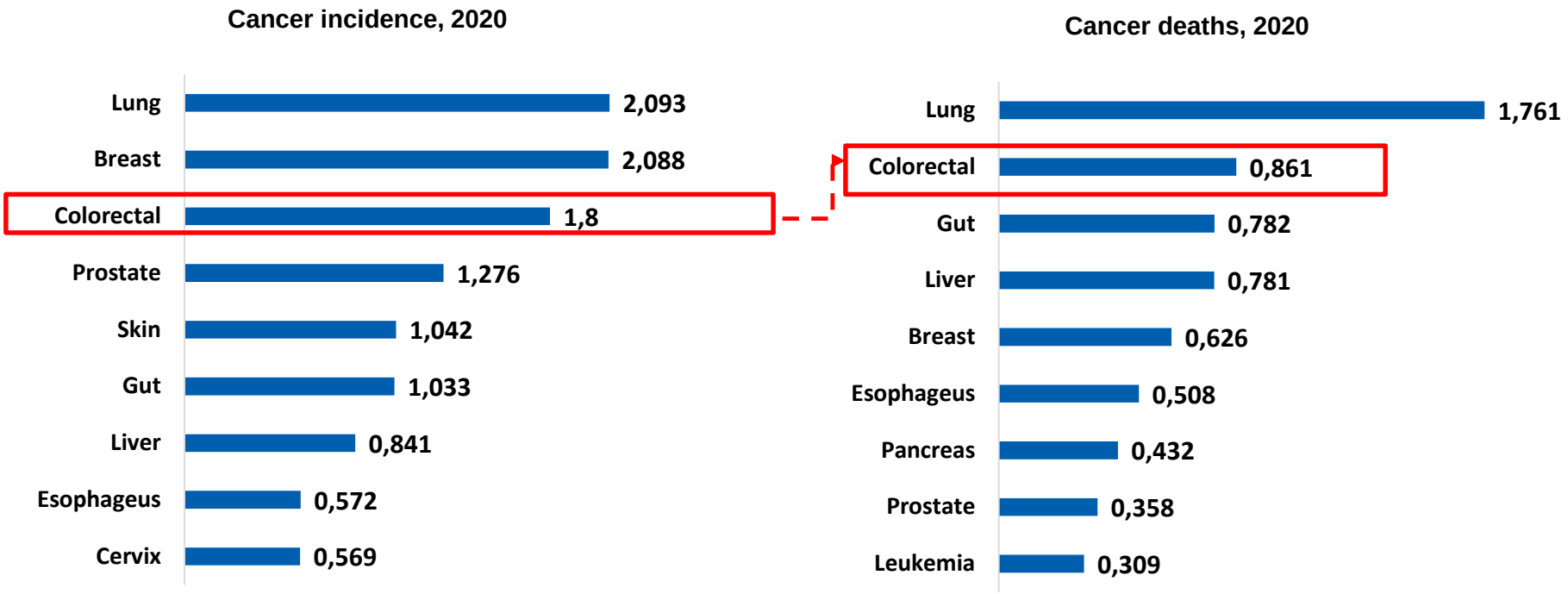
NANOKIDE

THERAPEUTICS

www.nanokide.com

1. INTRODUCTION

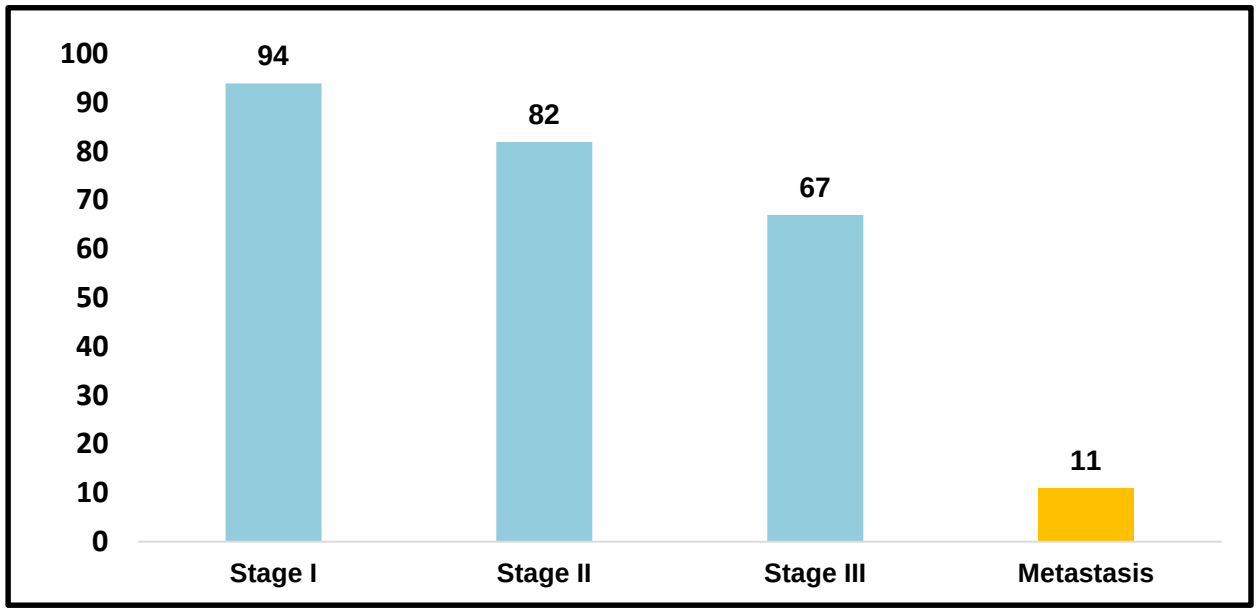
Colorectal cancer



Source: Bray, F., Ferlay, J., Soerjomataram, I., Siegel, R. L., Torre, L. A., & Jemal, A. (2018). Global Cancer Statistics 2018: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA: A Cancer Journal for Clinicians. doi:10.3322/caac.21492

