PTVB
Posgrado Tecnológico en Vacunas y Bioterapéuticos

Ciencia y Tecnología
Secretaría de Ciencia, Humanidades, Tecnología e Innovación

@PTVB_IPN

Graduate Program in Science and Technology of Vaccines and Biotherapeutics

Training technologists for the development of vaccines and biotherapeutics since 2022

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UNIVERSITY OF CALIFORNIA
ALIANZAMX

Who Are We? The Instituto Politécnico Nacional

- **Established on January 1, 1936, during President Lázaro Cárdenas del Río's administration.**
- For the 2023-2024 academic year, the IPN has an enrollment of approximately 216,000 students across various educational levels.
- **Educational levels:** The IPN serves students across three educational tiers:
  - High School
  - Undergraduate (60 programs)
  - Postgraduate (153 programs)
- With 90 academic units located in 36 municipalities across 23 states in Mexico, the IPN has a significant national footprint, extending quality education and research opportunities throughout the country.

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Why do we needed a program like this one?

- **Technological gap in the region:** Mexico and Latin America face a significant gap in the development and production of vaccines and biotherapeutics, which limits their autonomy and ability to respond to health crises.

- **Urgent demand for specialists:** There is a critical need to train highly skilled technologists who can develop, innovate, and transfer technology in Mexico and in the region.

- **Lack of specialized programs:** There was no other program with a comprehensive approach to training technologists in this field.
  This hinders the strenghtening of companies in the field which in turn may limit the supply of vaccines and biologics.

What are our differentiators?

- **Training of technologists with a strong scientific foundation**
- **Multi-campus structure** (ENCB, UPIBI, ESM, ESIME-Z, CICATA-M)
- **Mandatory technological internship** (industry, laboratories, government)
- **Annual conferences on selected topics with renowened speakers**

Integration into real-world work environments: Students are immersed in national and international companies and laboratories where technology-based projects take place. This experience enables them to leverage intellectual property protection opportunities upon program completion, facilitating the commercialization of vaccines and biopharmaceuticals as market-ready products.

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Technological Internship

Technological Internships

Technological internships are designed for students to develop research projects, technological innovation, for the implementation of health regulations in research laboratories, pharmaceutical companies, or regulatory agencies specialized in vaccines and biotherapeutics, both in Mexico and abroad.

Duration of Internships

- **Master's degree:** minimum 5 weeks, maximum 6 months.
- **Doctoral degree:** minimum 12 weeks, with no maximum duration.

Current agreements

La Jolla Institute for Immunology (LJI).
Sanofi-Mexico
Liomont

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Research areas

1: Vaccine and Biotherapeutic Design
Research, proof-of-concept, and early development of new vaccine and biotherapeutic candidates.

2: Preclinical Development
Experimental validation of biosafety and preclinical trials of vaccine or biotherapeutic candidates.

3: Production and Scaling-up
Process engineering and pharmaceutical technology for the manufacturing of vaccines and biotherapeutics.

4: Clinical Studies and Pharmacovigilance
Partner with companies to train our students in clinical trials and monitors post-marketing safety.

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Key Milestones of the PTVB Program

2022

Creation of the PTVB Program

2022

Incorporation into the National Postgraduate System (SNP)

