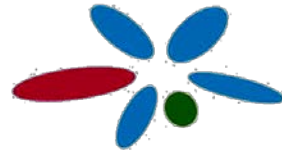


# Programa Cooperación Farma-Biotech

## Jornada IIb: **Oncología**

### Antitumor therapy using dendrimer-delivered siRNA



N a n o **D** r u g s

Madrid, 12 de mayo de 2011

# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

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### Content

## 1. The Company

## 2. The Product

- a) Therapeutic focus
- b) Innovative mechanisms of action
- c) Differential features facing the market
- d) Current status of development
- e) IPR protection
- f) Pitfalls & Risks to be considered

## 3. Availability for cooperation

# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

**NANODRUGS S.L.** [www.nanodrugs.es](http://www.nanodrugs.es)

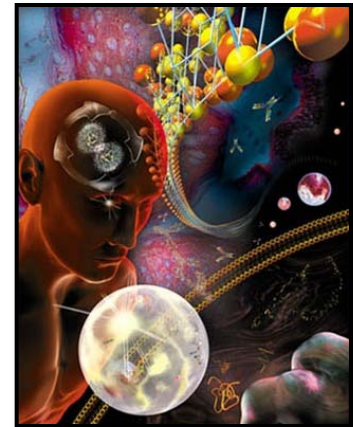
**Created in 2008 as a spin-off from the University of Castilla-La Mancha.**

**Research facilities located at the Technological and Scientific Park in Albacete. Spain.**

# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

***Objective: To generate  
business using  
nanoparticles as  
drug-delivery agents.***



# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### NANODRUGS S.L. Structure

#### SERVICES

- **Clinical Diagnostic**
  - Antiviral resistances
  - DNA sequencing
- **Bioguided Platforms.**
  - Neurodegeneration.
  - Toxicity.
  - Cancer.
  - Inflammation.
  - Neuronal physiology.

#### R+D

- Nanoparticles
- Cancer
- Diabetes
- Neurodegeneration
- Peritoneal dialysis

# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

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### NANODRUGS S.L. Patents.

**Title: Dendrimers as non-viral vectors for gene therapy.**

**Patent file #: P201030322**

**Title: Dendrimers as non-viral vectors for gene therapy.**

**Patent file #: P201030325**

**Título: A peritoneal dialysis fluid containing aliskiren.**

**Patent file #: P201030326**

**Title: Non-viral vectors for gene therapy.**

**Patent file #: P201031204**

**Title: Non-viral vectors for gene therapy.**

**Patent file #: P201031203**

# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

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### NANODRUGS S.L. Patents.

**Title: Dendrimers as non-viral vectors for gene therapy.**  
**Patent file #: PCT/ES2011/070140**

**Title: Dendrimers as non-viral vectors for gene therapy.**  
**Patent file #: PCT/ES2011/070141**

**Título: Peritoneal dialysis solution.**  
**Patent file #: PCT/ES2011/070142**

# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### TRANSGEDEN®. Differential facts.

- It is a new concept to approach cancer therapy.
- There are no products in the market using this technology.
- The “proof of concept” for the mechanisms of action has been already established.



# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### TRANSGEDEN®. Differential facts.

- Patent analysis of the use of nanoparticles in therapeutics show that there are no leaders in this area.
- Literature analysis indicate that TRANSGEDEN® performs better than the described nanoparticles.

# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

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NANODRUGS S.L. The product.