1. INTRODUCTION

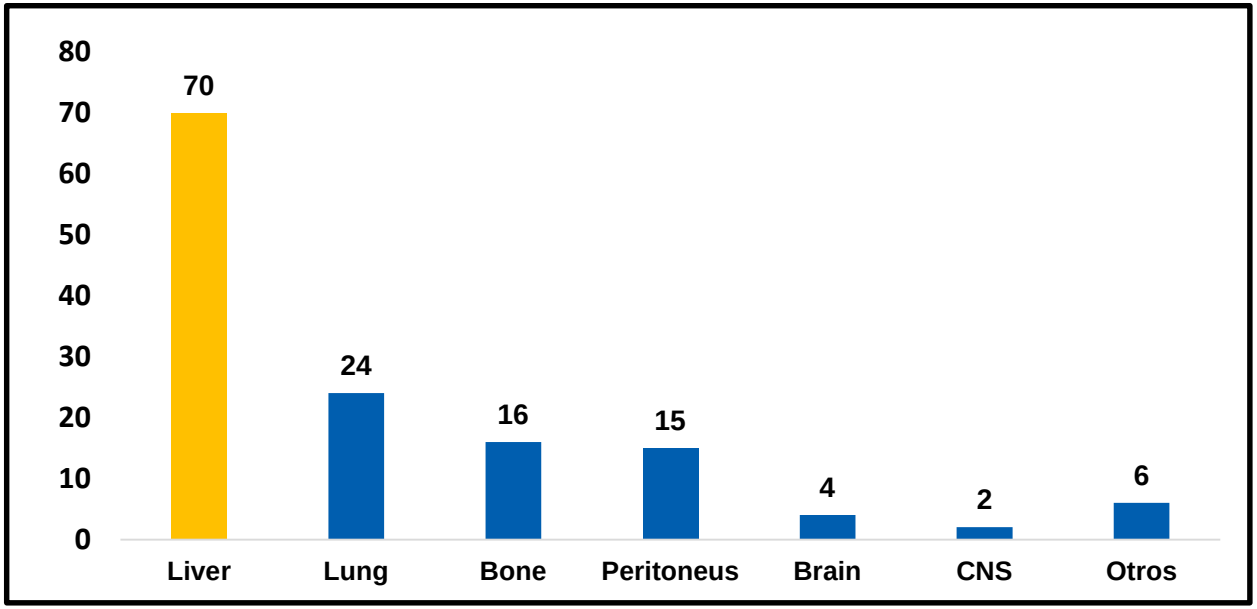
Colorectal cancer survival depending stage (%)



5-years survival rate. Source. American Association for Cancer Research .

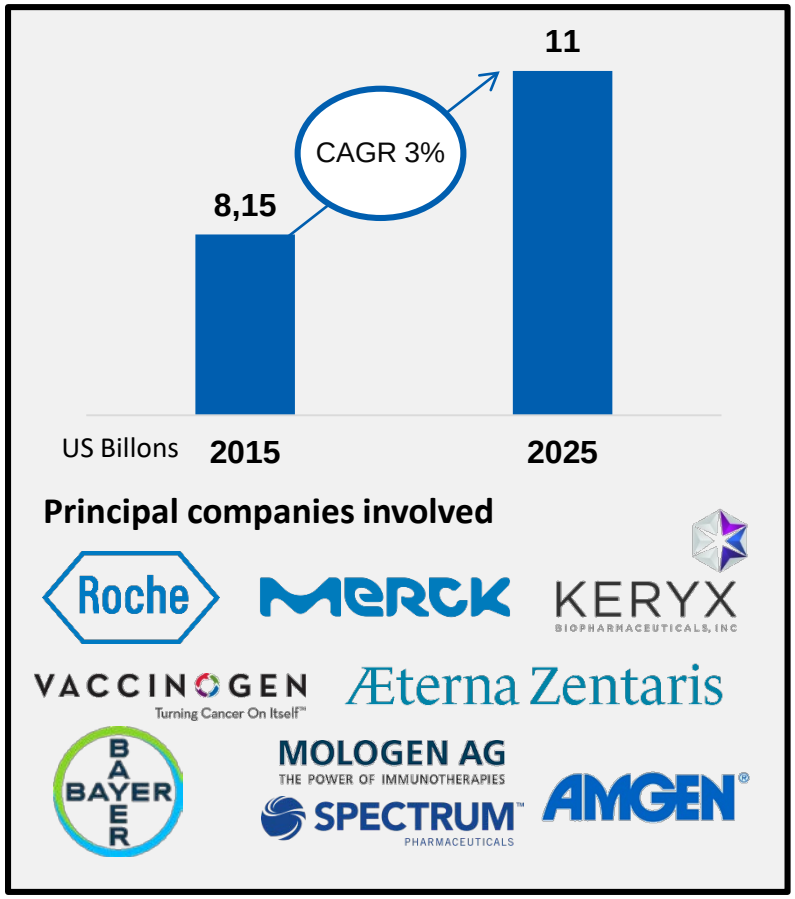
1. INTRODUCTION

Metasized organs by colorectal cancer



5-years survival rate. Source. American Association for Cancer Research .

Colorectal cancer market 2015-2025



Source: Global Data. Colorectal Cancer – Global Drug Forecast and Market Analysis to 2025

