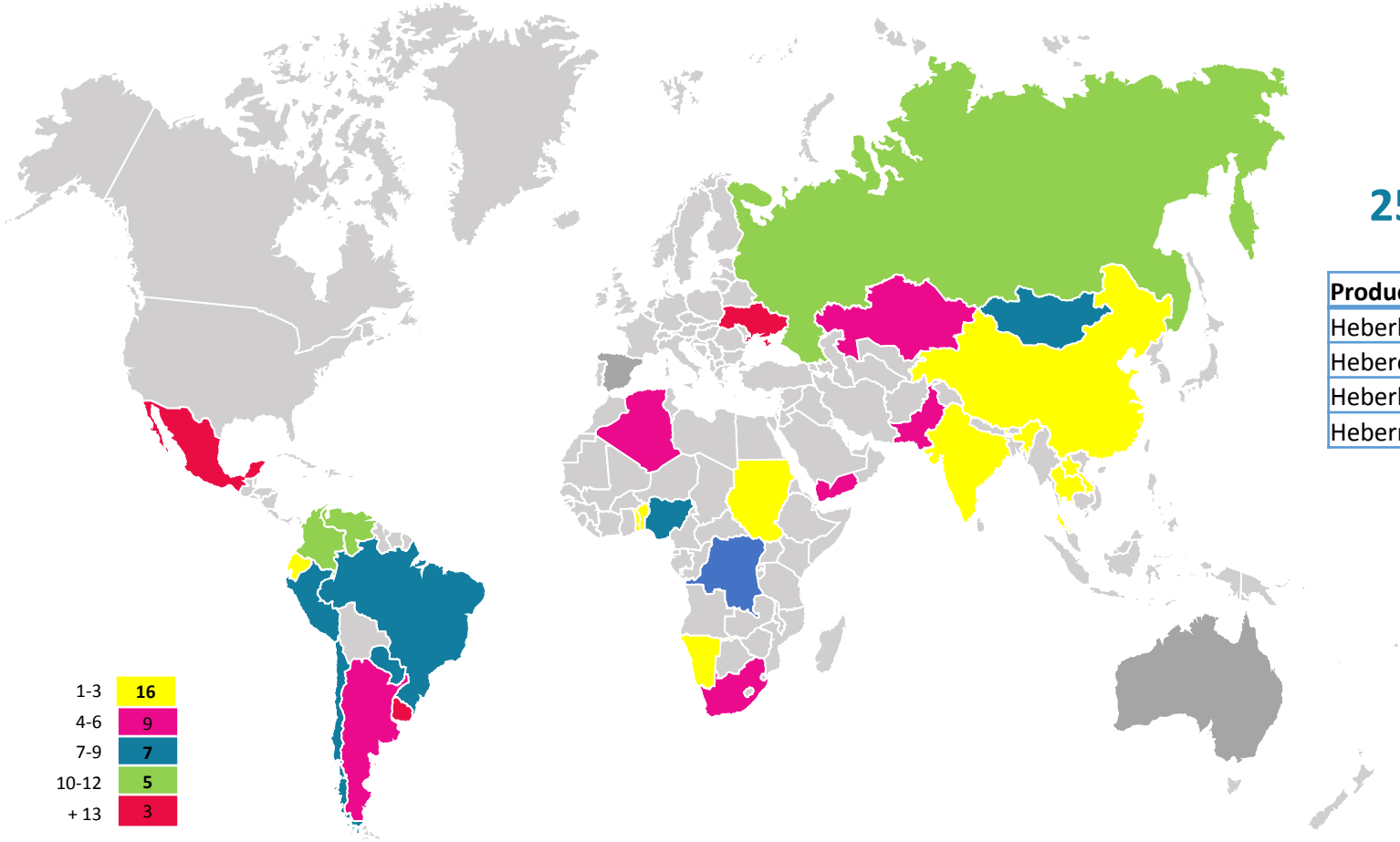


BRICS + AR + KR + MX

Rest of the world

First world
(US, EP, CA, JP, AU)

Product Marketing Authorizations abroad



252 approvals products in 57 countries

Product	No. Reg.	Product	No. Reg.	Product	No. Reg.
Heberbiovac HB	67	Hebervital	11	Heberprot-P	24
Heberon Alfa R	61	Heberitro	7	Trivac HB	4
Heberkinasa	22	Quimi-Hib	16	Acuabio 1	1
Hebermin	14	Gavac	4	Heberprenta-L	4

Vaccines, drugs and other products commercialized

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Range of Products Developed

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Me too

Biosimilars

Innovative

Products

Innovative

Projects

Biopharmaceutical Projects

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Project	Indication	Therapeutic Area	Laboratory	Development	Phase I	Phase II	Phase III
CIGB 300: Proapoptotic peptide that acts on phosphorylation mediated by CK2	Cervical Cancer	Oncology					
Heberprot-P: Recombinant human epidermal growth factor, for scarring	Diabetic foot ulcer	Diabetes and scarring					
Nasvac vaccine: Therapeutic recombinant vaccine	Chronic hepatitis B virus infection	Viral diseases					
CIGB 845: Neuroprotective agent	Neuroprotection	Neurology					
Heberprovac: Prostate Cancer Vaccine	Prostate cancer	Oncology					
Heberferon: Pharmaceutical formulation for parenteral use containing IFN alpha2b and gamma. Antiviral action.	COVID-19	Viral diseases					
Nasalferon: Nasal pharmaceutical solution, containing recombinant human interferon alpha 2b	Prophylaxis of SARS-CoV-2 virus infection	Viral diseases					
Heberferon: Pharmaceutical formulation for parenteral use containing IFN alfa2b and gamma. Anti-tumor action	Basal cell carcinoma	Oncology					
CIGB 247: Active Immunotherapy for Cancer Treatment	Ovarian cancer	Oncology					
CIGB 814: Deadly type of modified peptic ligament	Rheumatoid arthritis	Autoimmune diseases					

…….. continued https://www.cigb.edu.cu/en/project_category/bioph_project

Innovative product

Heberprot-P ®

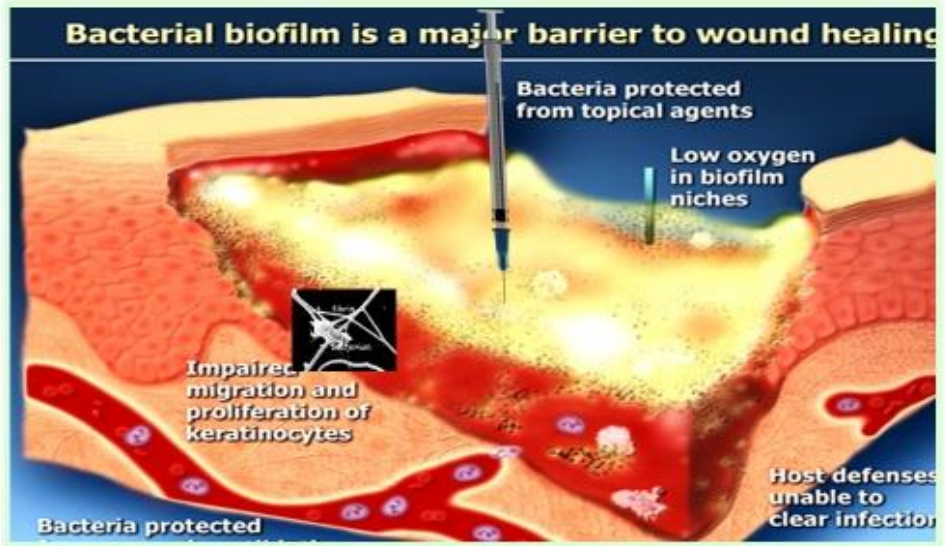
CIGB CENTRO DE INGENIERÍA GENÉTICA Y BIOTECNOLOGÍA

Recombinant human Epidermal Growth Factor (EGF)

Worldwide unique product for the treatment of patients with advanced diabetic foot ulcers with high risk of amputation.

Patents Granted: United States, European Union, Australia, Hong Kong, Singapore, South Korea, South Africa, Russia, China, India, Indonesia, Ukraine, Mexico, Malaysia and Cuba.

RATIONALE OF HEBERPROT-P INFILTRATION METHOD



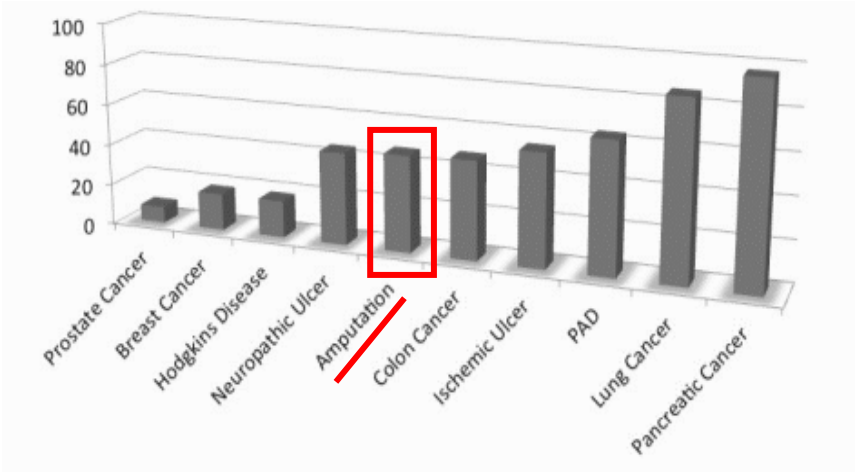
Severe DFU is also a life-threatening problem, greater than some types of cancer