# TRANSGEDEN®

## A therapeutic dendrimer

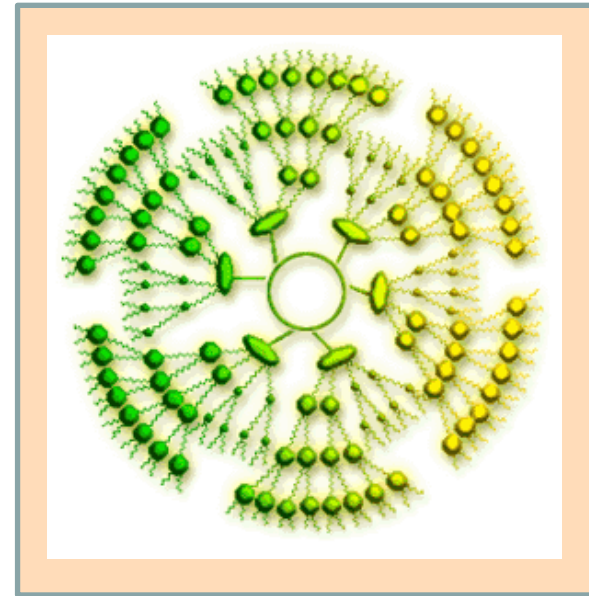
# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### NANODRUGS S.L. The product.

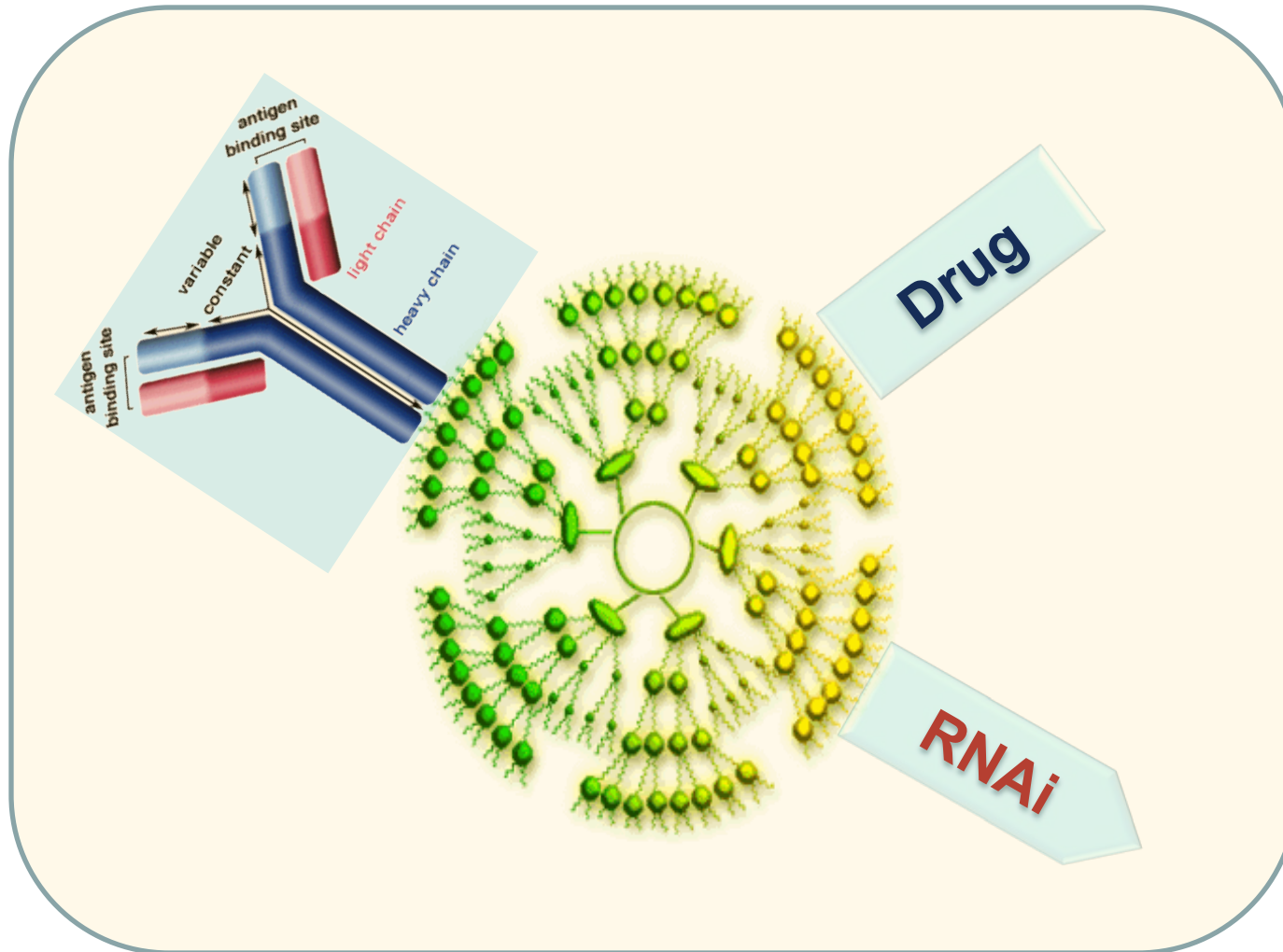
#### What is a dendrimer?