M&A activity in the field of colorectal cancer

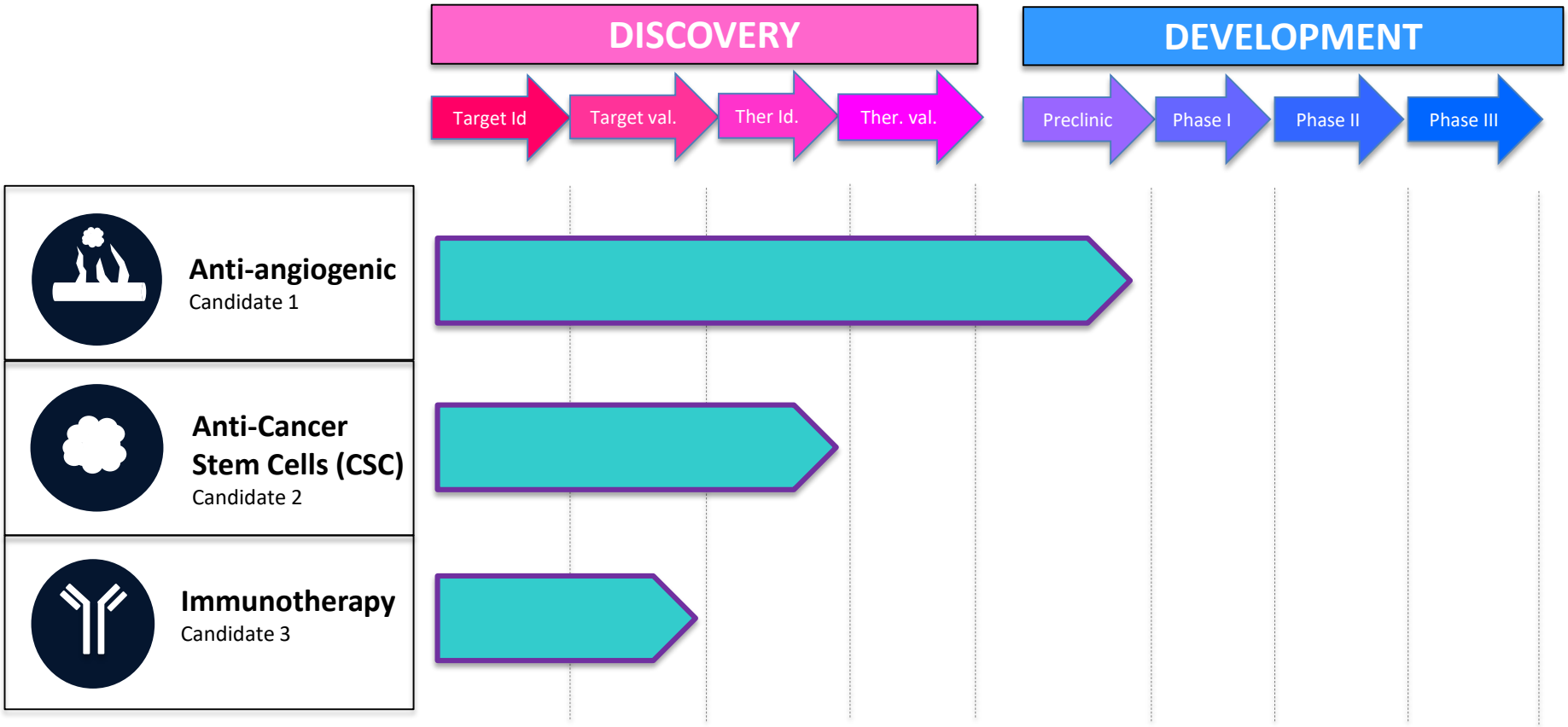
Companies involved			Value
SANOFI	WITH	OxfordBioMedica	$43M
Incyte	WITH	Merus	$350M
SERVIER	WITH	TAIHO PHARMA	$130M
SeattleGenetics	WITH	CASCADIAN THERAPEUTICS	$614M

Buy

Licence

Fuente: Fierce Biotech

3. PIPELINE



Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

Span based nanosystem

- Sorbitan ester-based lipid nanoparticles (SENS)
- Negatively charged
- Possibility decorate with Glucosaminoglucans (GAG) to improve delivery specificity
- Combined with oleylamine charge positively to combine genetic material

Fuente: Fierce Biotech

Span based nanosystem

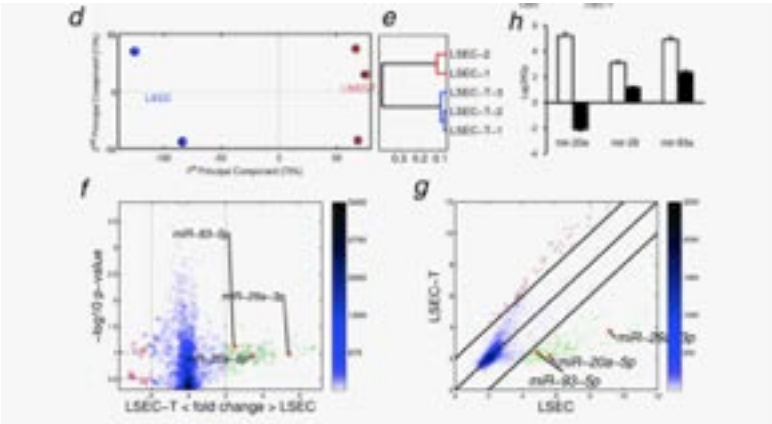
- Flexible platform
- Non-toxic
- Easy and cheap to produce
- Combine with mRNA, miRNA, DNA
- Disruptive therapeutic strategy
- IP protected

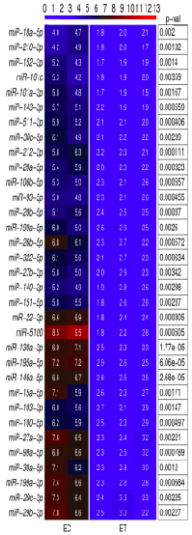
Fuente: Fierce Biotech

4. OUR TECHNOLOGY-CANDIDATE 1

Antiangiogenic therapy

- We identified miR-20a downregulated in endothelial cells during liver metastasis





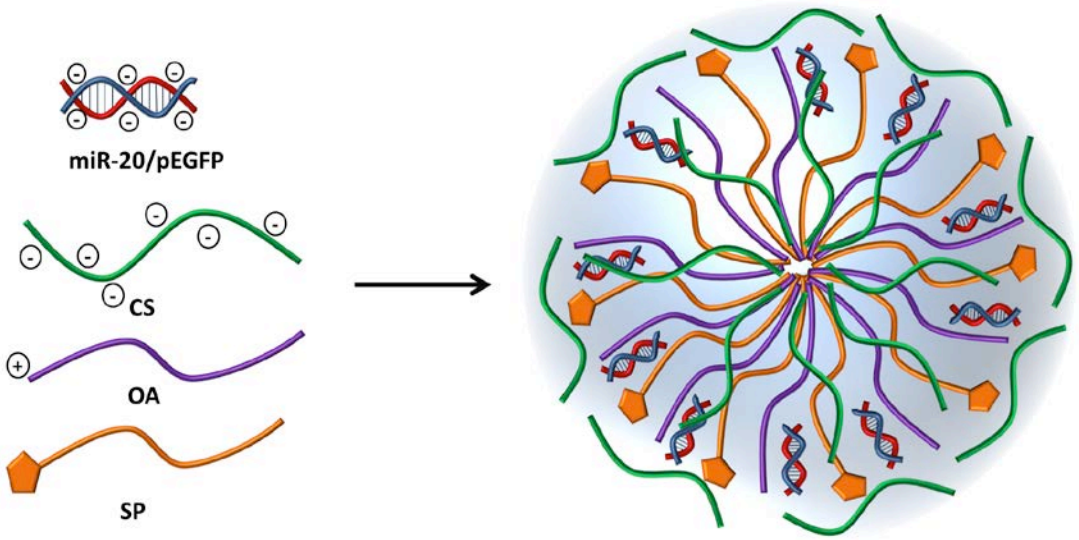
Downregulated miRNA	P value
miR-20	0,0023
miR-652	0,0027
miR-29	0,004
miR-674	0,006
miR-93	0,0059

Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

Antiangiogenic therapy

- Developed span based nanosystem to delivery miR-20a to liver endothelial sinusoidal cells

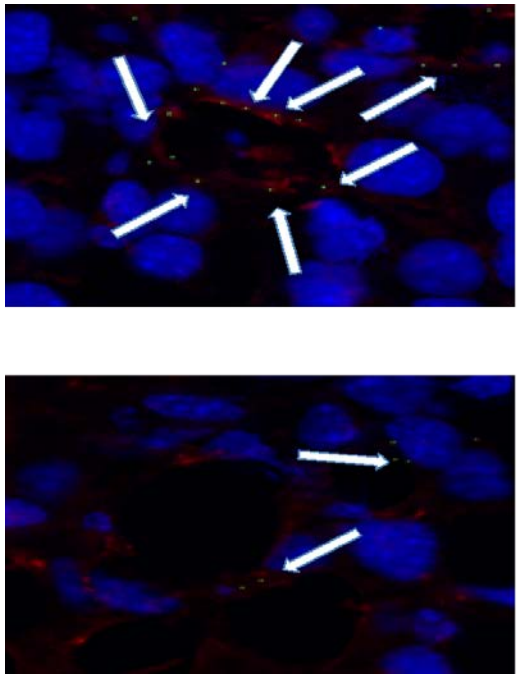


Author: J. Márquez

Fuente: Fierce Biotech

Antiangiogenic therapy

- Developed span based nanosystem to delivery miR-20a to liver endothelial sinusoidal cells

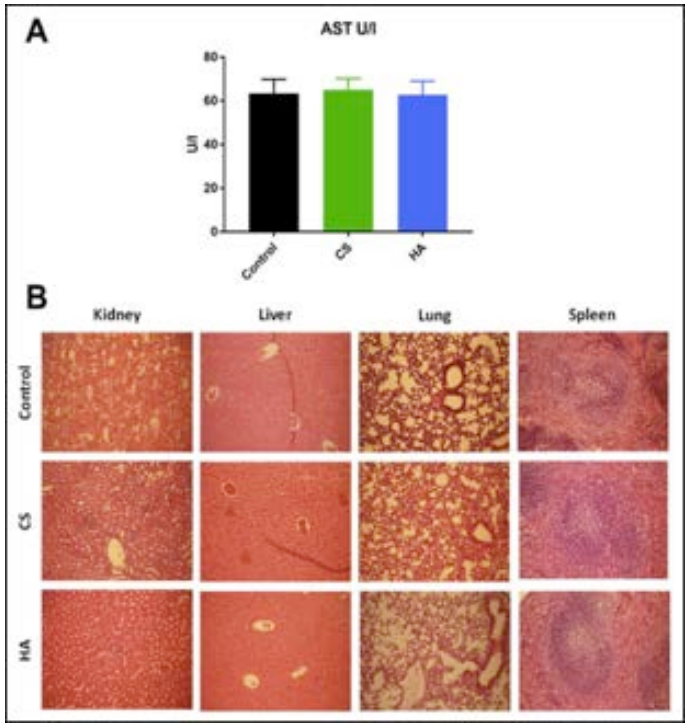


Author: J. Márquez

4. OUR TECHNOLOGY-CANDIDATE 1

Antiangiogenic therapy

- Non-toxic. NO Liver AST variation, NO reaction in kidney, liver, lung and spleen



Author: J. Márquez

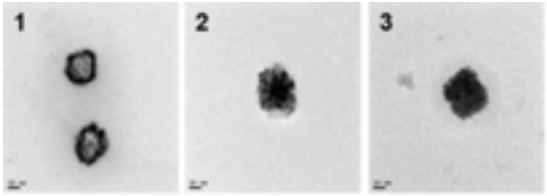
Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

4. OUR TECHNOLOGY-CANDIDATE 1

Antiangiogenic therapy

- Well-characterized. Reproducible.



Formulation	Size (nm)	PdI	ζ Potential (mV)
SP-OA-CS	132.9 ± 4.2	0.069	−38.2 ± 1.6
SP-OA-CS-pEGFP	142.7 ± 13.8	0.091	−36.4 ± 8.6
SP-OA-CS-miR-20	142.6 ± 1.4	0.065	−33.3 ± 3.0

Author: J. Márquez

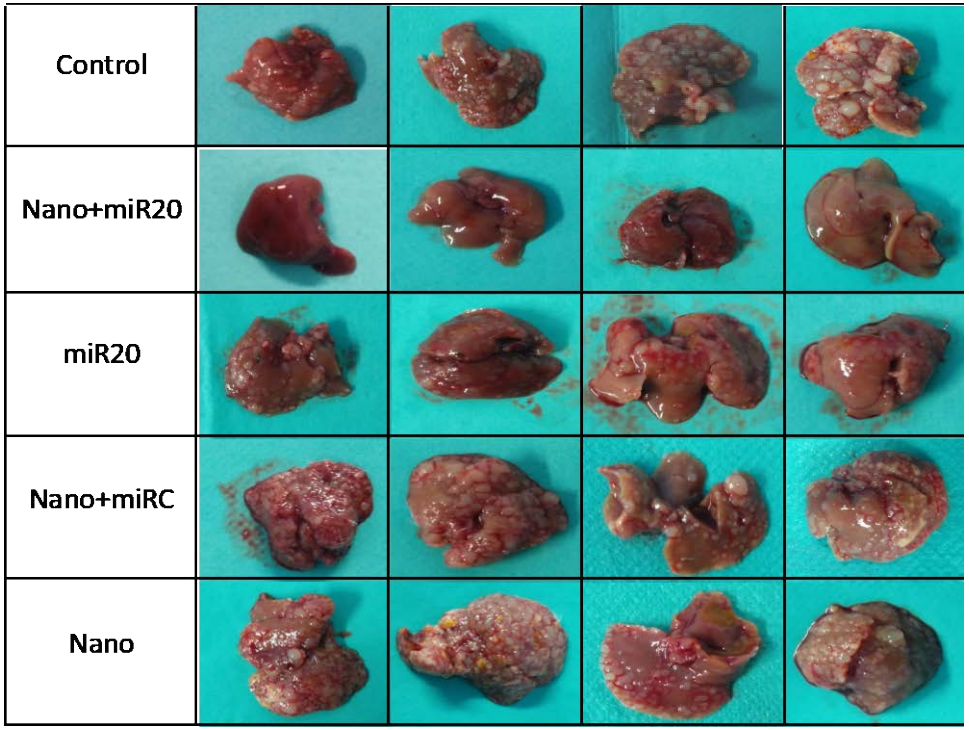
Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