15% of diabetic patients would be affected by DFU

30% of DFU patients never healing the ulcer with standard therapy

15% of DFU patients would be amputated as consequence of the DFU

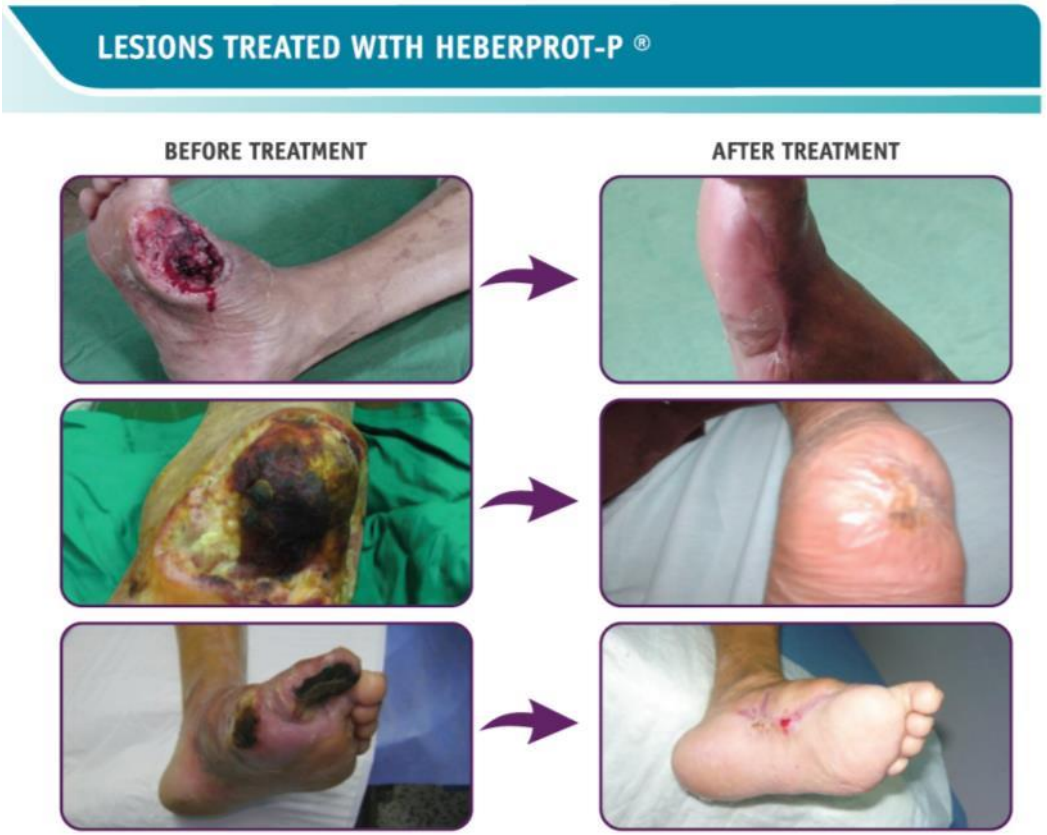
50% of amputee patients died in 5-year, one of the most severe conditions



Heberprot-P ®

CIGB CENTRO DE INGENIERÍA GENÉTICA Y BIOTECNOLOGÍA

For effective healing of diabetic foot ulcers (DFU)



Market Authorization in 28 countries.
More than 390,000 patients treated in Cuba and abroad.

Diabetes and Diabetic Foot Ulcer

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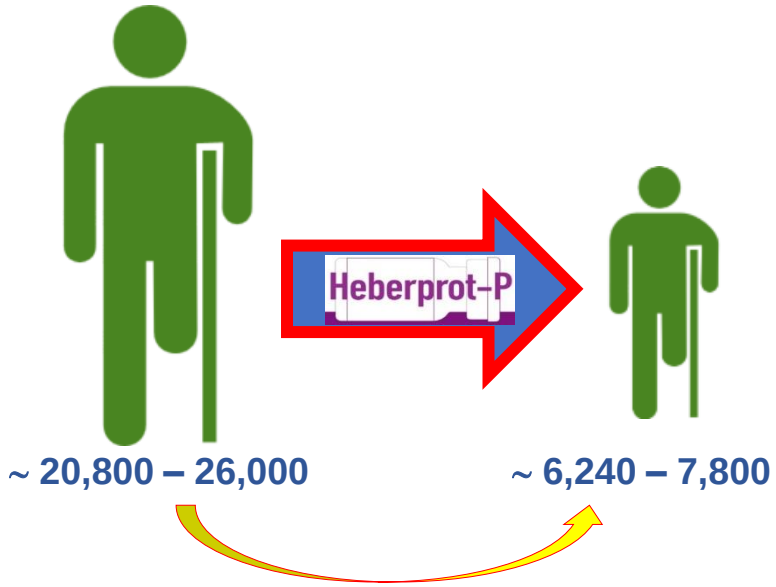
IRAN

	Population	Diabetic Adults	Amputations	Rate
USA	320,000,000	33,000,000	153,000	0.005
France	68,000,000	2,331,123	8,509	0.004
Italy	60,000,000	2,450,000	8,943	0.004
Greece	11,000,000	405,000	1,478	0.004
Iran	85,000,000	5,200,000 ★	20,800 *	0.005
			26,000 *	0.004
		DFU-related deaths	2,080 – 2,600 *	

★ *Diabetes in Iran: Prospective Analysis from First Nationwide Diabetes Report of National Program for Prevention and Control of Diabetes:* https://www.nature.com/articles/s41598-017-13379-z

* *Estimated*

~ **57 – 71 DFU amputations/day in Iran**



An national Heberprot-P program covering the whole population of advanced DFU patients in Iran might putatively save every year:

- ~ 14,000 – 20,000 lower limbs
- ~ 1,450 - 1,820 lives

Innovative product

HeberFERON

Treatment for non-melanoma skin cancer

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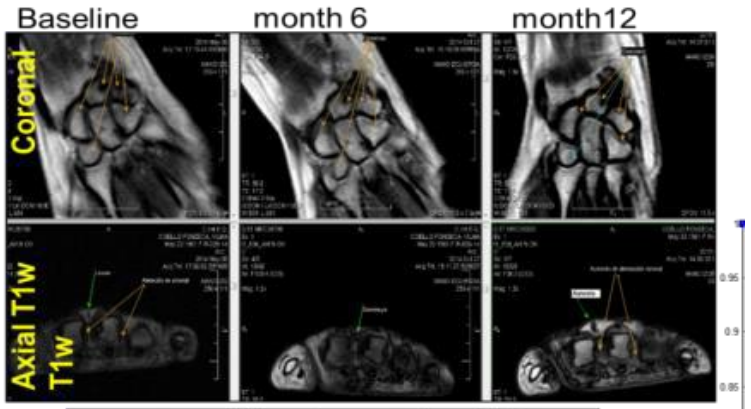
Innovative project

CIGB 814

For rheumatoid arthritis treatment

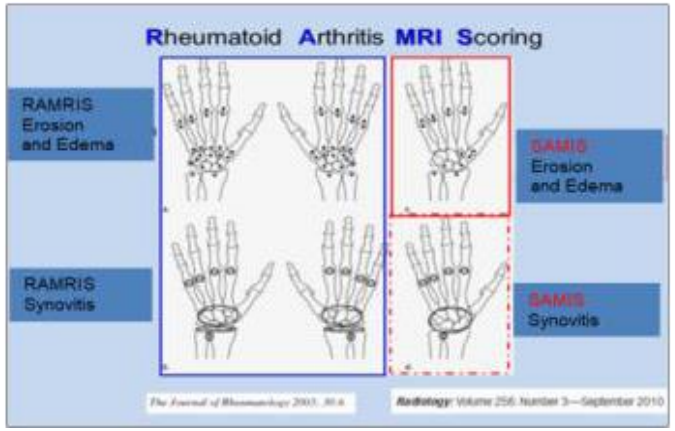
Current status: clinical trial phase II

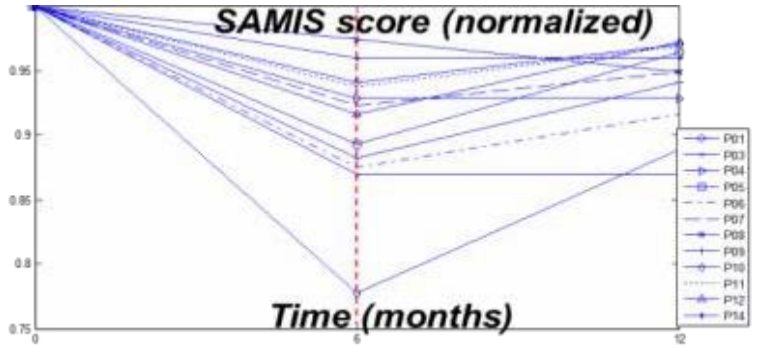
Clinical Trial assisted by Magnetic resonance imaging



