Marie Curie Actions

Recruitment event of IT-DED³

Universidad de Valladolid

University of Valladolid

ioba
Instituto Universitario de Oftalmobiología Aplicada

High Pressure Processes Group

ESR 4

Amalia Enríquez-de-Salamanca, PhD

Soraya Rojo, PhD

ESR 6

María J González-García, OD, PhD

Yolanda Diebold, PhD

IT-DED³

Antwerpen. May 24, 2018

Marie Curie Actions

IT-DED³

Universidad de Valladolid

Founded in 1241 AD

Located in **Valladolid**, (**Castilla y León region**) northwestern **Spain**

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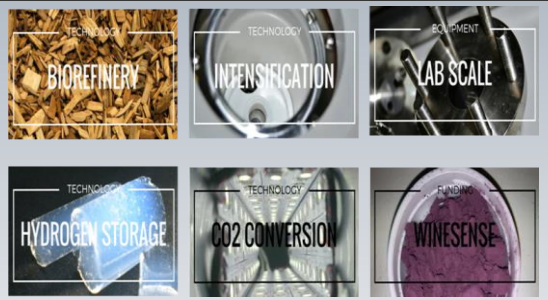
Instituto Universitario de Oftalmobiología Aplicada

CLINICAL CARE | RESEARCH | TEACHING

OCULAR SURFACE GROUP

Departamento de Ingeniería Química y Tecnología del Medio Ambiente

High Pressure Processes Group



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OCULAR SURFACE GROUP

Research lines

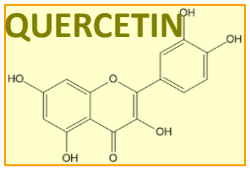
- Advanced therapies and nanomedicine
- Biomarkers of inflammation and pain
- Development of new research experimental models

Target diseases

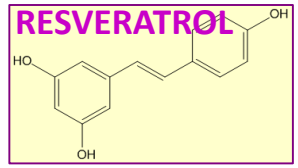
- Dry Eye Disease (Sjögren syndrome, graft *vs* host disease, Meibomian gland dysfunction...)
- Corneal blindness due to limbal stem cell deficiency
- Chronic ocular pain
- Contact lens discomfort and related pathology
- Other ocular surface inflammatory diseases (allergies, etc)

Working areas

- **Preclinical models**: *in vitro*, 3D, *ex-vivo*, *in vivo*
- **Clinical studies and trials**
  - **controlled environment** (CELab: Controlled Environment laboratory). Vision R&D

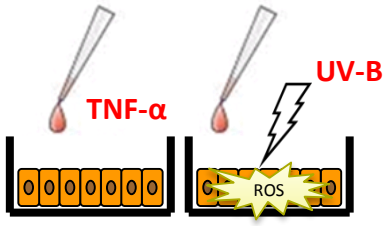


QCT
RES
QCT + RES



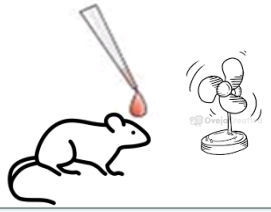
IN-VITRO

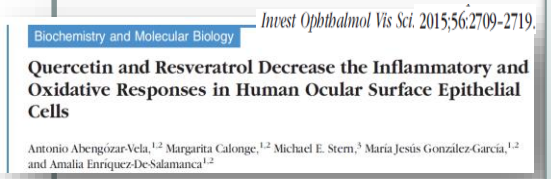
Human Ocular Surface Epithelial cells



IN-VIVO

Experimental Desiccating DE





Biochemistry and Molecular Biology

Invest Ophthalmol Vis Sci. 2015;56:2709-2719.

Quercetin and Resveratrol Decrease the Inflammatory and Oxidative Responses in Human Ocular Surface Epithelial Cells

Antonio Abengózar-Vela,[1,2] Margarita Calonge,[1,2] Michael E. Stern,[3] María Jesús González-García,[1,2] and Amalia Enríquez-De-Salamanca[1,2]

Topical Quercetin And Resveratrol Protect the Ocular Surface In Experimental Dry Eye Disease. Abengózar-Vela A. *Ocular Immunology and Inflammation* Journal. 2018 under review

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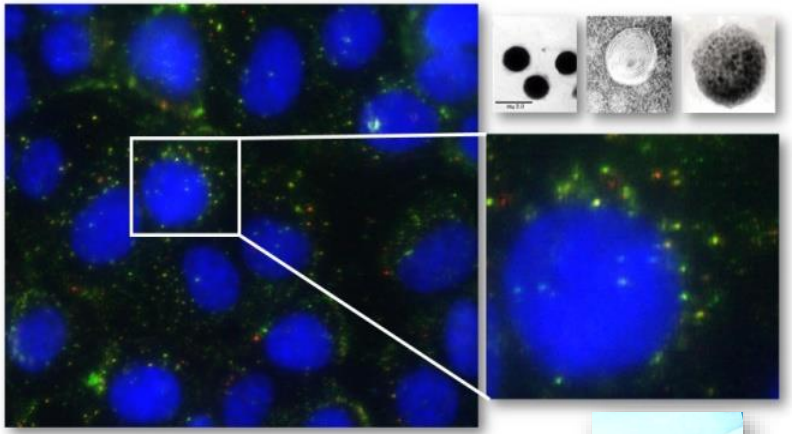
OCULAR SURFACE GROUP