4. OUR TECHNOLOGY-CANDIDATE 1

Antiangiogenic therapy

- 80% liver metastasis reduction (mouse)



Author: J. Márquez

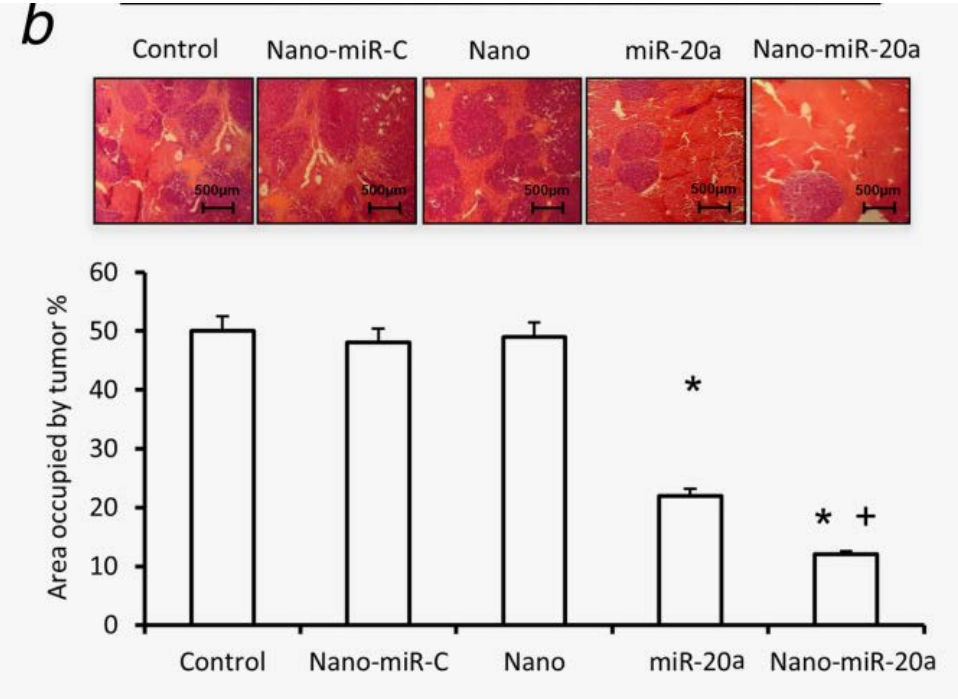
Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

4. OUR TECHNOLOGY-CANDIDATE 1

Antiangiogenic therapy

- 80% liver metastasis reduction (mouse)



Author: J. Márquez

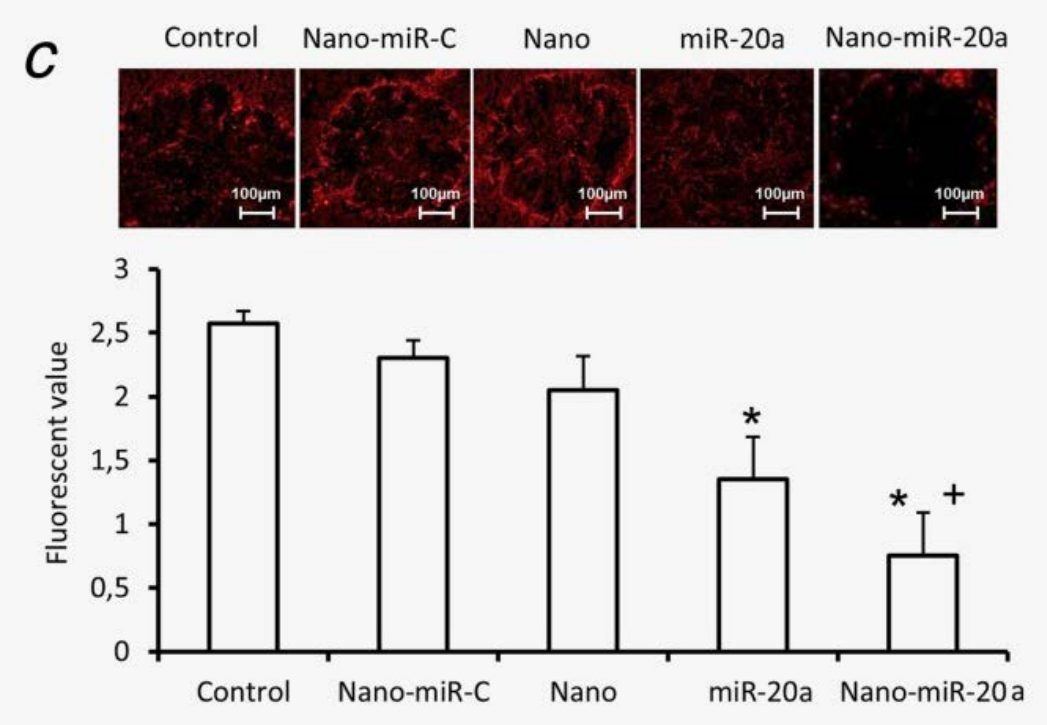
Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

4. OUR TECHNOLOGY-CANDIDATE 1

Antiangiogenic therapy

- 80% liver metastasis reduction (mouse)- angiogenesis reduction



Author: J. Márquez

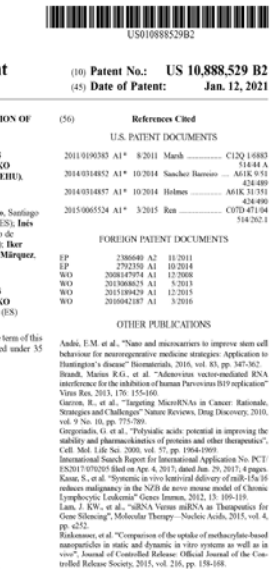
Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

4. OUR TECHNOLOGY-CANDIDATE 1

Antiangiogenic therapy

- Formulation patented and accepted in Europe and USA



US010888529B2

(12) **United States Patent**
Sánchez Barreiro et al.