Finding	T_o	%	T_f	%
Edema	10	58.8	5	29.4

13 patients out of 18 improve their score



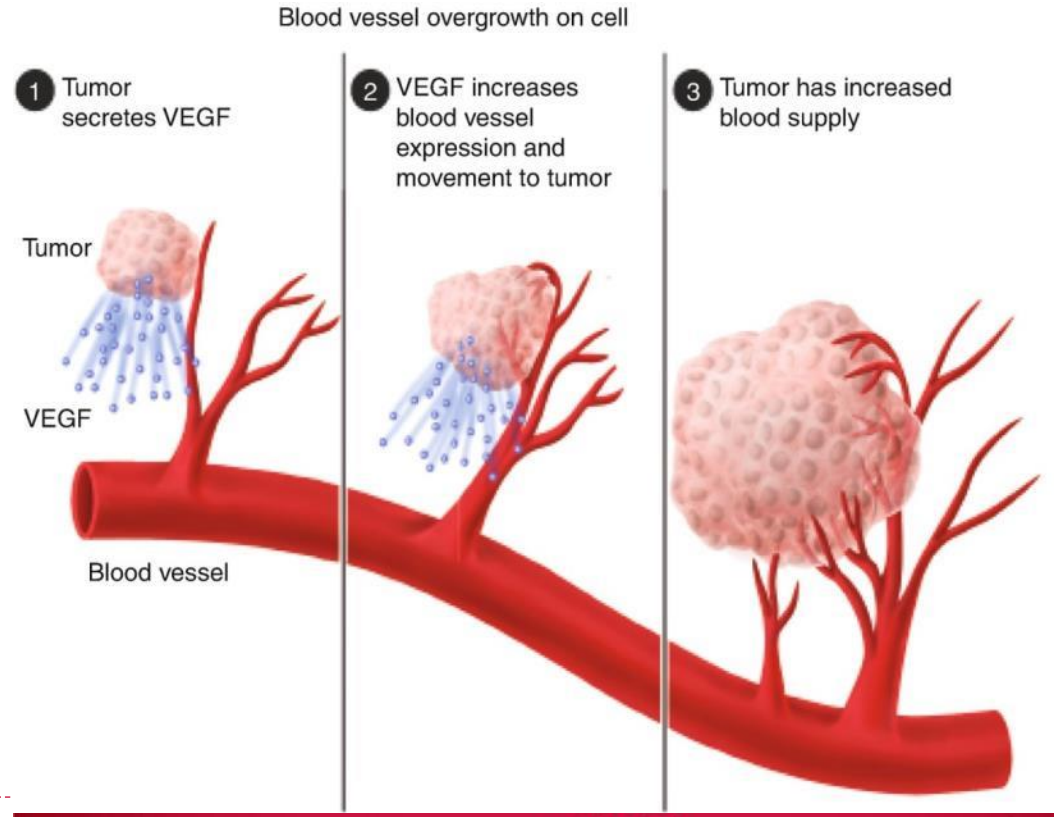


Innovative project

HeberSaVax

mediates humoral and cellular responses in cancer indications

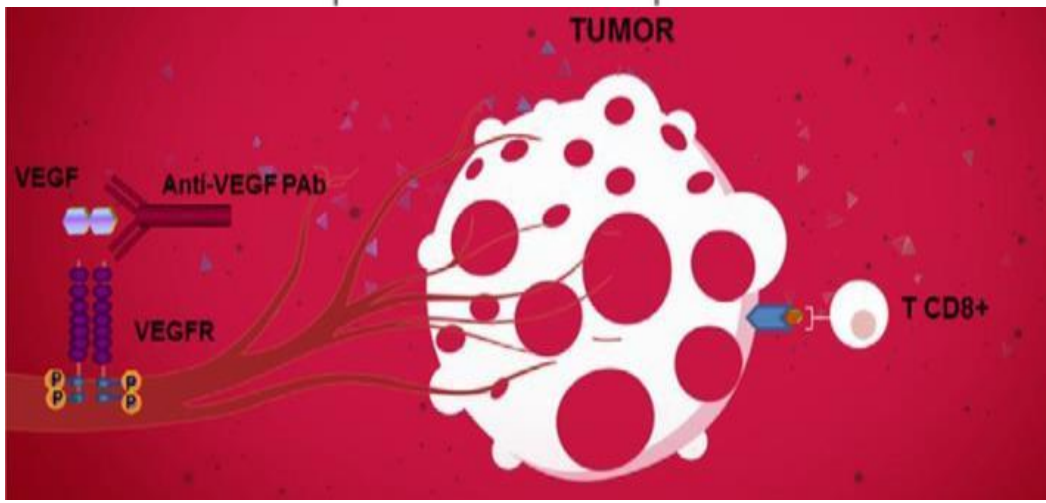
Current status: Clinical trial phase II



VEGF is overexpressed through the whole tumor “life cycle” and metastasis appearance and with bad patient prognosis.

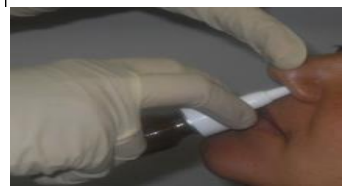
HeberSaVax induces anti-VEGF antibodies that block VEGF-VEGFR2 interaction and inhibit the pro-angiogenic and immune suppressive effects of this growth factor.

Activates cytotoxic T cells that kill tumor and other tumor strotmal cells that produce VEGF. The effector CD8+ T cells recognize major histocompatibility complex (MHC) class I binding VEGF-peptides expressed in tumor cells.



HeberNASVAC

Novel therapeutic vaccine for **Chronic Hepatitis B**



Composition:

HBsAg (adw2 subtype, *Pichia pastoris* expressed recombinant antigen)
HBcAg (183 aa full antigen, produced in *E. coli*)
Simple mixture in saline phosphate buffer.

Immunol and Cell Biol (2004)

- Both Nasvac antigens are VLP

HBsAg: high lipid content
HBcAg: super-antigen, containing bacterial nucleid acid (ARN)

- Both antigens form aggregates, that are in the range from 20 to 120 nm, with a mean size of 55±5 nm.
- This vaccine is for intranasal administration exploiting the immune resources presented at mucosal tissues.

Granted Marketing Authorization in Cuba

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Proctokinase

Treatment of Hemorrhoids with Recombinant Streptokinase Suppository

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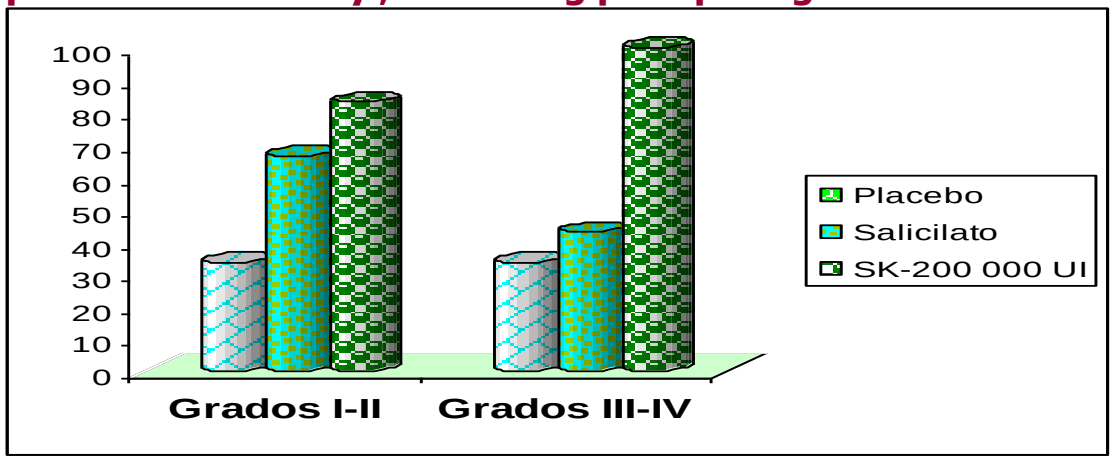
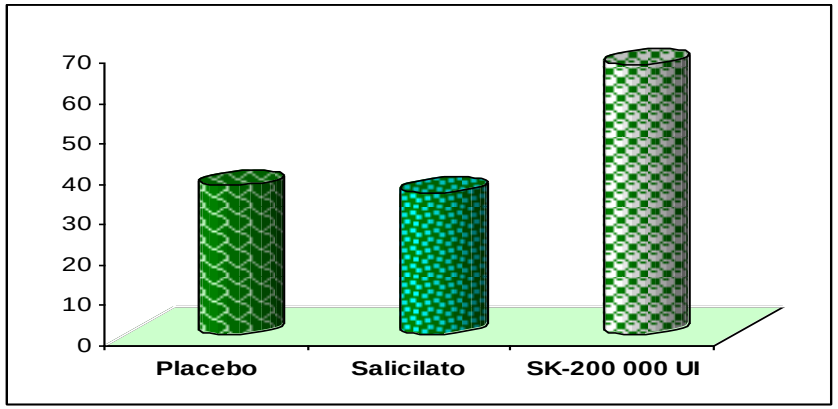
Hemorrhoids are one of the rectal pathologies with the highest worldwide incidence, 50 % of people with more than 50 years old will develop hemorrhoids.

Total response after 5to day , according prolapsus grade



Differences between Proctoquinasa (SK 200 000 UI) vs. Placebo, in III-IV Grades.

Total response at day 5th



Difference between Proctoquinasa (SK 200 000 UI) vs. Placebo.

COVID-19 Therapeutic products

Heberon Alfa R

Injectable recombinant interferon alpha

Covid positive patients, early stage.

HeberFERON

Combination of recombinant human interferon alpha 2b and gamma

Covid positive patients, early stage.

Nasalferon

Nasal recombinant interferon alpha

Persons in risk, and COVID-19 positive patients, early stage.

Jusvinza

Anti-inflammatory peptide

Persons with COVID-19 in serious/critical condition.