2023

Start of Technological Internships at The Jolla Institute for Immunology

2024

First Master's Graduate of the Program

2025

Inernships at national companies

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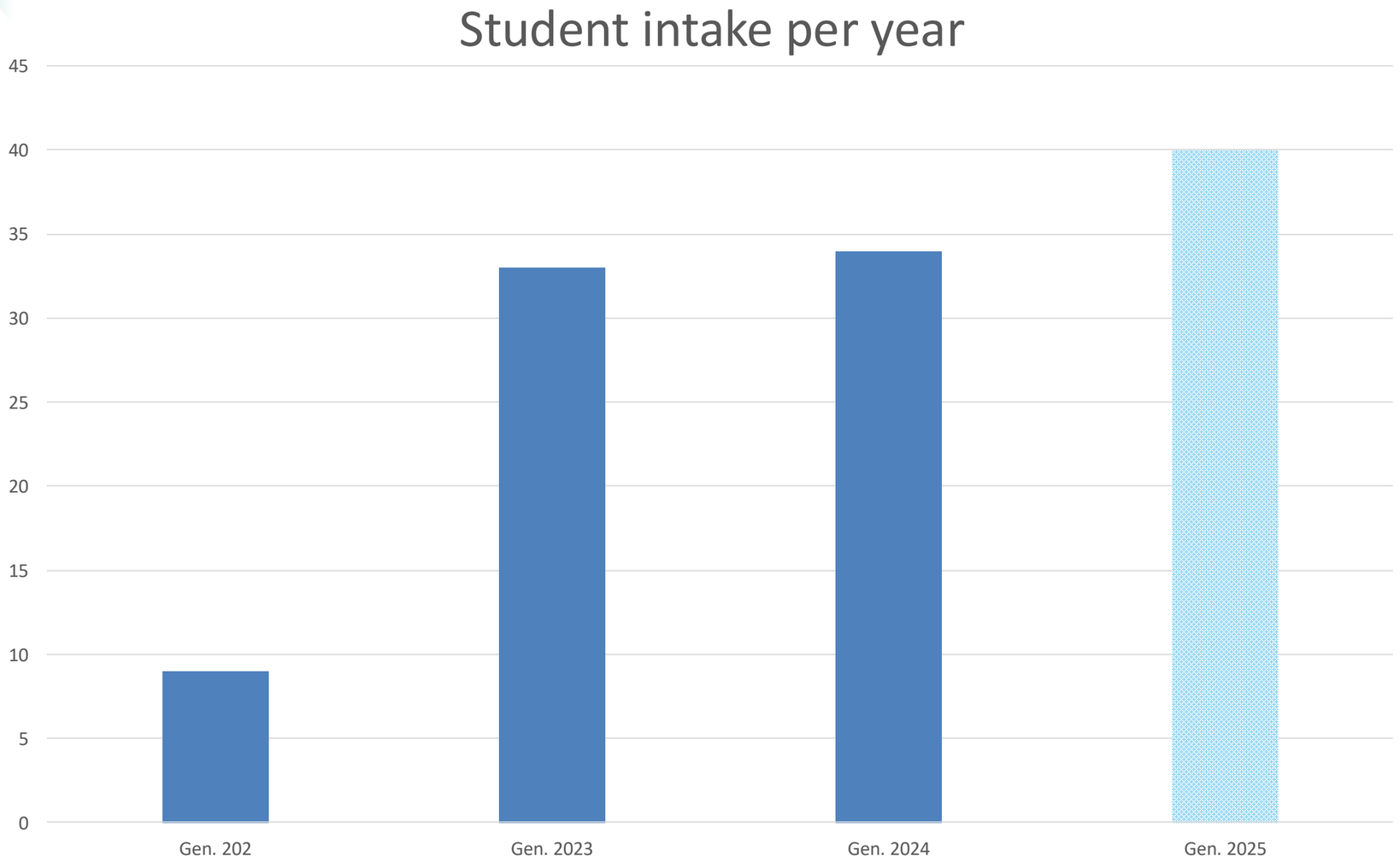
70 students enrolled
6 students have completed the program
By mid 2025 we expect to have 110 students enrolled



Group 1: Vaccines and Adjuvants

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Dr. Abel Antonio Ramos Vega (CICATA-Morelos)

- Development of vaccines against hepatitis B and C viruses.
- Development of new vaccine adjuvants based on plant saponins
- Development of HPV vaccines

Dr. Edgar Cano Europa (ENCB)

- Development of vaccines against *Acinetobacter baumannii*.
- Development of vaccines against *Klebsiella pneumoniae*

Dr. Jesus Agustín Badillo Corona (UPIBI)

- Development of mRNA vaccines against Dengue

Dr. Jesús Miguel Torres Flores (ENCB)

- Development of bacteriophage-based therapies for multidrug-resistant bacterial infections.
- Development of adenoviral vectors for vaccines in non-human primates.

Dra. Ma. Isabel Salazar Sánchez (ENCB)

- Development of vaccines against Zika, Dengue, Yellow Fever.

Group 2: Immunotherapy and Biotherapeutics

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Dr. Fernando Gómez Chavez (ENMyH)

- Production of T-regulatory CAR (T-CAR) cells to address antibiotic hypersensitivity.

Dr. Jesús Agustín Badillo Corona (UPIBI)

- Development of biocomparables (biosimilars).

Dr. Jose Luis Castrejon Flores (UPIBI)

- In silico design and expression of T-cell receptors for cancer therapy.

Dr. Noé Valentín Durán Figueroa (UPIBI)

- Production of nanobodies for various types of cancer.
- Use of microRNAs as theranostic for cancer.

Dra. Sonia Mayra Pérez (ENCB)

- Discovery and engineering of therapeutic antibodies for chronic degenerative and infectious diseases.
- Generation of stable cell lines for recombinant antibody production.
- Preclinical evaluation of biotherapeutics.

Dr. Edgar Salgado Manjarrez (UPIBI)

- Recovery and purification of proteins with therapeutic potential.

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Grup 3: Platforms and genetic tools

Dr. Jesus Agustín Badillo Corona (UPIBI)

- Development of modular cloning kits (MoClo) to produce recombinant proteins (vaccines or biotherapeutics) in prokaryotic or eukaryotic systems.