(10) **Patent No.: US 10,888,529 B2**
(45) **Date of Patent: Jan. 12, 2021**

(54) **VEHICLES FOR THE TRANSFECTION OF MIRNAS**

(71) Applicant: **UNIVERSIDAD DEL PAIS VASCO-EUSKAL HERRIKO UNIBERTSITATEA (UPV/EHU)**, Leioa (ES)

(72) Inventors: **Alejandro Sánchez Barreiro**, Santiago de Compostela—la Coruña (ES); **Inés Fernández Piñeiro**, Santiago de Compostela—la Coruña (ES); **Iker Badiola**, Leioa (ES); **Joana Márquez**, Leioa (ES)

(73) Assignee: **UNIVERSIDAD DEL PAIS VASCO-EUSKAL HERRIKO UNIBERTSITATEA**, Leioa (ES)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/091,071**

(22) PCT Filed: **Apr. 4, 2017**

(86) PCT No.: **PCT/ES2017/070205**
§ 371 (c)(1),
(2) Date: **Oct. 3, 2018**

(87) PCT Pub. No.: **WO2017/174847**
PCT Pub. Date: **Oct. 12, 2017**

(65) **Prior Publication Data**
US 2019/0111002 A1 Apr. 18, 2019

(56) **References Cited**

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Paseo de la Castellana 93
5ª planta
28046 Madrid
ESPAGNE

Date
28.10.21

Reference	Application No./Patent No.
P184532EP	17778723.1 - 1112 / 3441074

Applicant/Proprietor
Universidad del Pais Vasco - Euskal Herriko Unibertsitatea (UPV/EHU)

Decision to grant a European patent pursuant to Article 97(1) EPC

Following examination of European patent application No. 17778723.1 a European patent with the title and the supporting documents indicated in the communication pursuant to Rule 71(3) EPC (EPO Form 2004C) or in the information (EPO Form 2004W, cf. Notice from the EPO dated 8 June 2015, OJ EPO 2015, A52) dated 25.05.21 is hereby granted in respect of the designated Contracting States.

Patent No. : 3441074
Date of filing : 04.04.17
Priority claimed : 05.04.16/ESA 201630417

Designated Contracting States and Proprietor(s) : AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Universidad del Pais Vasco - Euskal Herriko Unibertsitatea (UPV/EHU)
Barrio Sarriena, S/N
48940 Leioa, Vizcaya/ES

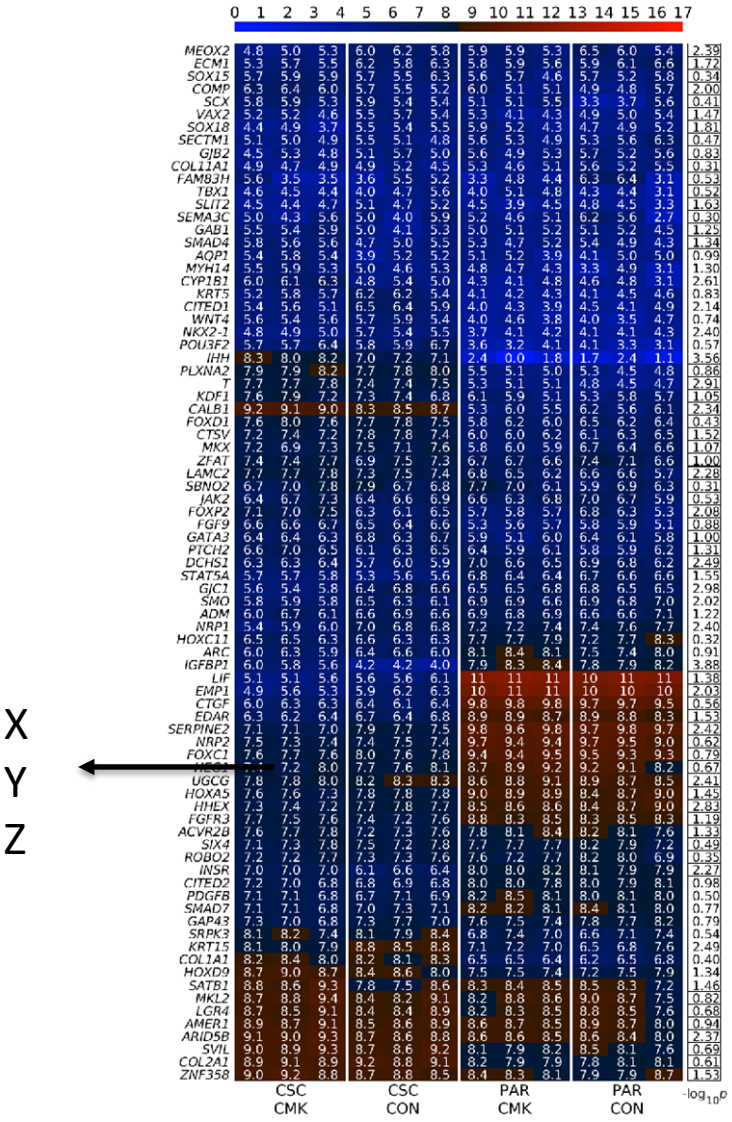
Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

4. OUR TECHNOLOGY-CANDIDATE 2

Anti-CSC therapy

- We identify 3 CSC differentiation genes

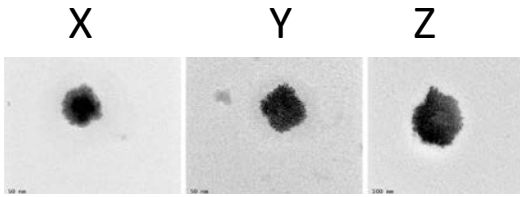


Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

Anti-CSC therapy

- We created 3 nanosystems with candidates genes mRNA



Formulation	Size(nm)	Pdl	Potential(mV)
SP-OA-X	110.3 ± 4.5	0.055	-33.6 ± 1.3
SP-OA-Y	115.4 ± 3.3	0.049	-36.1 ± 2.5
SP-OA-Z	145.8 ± 3.7	0.065	-39.8 ± 3.3