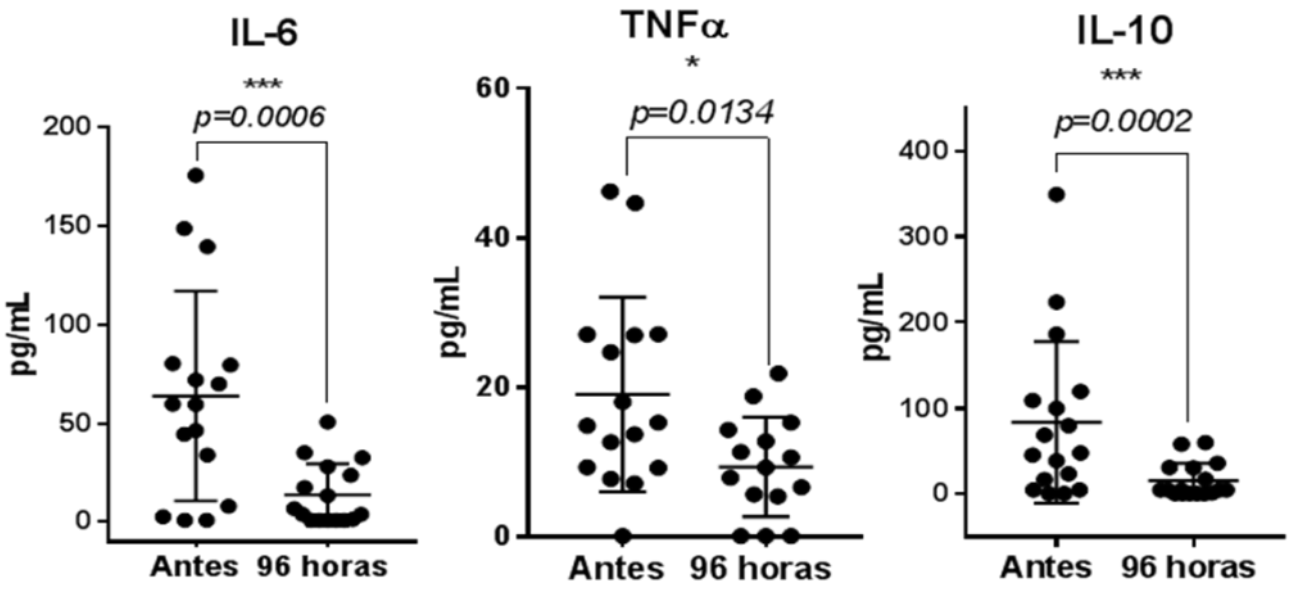
Anti-inflammatory peptide for the treatment of COVID-19 patients in serious/critical condition

Jusvinza

Jusvinza reduces citoquine levels associated with hyperinflammation in COVID-19 patients

Granted **Emergency Use Authorization** in Covid-19 by the Cuban Regulatory Agency (CECMED)

Molecular and cellular characterization molecular of Jusvinza effect on COVID-19 patients



Anti-inflammatory peptide for the treatment of COVID-19 patients in serious/critical condition

Jusvinza

- The use of **Jusvinza** in the national COVID protocol has been crucial in mortaility reduction
- More than 6,000 COVID patients treated

Obstetric

In ICU N = 124

- Crítical condition: 60
- Serious condition: 64
- Death : 16

Recovered: 108 (87,09 %)

Pediatric

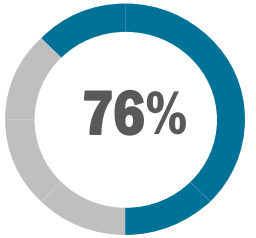
In ICU N = 118

- Death: 4 (3 PCR -)

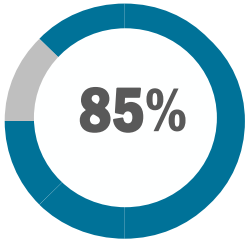
Data from the Ministry of Health

(January – August 2021)

ICU patients	Treated with Jusvinza	Recovered
871	**676**	**575**



Pacients treated with Jusvinza



Pacients recovered

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Nasal recombinant interferon alpha, for persons in risk and early stage COVID-19 positive patients

Nasalferon

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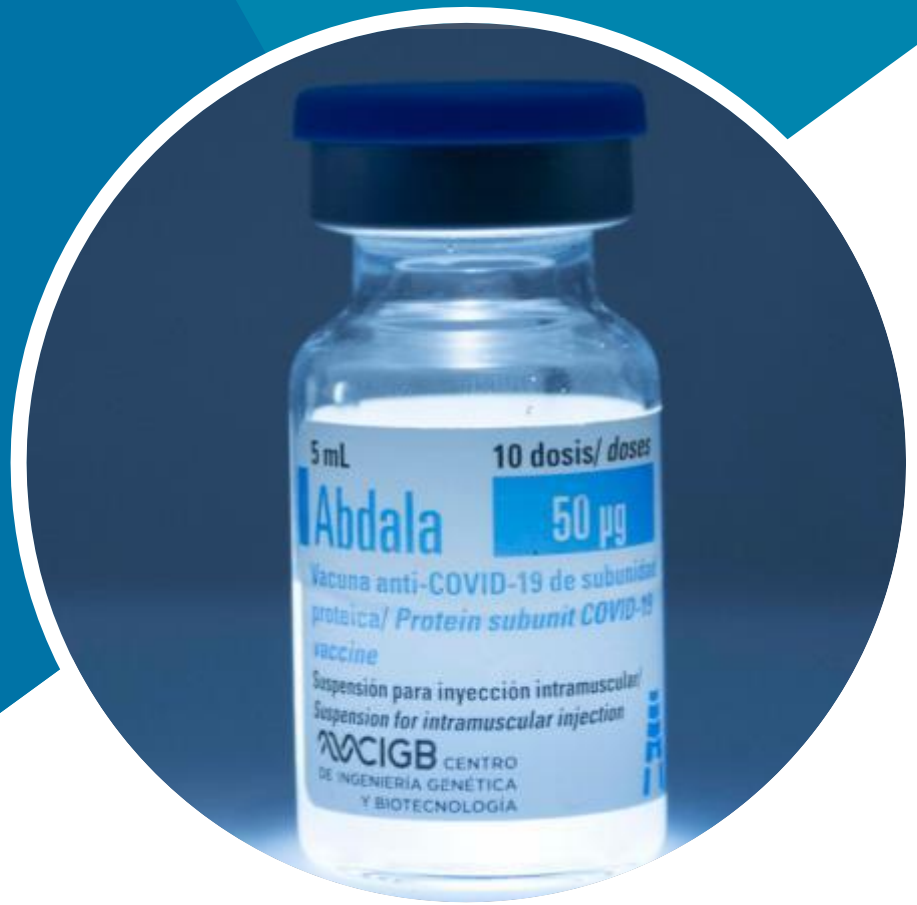
More than 1 million units delivered to the Ministry of Health



Abdala the first Latin American vaccine against COVID-19

CIGB CENTRO DE INGENIERÍA GENÉTICA Y BIOTECNOLOGÍA

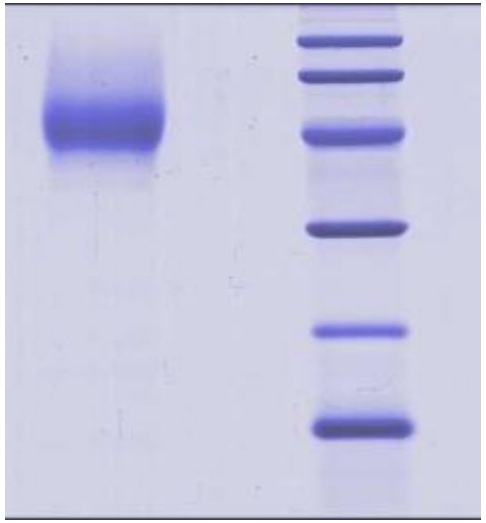
- CIGB has wide experience in the production of vaccines, including those based on subunit proteins (VPs).
- VPs are safe, non-toxic, without risk of pathogenicity.
- VPs are very stable, storage and cold chain during vaccination do not need freezing.

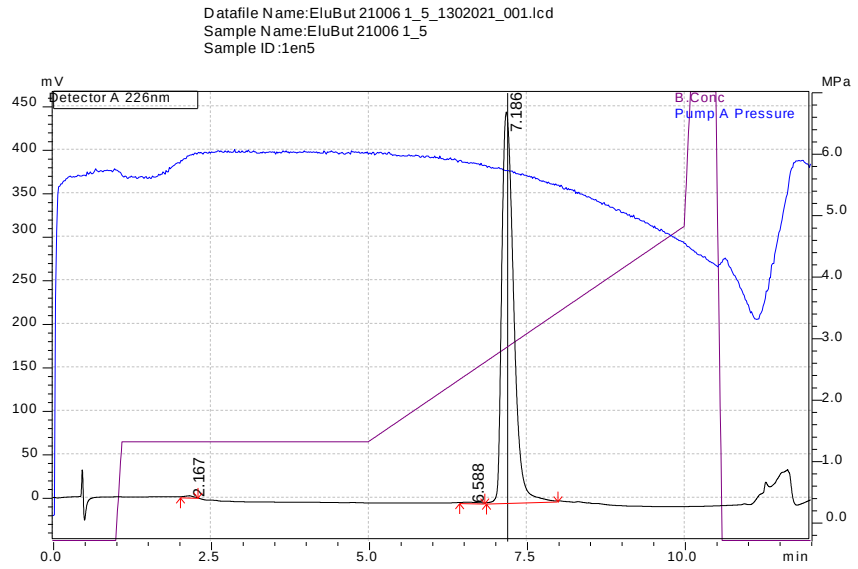
CIGB CENTRO DE INGENIERÍA GENÉTICA Y BIOTECNOLOGÍA

Abdala

COVID-19 vaccines

- **Abdala** is based on the receptor binding domain (RBD) of the spike protein of the SARS-CoV-2 virus. Abdala's production platform is based on *Pichia pastoris* yeast, which has been used in the Heberbiovac HB® preventive recombinant vaccine against the hepatitis B virus, registered in more than 30 countries and certified by the WHO.
- **Patent Number:** CU 2020-0081 “Proteína quimérica que comprende el dominio de unión al receptor de la proteína de la espiga de coronavirus y composiciones que la comprenden”. Submission Date: 4.11.2020





Abdala: Three doses, efficacy 92.28%

EMERGENCY USE AUTHORIZATION (EUA)

Product with **Emergency Use Authorization** granted by the Center for State Control Of Medicines, Equipments and Medical Devices (Cuban Regulatory Authority, CECMED). Date of issue: July 9, 2021.

Pediatric application extended use from 2 years old.
Date of issue: October 27, 2021.

BOOSTER DOSE

Authorization for the administration as a **booster dose**, starting 6 months after completing the immunization scheme against COVID-19 approved in Cuba.

EFFICACY

92.28 % against symptomatic COVID-19.

100 % at preventing the severe systemic disease.

100 % at preventing death in immunized patients.