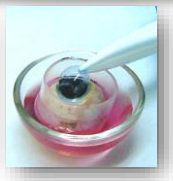
Advanced Therapies and Nanomedicine for Ocular Surface Diseases

Nanotechnology for drug delivery

Preclinical *in vitro and ex vivo* testing



Contreras-Ruiz *et al.* Mol Vis. 2011; 17:279–290. IOBA



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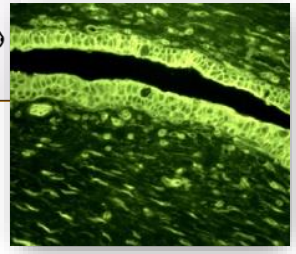
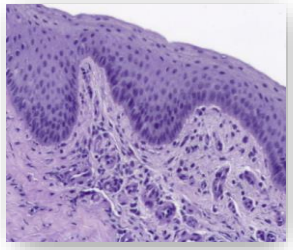
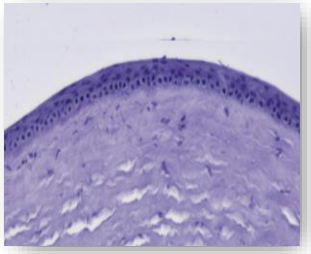
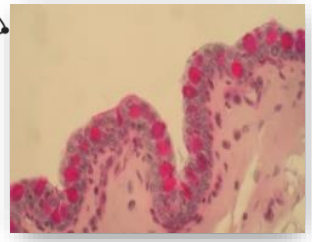
Preclinical *in vivo* testing



Enríquez de Salamanca *et al.* IOVS. 2006;47(4):1416-25. IOBA







Marie Curie Actions

IT-DED^3

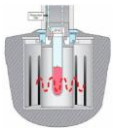
Departamento de Ingeniería Química y Tecnología del Medio Ambiente

High Pressure Processes Group

INTENSIFIED **EXTRACTION** OF BIOACTIVE COMPOUNDS FROM NATURAL/RENEWABLE RESOURCES

Working on **MW extraction** since 2006:

- ✓ **Polyphenols**: natural sources: winery by-products (grape marc and wine lees), aromatic plants
- ✓ Essential oils aromatic plants
- ✓ Lipid and pigments: microalgae



Batch. Lab scale

Continuous. Pilot scale

FORMULATION OF BIOACTIVE COMPOUNDS

Working on **Formulation** since 2000: carotenoids, **polyphenols**, essential oils

Frequent problem of (bio)active compounds: Low bioavailability

- ✓ Degradation with oxygen, light, pH and high temperatures
- ✓ Low permeability
- ✓ Low solubility in water

Reduce Particle size

Encapsulation with polymers

ESR-4 project description

Supervisors:
A Enríquez-de-Salamanca (IOBA)
S Rojo (HPP)

❖ **OBJECTIVE:**

To determine the potential **effect** of isolated **natural compounds** on maintenance of **ocular surface health** in inflammatory diseases such as **Dry Eye** (DED)

❖ **EXPECTED RESULTS:**

✓ **Extraction** and **isolation** of natural **polyphenols**: Olive marc extracts; Isolation of polyphenols: oleuropein, tyrosol, and/or hidroxytirosol

✓ Characterization of **anti-inflammatory** and **antioxidant properties** of natural compounds selected **on ocular surface in vitro** (conjunctival and corneal epithelial cells) and **in vivo** (mouse dry eye model)

ESR-6 project description

Supervisors:
M J González-García (IOBA)
Y Diebold (IOBA)

❖ **OBJECTIVE:**

To study the **biocompatibility** and **efficacy** of different **drug delivery systems** loaded with **natural compounds** and formulated to achieve adequate delivery to inflamed anterior eye structures

❖ **EXPECTED RESULTS:**

✓ **Characterization** of lead natural compound-based **formulations** to **optimize ocular drug delivery**

ESRs Planned secondments

ESR 4

1. **Industrial. iBET:** (5 months). Compounds isolation, in vitro characterization of the antioxidant and anti-inflammatory properties.
2. **Academic. UHC**: (3 months). Selected compound/s formulation/s testing in a mouse desiccating stress dry eye model

ESR 6

1. **Academic. UEF** (2 months). Acquisition of knowledge about biopharmaceutical barriers and drug kinetics
2. **Industrial. HG&Beyond** (4 months). Proof-of-concept of inclusion of natural compounds in a contact lens as drug carrier

4.Doctoral school linked to the beneficiary and offering training on transferable skills

Doctorate Programme in Visual Sciences

- ✓ Will provide ESRs with several **competences:**
  - Research skills
  - Networking and team work
  - Career development
  - Scientific writing/publishing
  - …

ESDUVa
Escuela de Doctorado Universidad de Valladolid

- ✓ Will provide complementary **formative activities**
  - Data managing
  - Statistics
  - Management of information
  - Spanish courses (UVa-Language Center)
  - …

Thanks for your attention