Author: I. Badiola

Fuente: Fierce Biotech

4. OUR TECHNOLOGY-CANDIDATE 3

Immunotherapy

- NNPM-Neuronal Neoantigen Predicting Model
- Transfect neoantigen mRNA using Span-Based Nanosystem to DC

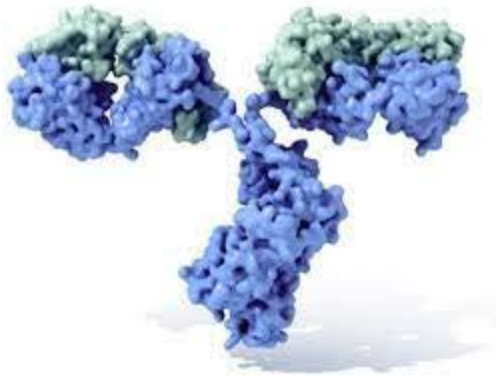
Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

4. OUR TECHNOLOGY-CANDIDATE 3

Immunotherapy

- NNPM developed
- Nanosystem developing



Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

5. COMPETITORS

Our competitors

Candidate 1

Bevacizumab (Avastin ®)

Cabozantinib (Cometriq®)

Sorafenib (Nexavar ®)

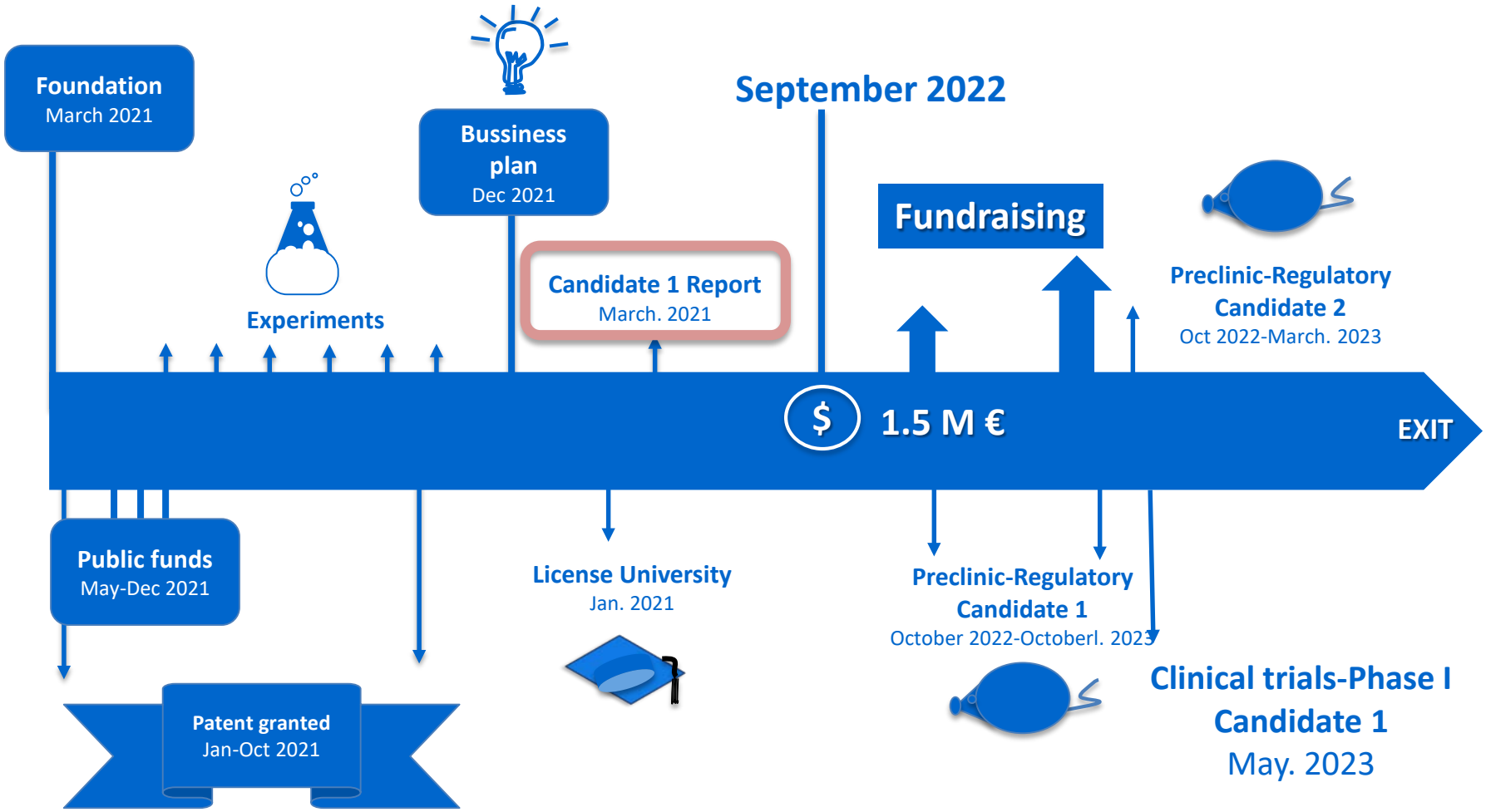
Ramucirumab (Cyranza ®)

Molecule type	Nanoparticle	Antibody	TKI	TKI	Antibody
Cheap production	✓	✗	✓	✓	✗
Molecular Specificity	✓	✓	✗	✗	✓
Low Toxicity	✓	✓	✗	✗	✓
Multi-target	✓	✗	✓	✓	✗
Other applications	✓	✗	✓	✓	✗
Specific delivery	✓	✗	✗	✗	✗

Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

5. TIMELINE



Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

5. TIMELINE

INNOQUA Toxicology Consultants

C/ Sant Antoni Maria Claret, 272, Dcha 2ºB
08041-Barcelona (Spain)
Phone: +34 93 436 91 42
www.innoqua.net

SENS chondroitin sulfate (CS) nanoparticles loaded with miRNA-20a Non-Clinical Development Plan enabling First into Men

Prepared for Iker Badiola

Version: 1
Issued on 18th March 2022

Author(s):