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Safety, Immunogenicity and Efficacy

Phase III clinical trial, multicenter, placebo-controlled, randomized and double-blind in order to evaluate the efficacy. More than 48,000 subjects enrolled.

Summary of Clinical Trials

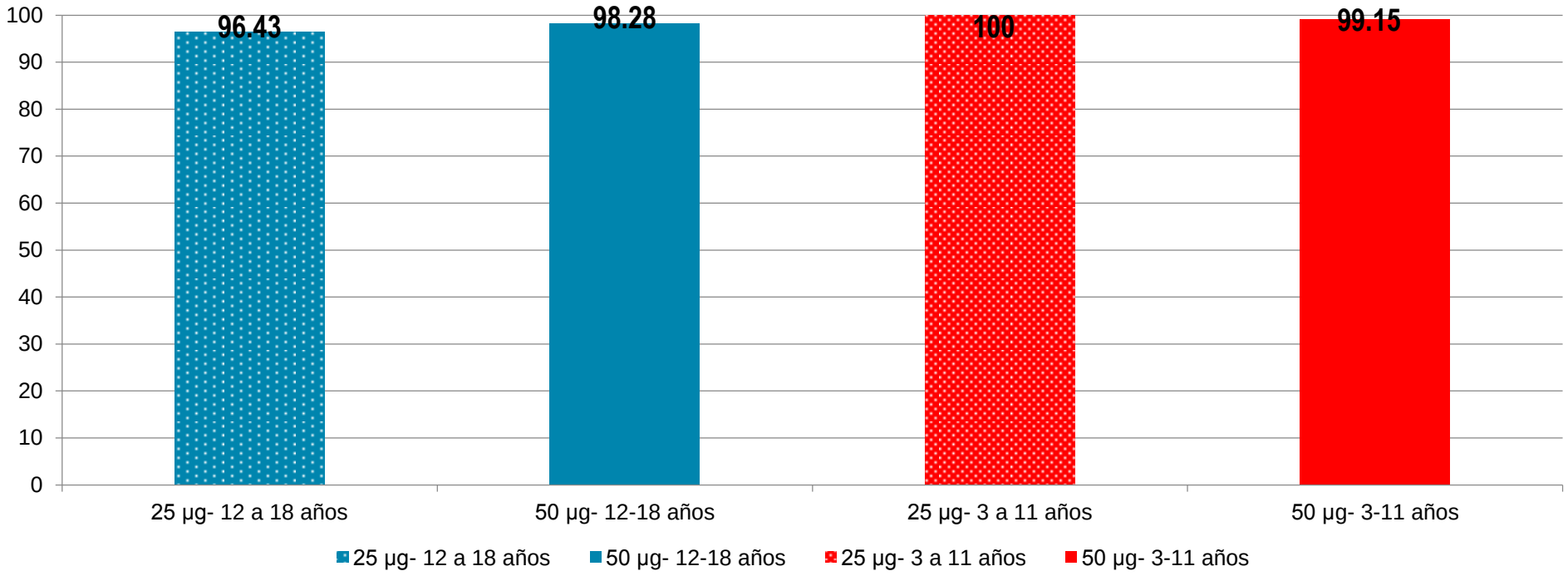
Study Name Trial Registration	**Phase Type (primary outcome)***	**Location**	**Participants & Ages eligible**	**Groups of study**	**Schedule**	**Start day/ Status**
Abdala Phase I/II RPCEC 00000346	Phase I/II Randomized, double blinded, placebo controlled trial Safety and immunogenicity	Cuba (Santiago Cuba province)	Phase 1: 132 healthy participants 18-54 years	6 groups of 22 volunteers receiving 25 µg/50 µg/placebo in two immunization schedules (1:1:1:1:1:1)	Three groups receiving 3 dose at 0-14-28 days and the 3 other at 0-28-56 days	Started: Dec 7, 2020 **Complete**
			Phase 2: 600 healthy participants 18-80 years	3 groups of 220 volunteers receiving 25 µg/ 50 µg/ placebo (1:1:1)	3 doses at 0-14-28 days	Started: February 7, 2021 **Complete**
Abdala Phase III RPCEC 00000359	Phase III Multicenter, randomized, double blinded, placebo controlled trial Safety and efficacy	Cuba (Santiago Cuba/ Granma /Guantanamo provinces)	48 290 participants 18-80 years	2 groups of volunteers receiving 50 µg/ placebo (1:1)	3 doses at 0-14-28 days	Started: March 22, 2021 **Complete***
Ismaelillo RPCEC 00000381	Phase I/II Multicenter randomized, double blinded, Safety and immunogenicity	Cuba (Camaguey province)	Phase I: 88 healthy children 3-18 years	2 groups of volunteers receiving 25 µg/ 50 µg (1:1)	3 doses at 0-14-28 days	Started: July 15, 2021 ***Complete***
			Phase II: 504 healthy children 3-18 years	2 groups of volunteers receiving 25 µg/ 50 µg (1:1)	3 doses at 0-14-28 days	Started: July 26, 2021 ***Complete***

Emergency Use Authorization on July 9th, granted by Cuban NRA: CECMED

- ✓ **More than 30 million doses had been delivery to MOH**

- ✓ Studies of interventions in high risk cohorts such as pregnancy woman
- ✓ Population intervention in groups and territories of risk
- ✓ Massive vaccination

In children high percentages of SEROCONVERSION (main variable of the study)



Seroconversion: Increase in anti-RBD IgG antibody titers 4 or more times from baseline before vaccination

✓ The hypothesis for the main variable of immunogenicity is fulfilled in both strata, with no significant differences between the study groups in this variable.

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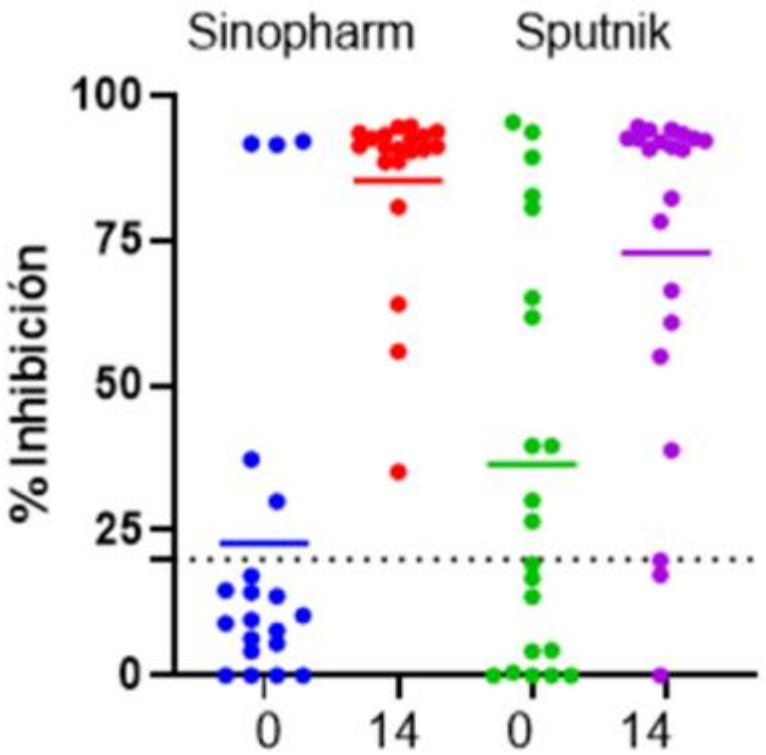
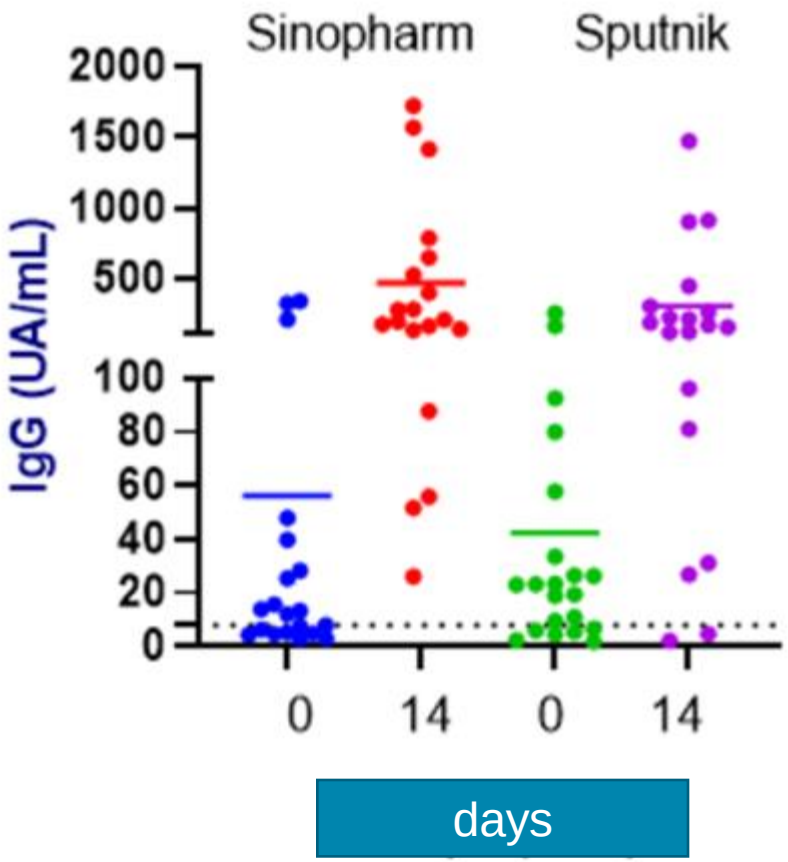
Y BIOTECNOLOGÍA

Abdala response durability and as a booster to others vaccines

Abdala as a booster of subjects immunized with Sputnik and Sinopharm vaccines





CIGB CENTRO DE INGENIERÍA GENÉTICA Y BIOTECNOLOGÍA

MINISTERIO DE SALUD PÚBLICA
República de Cuba

ABDALA Covid-19 Vaccine Timeline

- **April 2020** — Research project start.
- **Dic 2020** — Phase I clinical trial.
- **Feb 2021** — Phase II clinical trial.
- **Mar 2021** — Phase III clinical trial.
- **Jun 2021** — Efficacy results (92.28%).
- **Jul 2021** — Emergency Use Authorization granted.
- **Jul 2021** — Massive vacunation start.
- **Oct 2021** — 40 MM doses produced.
- **Oct 2021** — Authorization for children.
- **Oct 2021** — Effectiveness results in Havana.
- **Nov 2021** — Booster shot authorization granted.
- **Nov 2021** — 8 MM people vaccinated, 24 MM doses.