Dr. Juan Alfonso Beltrán Fernández (ESIME – Z)

- Robotic automation solutions for pharmaceutical packaging.
- Virtual training tools for healthcare personnel.
- 3D printing applications for vaccine development.

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Group 4: Economic Evaluation, Diagnostics, and Regulatory Strategies

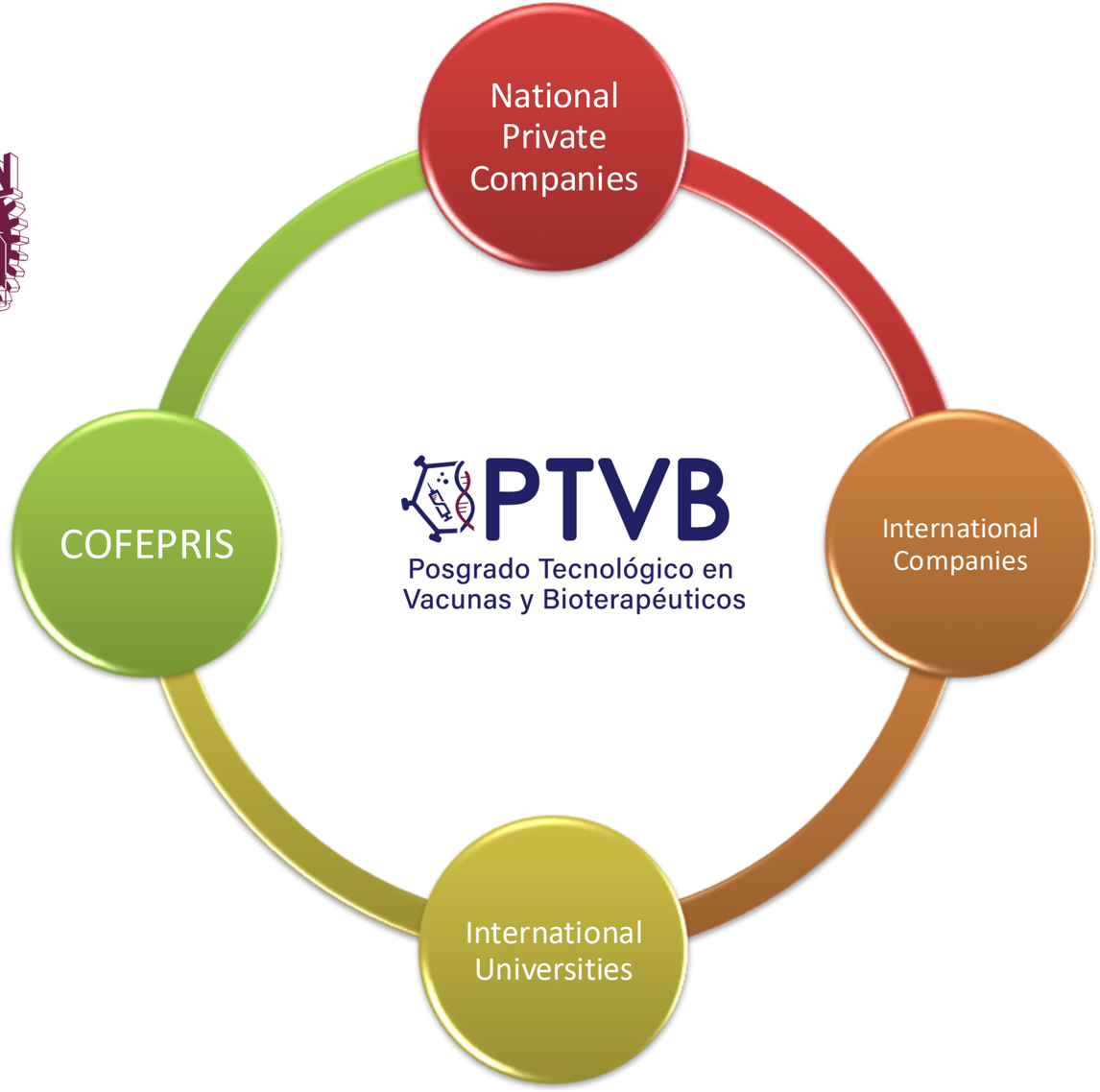
Dra. Sonia Mayra Pérez (ENCB)

- Diagnostic approaches and regulatory strategies to foster the development of biotechnological medicines and vaccines in Mexico and LATAM.

Dra. Vanessa Blas Valdivia (ENCB)

- Systematic reviews and meta-analyses to determine efficacy and safety of biotherapeutics and vaccines.
- Pharmacoeconomic analyses of biotherapeutics aimed at preventing renal damage from catastrophic systemic diseases.

Articulation



COLLABORATIONS

La Jolla Institute FOR IMMUNOLOGY

sanofi

LIOMONT

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