- Polymeric spherical molecule
- Concentric layers.
- Central core.
- Tree-shaped structure
- Many branches
- Used to deliver drugs and genetic material.



# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología



# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### TRANSGEDEN®. Therapeutic focus

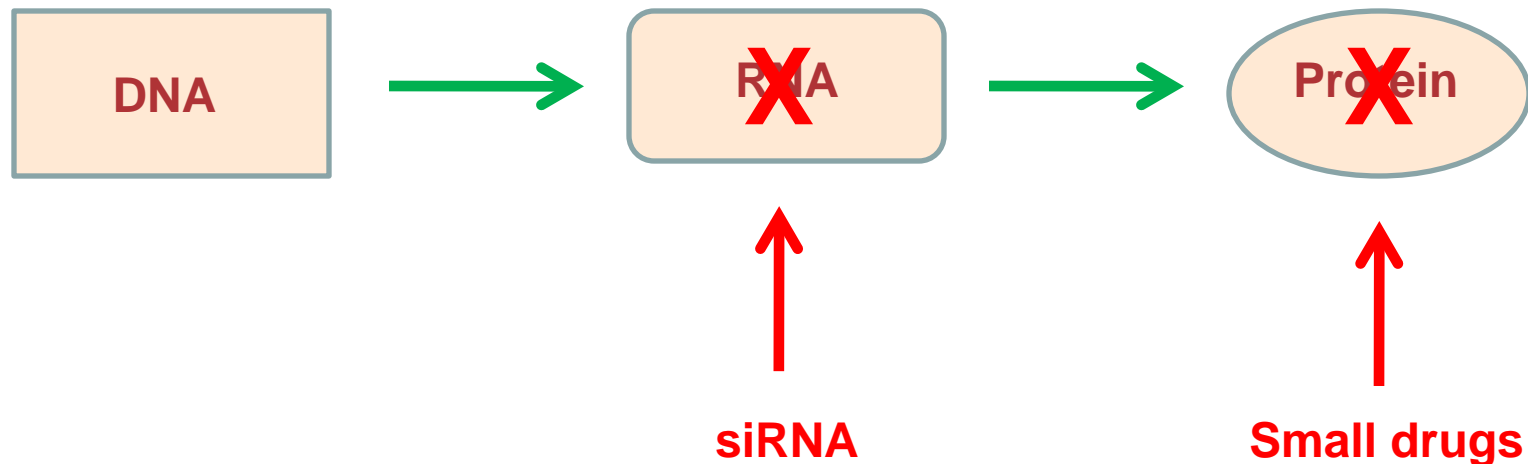
1. Cancer therapy with focus on prostate cancer and glioblastoma.
2. Neurodegenerative diseases.

# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### TRANSGEDEN®. Mechanism of action.