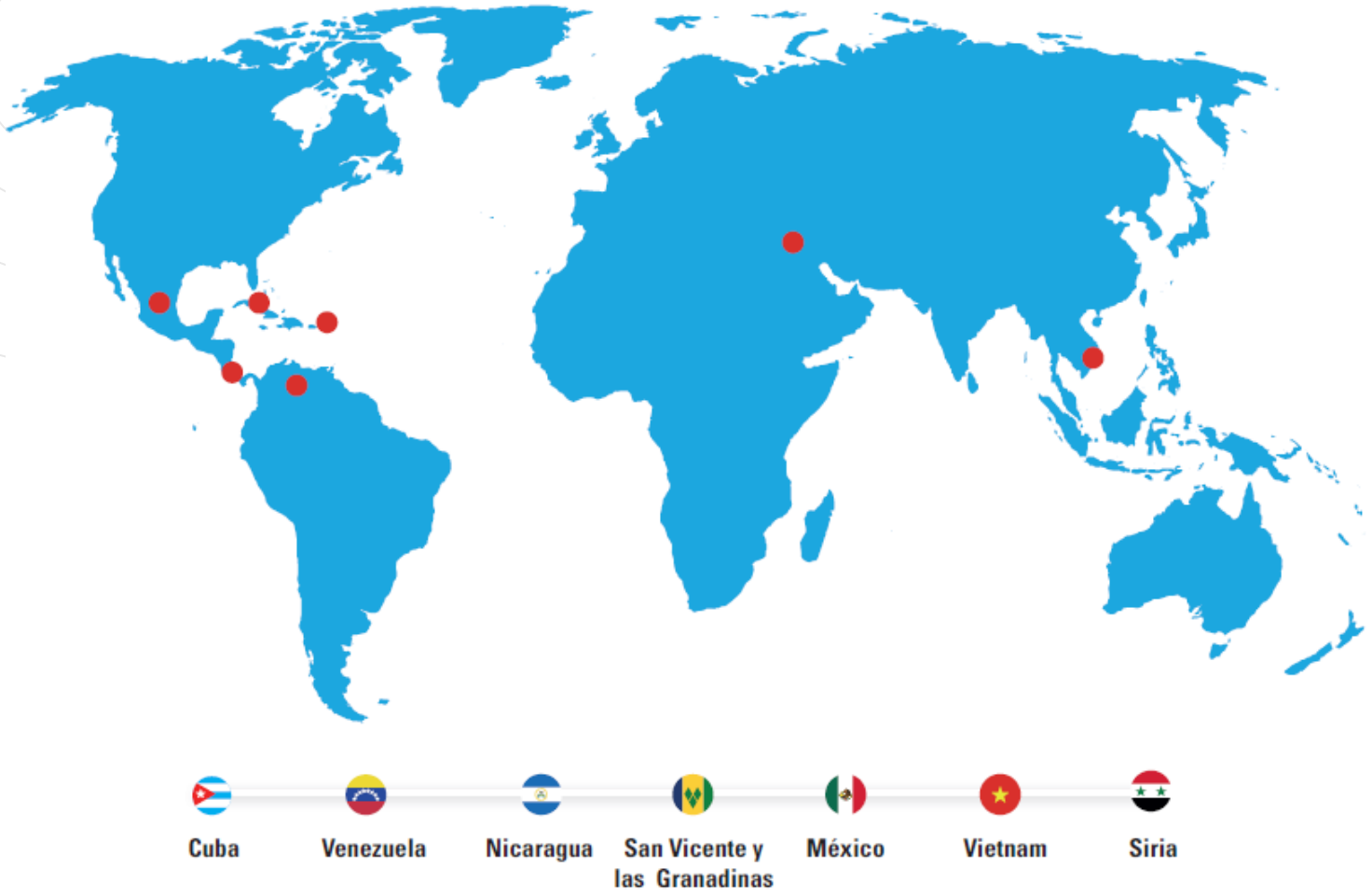
Effectiveness study, Havana
August 5 – 31
(1,665,228 persons)

Abdala		Serious, Critical	Death
EFFECTIVENESS AGAINST SERIOUS/CRITICAL DISEASE AND DEATH	CI 95%	92,0 (88,4-93,5)	90,7 (88,4-93,5)

Siempre por la vida

CIGB CENTRO DE INGENIERÍA GENÉTICA Y BIOTECNOLOGÍA

Abdala: Granted emergency use authorization in several countries and massively used in vaccination campaings abroad.



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Abdala

Mambisa

CIGB CENTRO DE INGENIERÍA GENÉTICA Y BIOTECNOLOGÍA

First nasally-administered COVID-19 vaccine candidate

- Recent publications in important scientific journals in the world, as well as relevant international immunology specialists, have pointed out the great prospects and potential advantages of nasal vaccines to combat the COVID-19 pandemic. However, currently there are only 11 vaccine candidates in clinical research phases with the intention of being used by nasal administration, among which **Mambisa** has been recognized.
- **Mambisa** vaccine candidate is one of the immunogens for nasal use against COVID-19 with the most advanced research at this time in the world, endorsed of high security because it is based on protein antigens produced on a platform with a history of safe and effective use for over 25 years.

Mambisa: nasally-administered COVID-19 vaccine candidate

RELEVANT FEATURES

- Stimulates immunity in the nasal passages, site of entry of SARS-CoV-2 virus.
- Based on recombinant proteins produced in a safe and effective technological platform in use for over 25 years.
- First protein vaccine candidate for nasal use against COVID-19 that began a phase of clinical studies in humans in the world.
- Induce immunological response both at mucosal and systemic level
- Booster for convalescent subjects only one dose.
- Booster dose for other vaccines.
- IMPD is already submitted to the NRA
- It is a combination of two recombinant proteins: the RBD protein from the spike of the SARS-CoV-2 virus, and the protein from the nucleocapsid of the hepatitis B virus.
- Previous research by the CIGB has shown that the protein from the hepatitis B virus nucleocapsid has a powerful adjuvant effect in stimulating nasal immunity, which led to its use in the production and sanitary registration of the HeberNasvac therapeutic vaccine against hepatitis B in 2015.

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Project portfolio, animal biotechnology

Project	Therapeutic Area	Research	Phase I	Phase II	Phase III	Record
CIGB-552vet	Veterinary					
Acuabio IV	Aquaculture					
Cunvac: Recombinant vaccine candidate against rabbit haemorrhagic disease	Veterinary					
Salvac: Vaccine candidate against sea lice, an ectoparasite of salmonids	Aquaculture					
P0 vaccine: Protein-Based Tick Vaccine Candidate	Veterinary					
Vaccine candidate for biological immunocastration	Veterinary					
Antimicrobial peptides	Veterinary					

https://www.cigb.edu.cu/en/project_category/vet_project/

Acuabio V

Aquatic species growth and health booster

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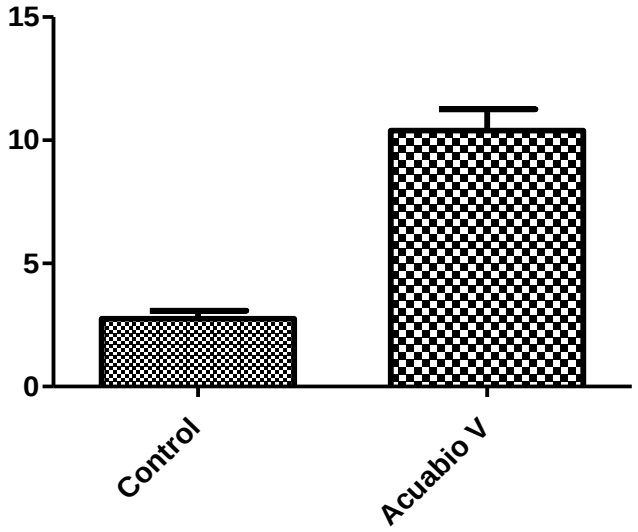
Impact of Acuabio V application on shrimp post-larvae

P<0.0001



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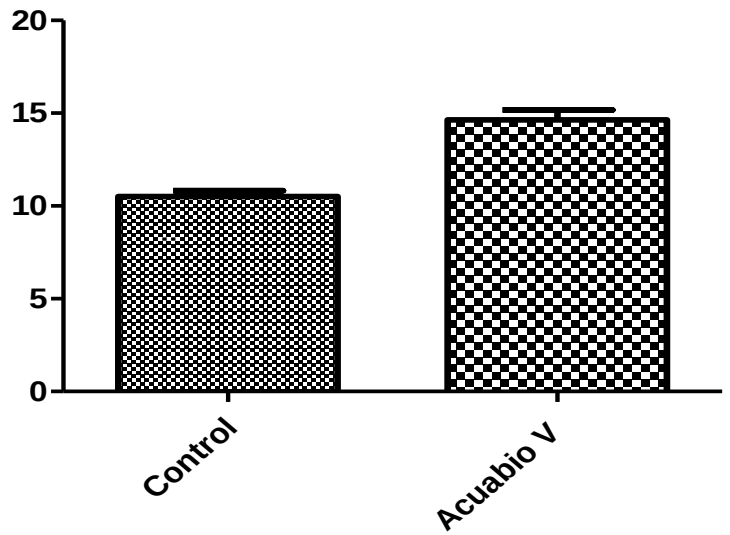
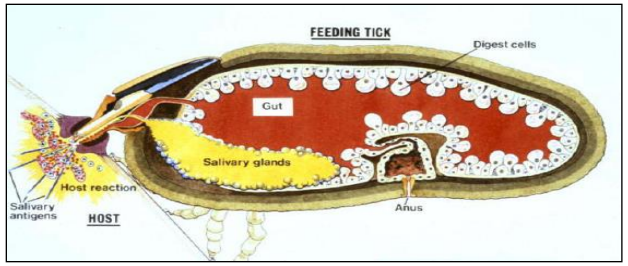