Ana Andrés Perni, BSc, PhD
Toxicology Consultant

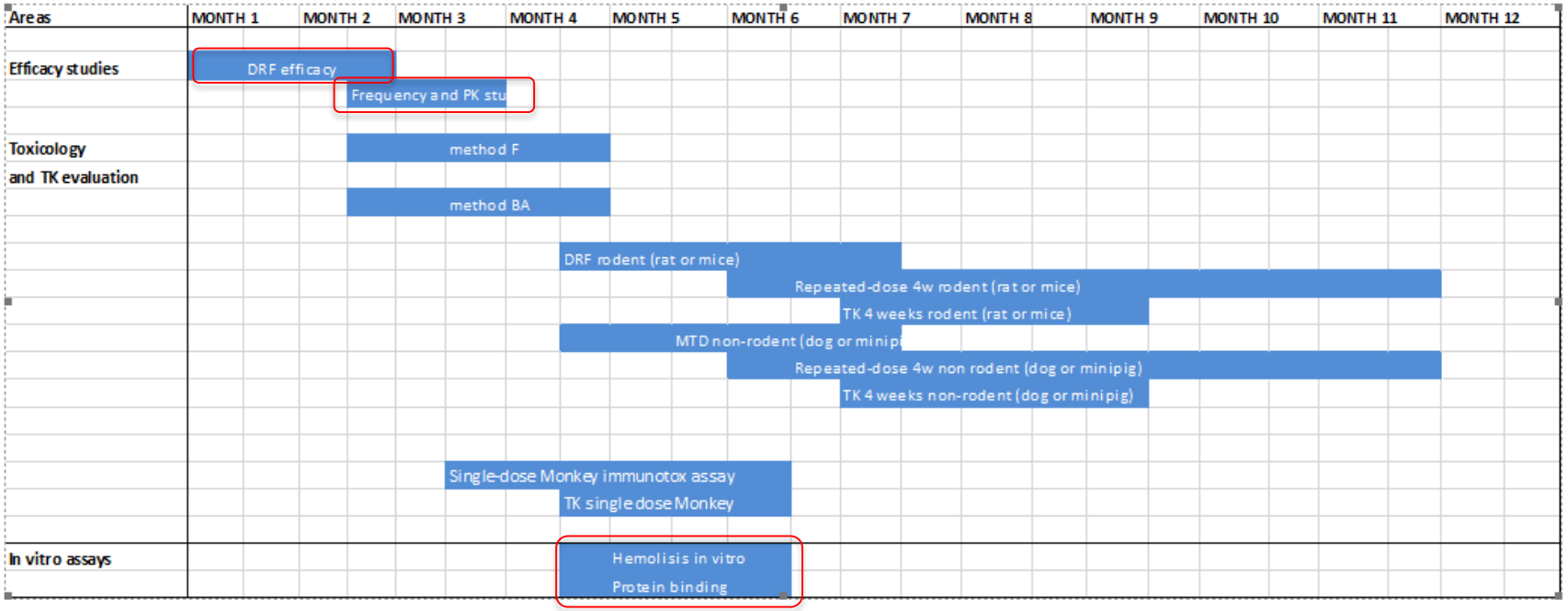
Eduardo Cunchillos, DVM.
Toxicology Consultant
EUROTOX Registered Toxicologist

Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

5. TIMELINE

Timeline Non-clinical studies to support First in Human clinical trial (up to 1 month):



Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

5. TIMELINE

8 LIST OF STUDIES AND ESTIMATED COSTS (EUROS)

Studies	Price (Euro)
Pharmacology	
Selection of animal species	(sponsor)
Efficacy	
DRF efficacy study	15.000-20.000
PK and frequency study at selected efficacy dose	15.000-20.000
Analytical development**	
Analytical method validation for formulations analysis	20.000-30.000
Analysis of the formulations used for the in vitro prot binding and toxicity studies	35.000-40.000
Hemolysis *in vitro*	6.000
Toxicology (miRNA-loaded nanoparticle/empty nanoparticle/control (vehicle)) *	
Rodent (mice or rat)	
DRF	25.000-35.000
4-week repeated dose (including TK)	160.000-200.000
Non rodent (Minipig/ Dog)	
MTD	40.000-60.000
4-week repeated dose (including TK)	200.000-250.000
Phototoxicity	
MEC determination	300
Phototoxicity assay (if necessary)	4.000
ADME	
Protein binding	6.000-8000
Monkey	
Acute immunostimulation iv assay and TK	120.000-140.000
Bioanalytical methods validation	
Method validation in rodent plasma	30.000-40.000
Method validation in non rodent plasma	30.000-40.000
Partial method validation (non GLP) in monkey	20.000-25.000
Total approx.	**726.300-918.300**

*: These activities will include the assessment of safety pharmacology parameters

**: To consider if the analytical work can be conducted by the same CMO that develops and characterize the drug product

***Note**: price of toxicology studies has been estimated based on a 5-groups and 2 sexes design*

600.000-800.000 €

Fuente: Fierce Biotech

NANOKIDE THERAPEUTICS

6. TEAM

Dr. Prof. Iker Badiola
Chief Executive Officer

Dr. Isabel Rial
Chief Scientific Officer

Dr. Isabel Rial
Chief Medical Officer

1. TEAM

Dr. Prof. Iker Badiola
Chief Executive Officer

- Assistant profesor University of Basque Country (acreditted Full Profesor)
- Founder Innoprot SL (2007)
- Founder Nanokide therapeutics SL (2021)
- Young investigator award ISCHS, 2006, Niigata (Japan)
- Ernesto Vietiz award, best 2020 molecule (Spain).
- 1 patent
- 26 papers
- 5 books

6. TEAM

Dr. Isabel Rial
Chief Scientific Officer

- PhD in delivery bioactive molecules.
- Best PhD award USC 2016
- Qenns University Belfast 2016-2018
- University-Industry contracts (250 K €)
- Founder Nanokide Theraeutics (2021)
- 1 patent
- 14 papers.
- 1 book.

6. ACHIEVEMENTS


Real Academia Galega de Ciencias

A REAL ACADEMIA GALEGA DE CIENCIAS

concede a

Iker Badiola Etxaburu

o Premio de Investigación Ernesto Vázquez 2018

na modalidade de mellor traballo de investigación pola súa participación no traballo

"La administración de nanopartículas específicamente diseñadas para direccionar miR-29a a las células endoteliales del sinusoide hepático hace posible una eficaz reducción de los mediadores hepáticos causados por el cáncer de colon"

Santiago de Compostela, 23 de xaneiro de 2019

Candidate 1 awarded by RCAG


United States Patent

Candidate 1 patented

Candidate 1 granted by USA NIH nanoparticle program

Big Pharma interest

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