## General Principle of Biology



# Programa Cooperación Farma-Biotech

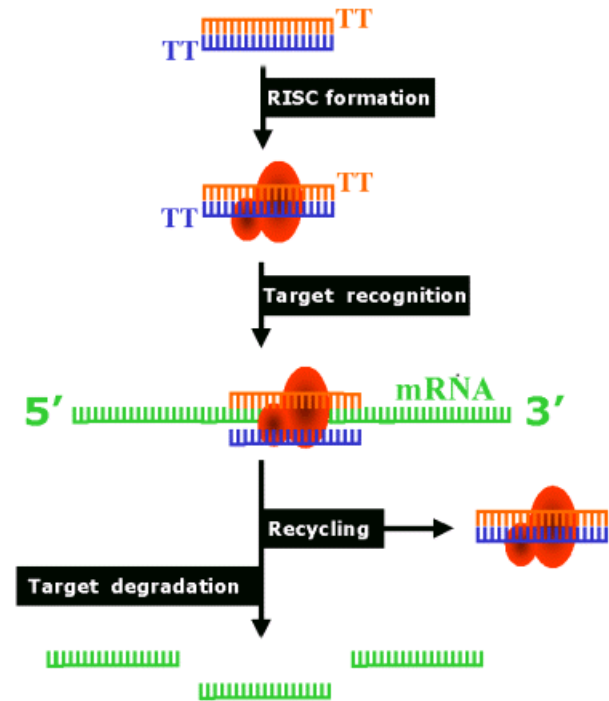
## Jornada IIb: Oncología

### TRANSGEDEN®. Mechanism of action.

#### siRNA:

- is very specific.
- degrades selectively the target mRNA.
- is not toxic.
- but.....

requires delivery into the cell.

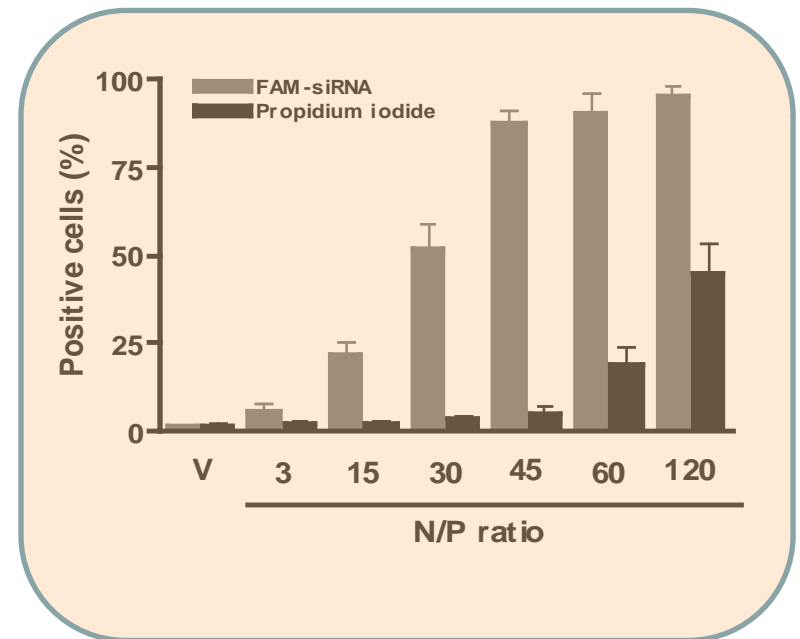


# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### TRANSGEDEN®. Mechanism of action.