Granted MA in Cuba

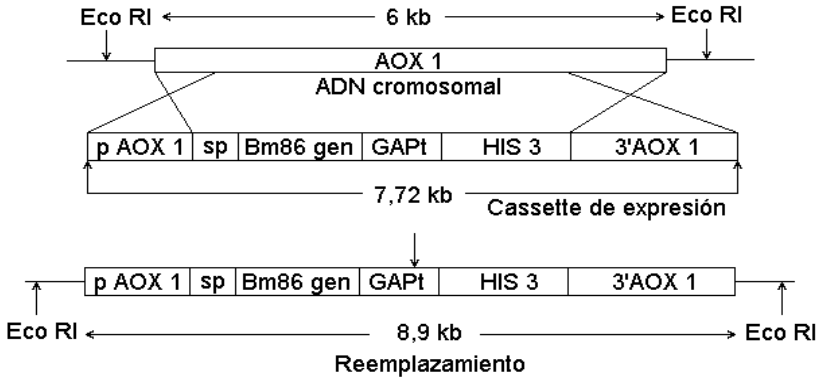
GAVAC: Vaccine against ticks

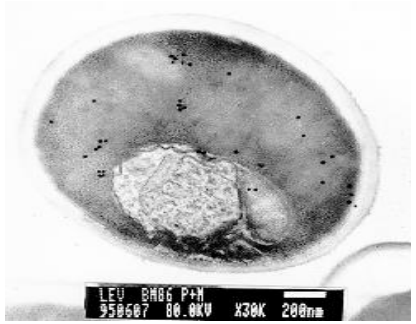
CIGB CENTRO DE INGENIERÍA GENÉTICA Y BIOTECNOLOGÍA

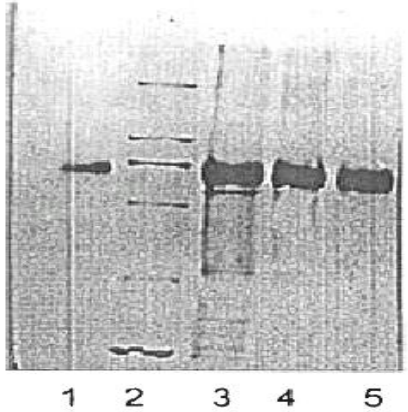


Bm86 gene obtained from gut of *Rhipicephalus microplus* tick

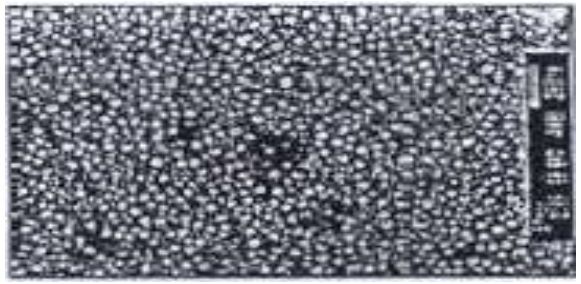
Inserted in *Pichia pastoris* strain







Bm86



GAVAC

Granted MA in Cuba and several countries

P0, a new antigen against ticks

CIGB CENTRO DE INGENIERÍA GENÉTICA Y BIOTECNOLOGÍA

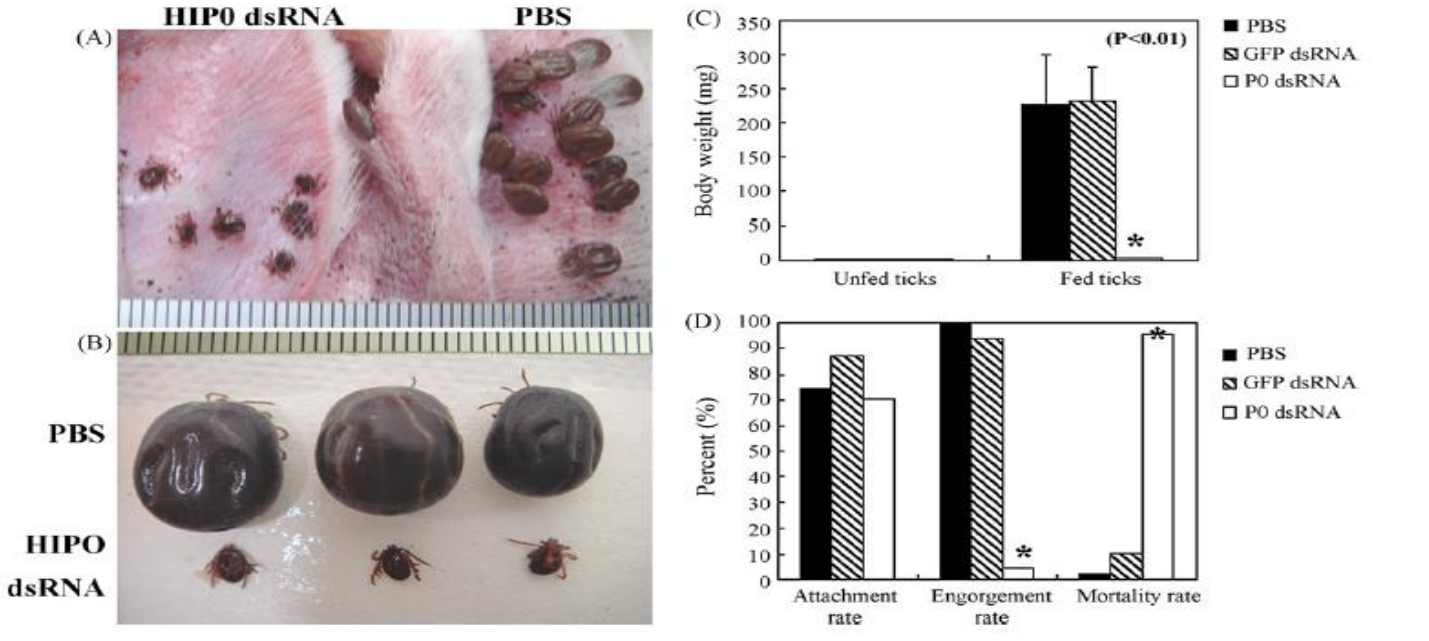
RNA interference in *Haemaphysalis longicornis* tick

PO is a protein (a ribosome structural component), essential for cell viability, present in all organisms.

Available online at www.sciencedirect.com
ScienceDirect
Veterinary Parasitology 151 (2008) 268–278
veterinary parasitology
www.elsevier.com/locate/vetpar

Gene silencing of ribosomal protein P0 is lethal to the tick *Haemaphysalis longicornis*

Haiyan Gong[a], Min Liao[b], Jinlin Zhou[a], Tekeshi Hatta[a], Penglong Huang[a], Guohong Zhang[a], Hirotaka Kanuka[a], Yoshifumi Nishikawa[a], Xuenan Xuan[a], Kozo Fujisaki[a,b,*]



Project portfolio, plant biotechnology

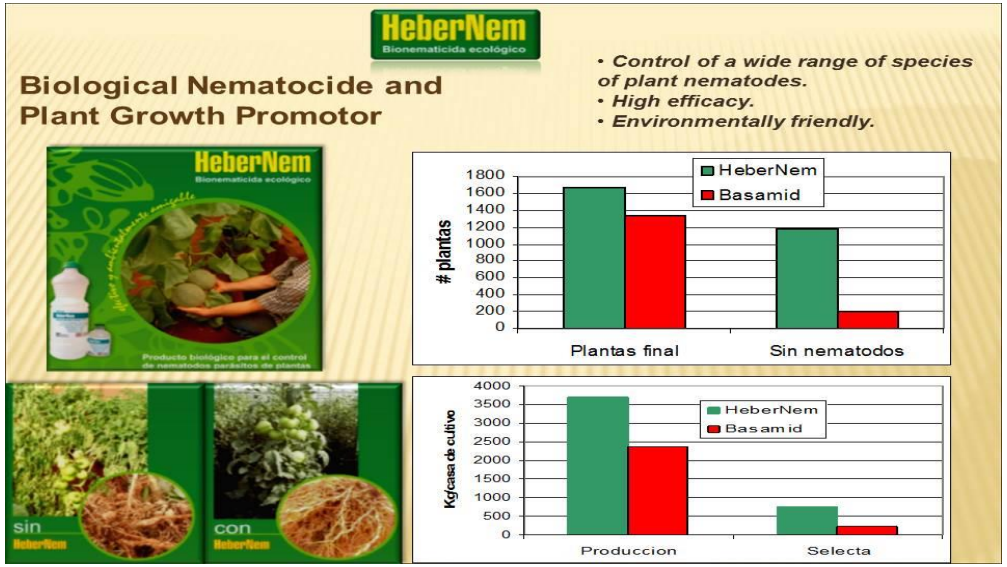
Project	Therapeutic Area	Research	Pilot scale development	Field trials	Record
Genetic improvement of maize with biotechnological tools to sustainably increase yields in Cuba	Agriculture				
Highly thermostable biocatalyst enzymes for the production of invert syrup from sucrose	Industrial enzymes				
Obtaining soybean plants that carry the nmdef02 defensin gene and its evaluation against the Phakopsora pachyrhizi fungus	Agriculture				
Plants as bioreactors	Agriculture				
CIGB-42: for the control of infectious diseases in plants	Agriculture				
Control of geminivirus diseases in plants	Agriculture				
Transgenesis in plants	Agriculture				