**TRANSGEDEN® can incorporate fluorescein-labelled siRNA into prostate cancer PC3 cells and....**



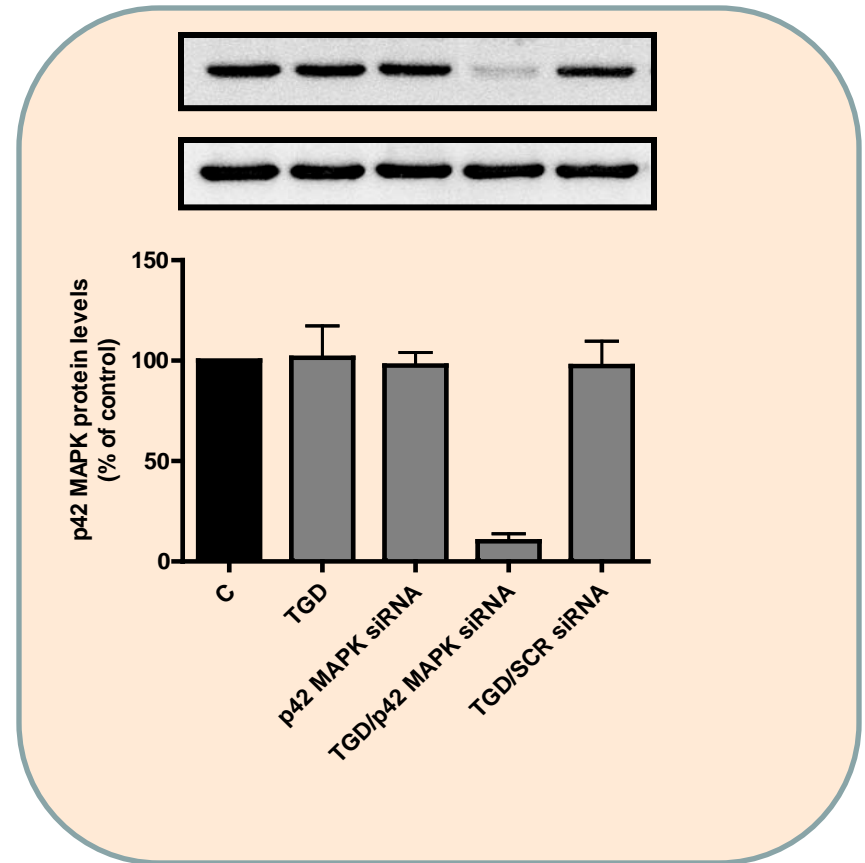


# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### TRANSGEDEN®. Mechanism of action.

...this can eliminate ERK-1 from the cancer cells.

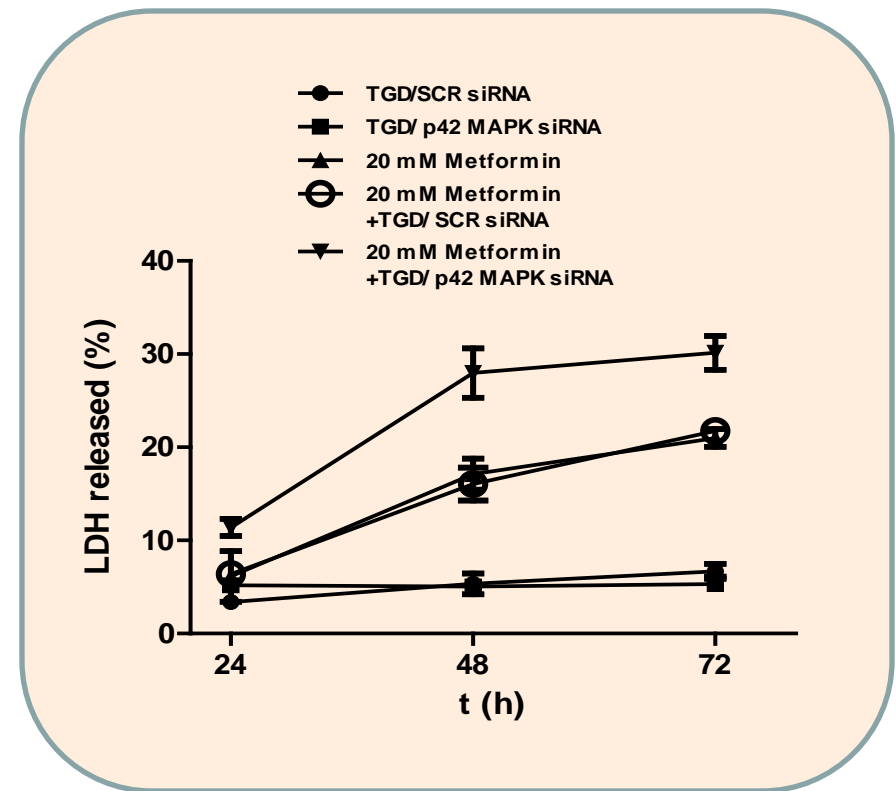


# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### TRANSGEDEN®. Mechanism of action.

**“Proof of concept”:** Removal of a protein involved in cancer proliferation and survival will potentiate antitumoural drug action.



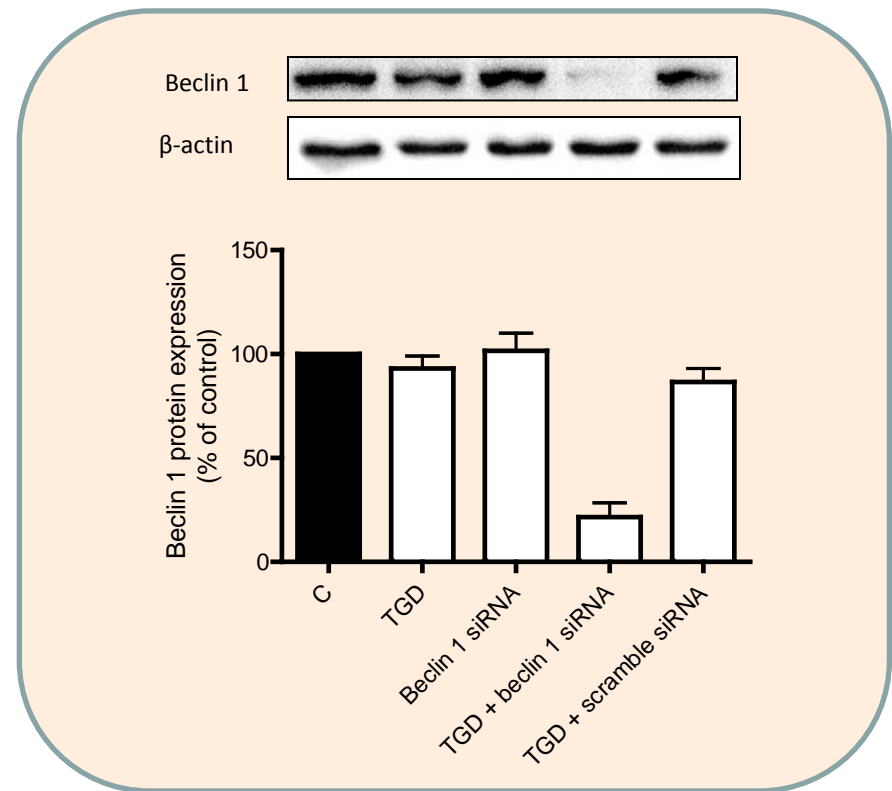
# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### TRANSGEDEN®. Mechanism of action.

But.....

**TRANSGEDEN® also works in neurons.**



# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

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**TRANSGEDEN®.** Mechanism of action.

**TRANSGEDEN® can also deliver small  
molecules and peptides into cancer cells**

# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

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NANODRUGS S.L. The product.

# TRANSGEDEN®

## Present status

# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### TRANSGEDEN®. *In vitro* data.