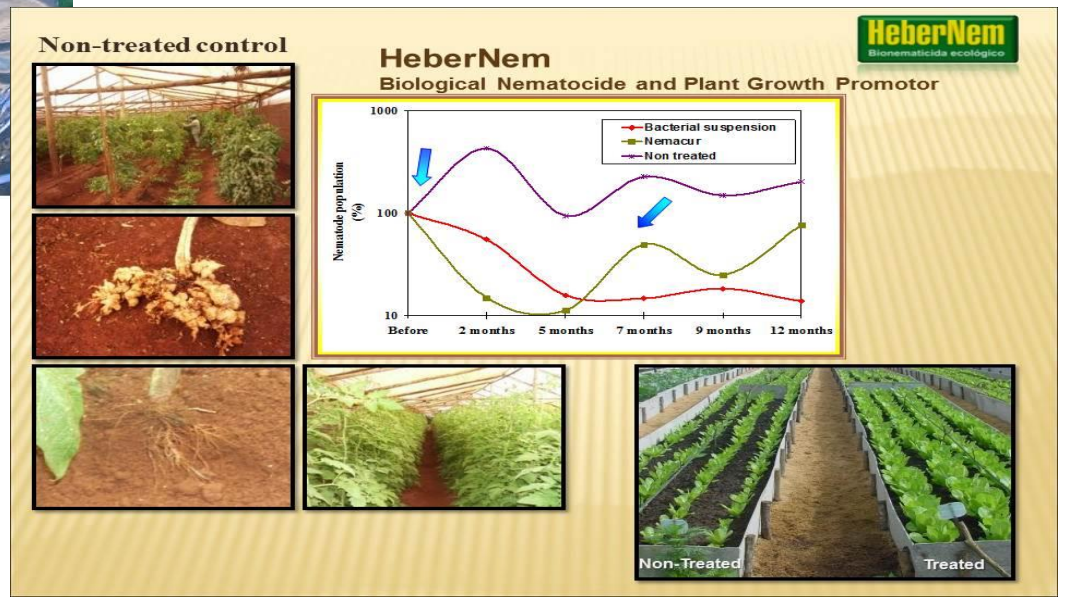
https://www.cigb.edu.cu/en/project_category/agricultural_project/

CIGB CENTRO DE INGENIERÍA GENÉTICA Y BIOTECNOLOGÍA

HeberNem

an effective biocontrol of nematodes and a biofertilizer





- Greater effectiveness than other biological control methods and comparable to chemical nematocides.

-Scalable for industrial production .

- Broad spectrum of action against nematode species and effective against larvae and eggs.

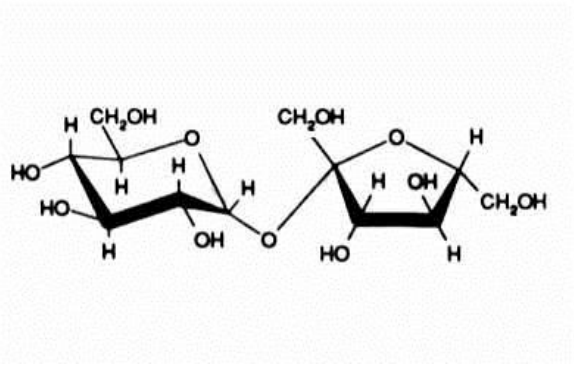
- Compatible with other biologicals and chemicals.

-Environmental friendly biological control and...

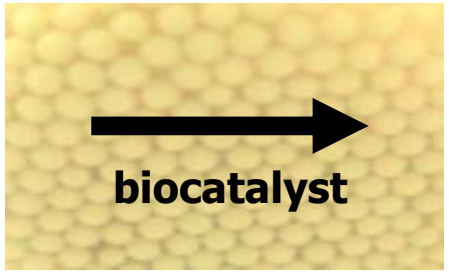
-Also a growth promoter.

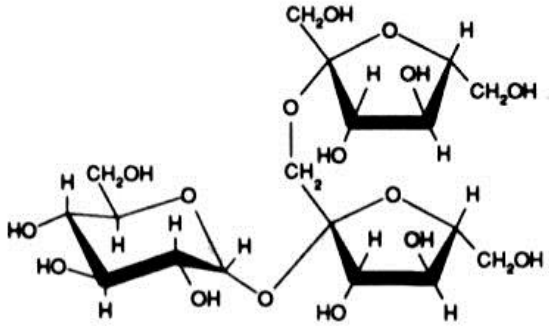
CIGB CENTRO DE INGENIERÍA GENÉTICA Y BIOTECNOLOGÍA

Enzymatic Technology for FOS* Production from Sucrose



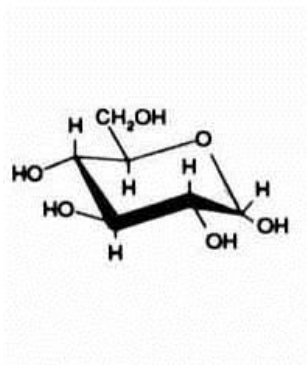
sucrose + sucrose





1-kestose
(natural prebiotic)

+



glucose

IGB CENTRO DE INGENIERÍA GENÉTICA Y BIOTECNOLOGÍA

* FOS = fructo-oligosaccharides

Natural ways of FOS (inulin) consumption

Onion (2.8%), Garlic (1.0%), Barley (0.7%) Banana (0.3%), others

Vegetarian diet ⇒ ≤ 2 g fructans / day

Alternative ways of FOS (inulin) consumption

1) Ingredients of functional foods (with/without probiotics) (yogurt, ice cream, confectionery, soft drinks, infant formulas, etc)


2) Dietary complement or medical treatment (w/o probiotics)

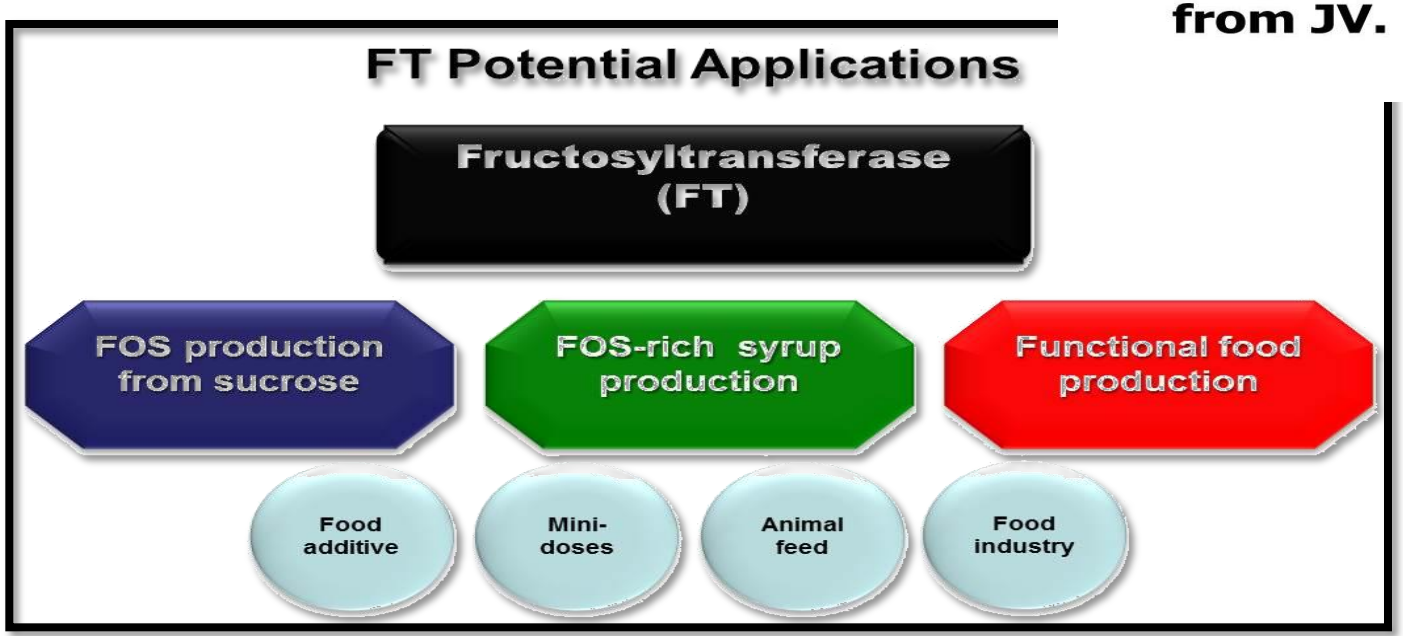
Humans
Minimal effective dose: 5 g/day
Average prebiotic dose: 5-10 g/day
Digestive tolerance: >40 g/day

100g $7.05


140g $15

½-1 tea spoon 2-4 times a day

FT Potential Applications



The CIGB technology permits:

- **High FOS yield** ($GF_2 \geq 50\% + GF_3 \sim 5\%$)
- **Concentrated reaction** (initial sucrose 55-60ºBx)
- **Conversion factor** (0.55 kg FOS / kg sucrose)
- **High specific activity** (≥ 1000,000 u / L of culture)
- **High productivity** (275 kg FOS / L FT/day)
- **Short-time reactions** (20 h, 2 u/g de sucrose)
- **Operation at 30-40ºC, pH=6**
- **Large-scale supply of enzyme from JV.**

CIGB CENTRO DE INGENIERÍA GENÉTICA Y BIOTECNOLOGÍA

New CIGB production facilities in Mariel Special Development Zone

Industrial Biotecnológico
CIGB-MARIEL S.A.

New CIGB production facilities in Mariel Special Development Zone

Industrial Biotecnológico
CIGB-MARIEL S.A.

THANKS!