#### TRANSGEDEN® :

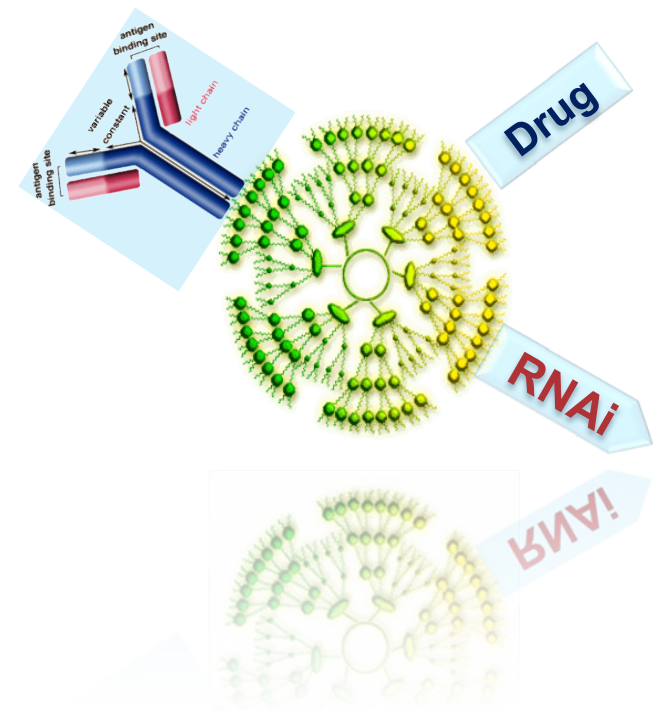
- Lacks toxicity on mammalian cells.
- Delivers siRNA into cancer cells.
- Decreases cellular levels of all proteins studied to 10 to 20% of control values.
- Is as effective in neurons as in cancer cells.

# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### TRANSGEDEN®. *In vitro* data.

➤ Cell-specific targeting to decrease antitumoural drug side-effects is under way.



# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### TRANSGEDEN®. *In vivo* data.

#### TRANSGEDEN® :

- LD50 determined in mice.
- Biocompatible.
- No biochemical acute toxicity observed following 5 daily doses. Chronic toxicity studies are under way.

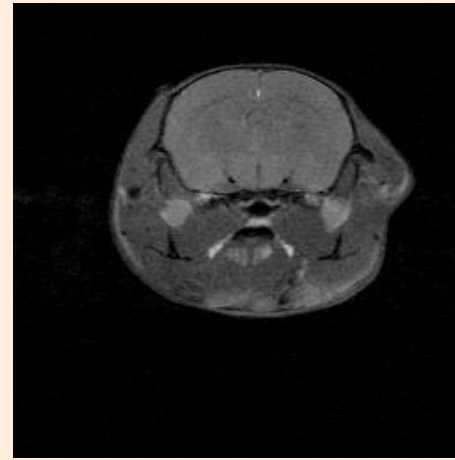
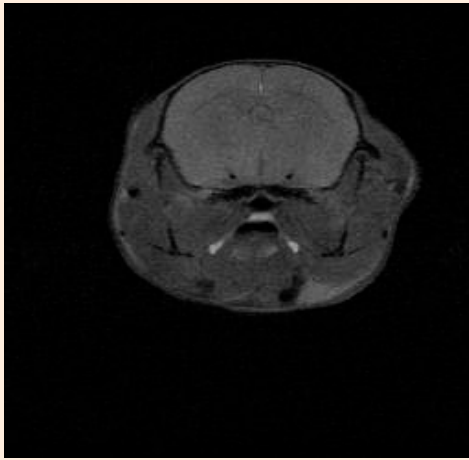


# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### TRANSGEDEN®. *In vivo* data.

- Biodistribution studies using MNR are under way.



- Chemical modifications of the molecule are under way for :
  - a) Increasing blood brain barrier crossing
  - b) Organ targeting

# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### What about regulatory rules ?

The data has been obtained outside regulatory rules, but all the experimental conditions have been set up, which means that the data could be obtained, under regulatory rules, in less than 6 months.

# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

**TRANSGEDEN®. IP protection.**

**TRANSGEDEN® IP is covered by a PCT patent. NanoDrugs, S.L. holds all rights on it.**

# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

### TRANSGEDEN®. Pitfalls and risks.

No pitfalls are foreseen at the present stage of development, but the following areas of uncertainty have been identified in preclinical studies:

- Degree of Blood Brain Barrier crossing.
- Half-life in plasma. TRANSGEDEN protects siRNA from RNAses degradation.
- Cell/organ targeting.

# Programa Cooperación Farma-Biotech

## Jornada IIb: Oncología

**NanoDrugs, S.L. Cooperation.**

**We look for partners in the development of  
the molecule, but we are open to discuss  
different types of collaboration.**