

COLLABORATION WITH RESEARCH GROUPS AND UNIVERSITY DEPARTMENTS: BSL3/BSL4 TRAINING AND RESEARCH, RESULTS AND PERSPECTIVES

Szilvia Bősze, PhD
Associate Professor

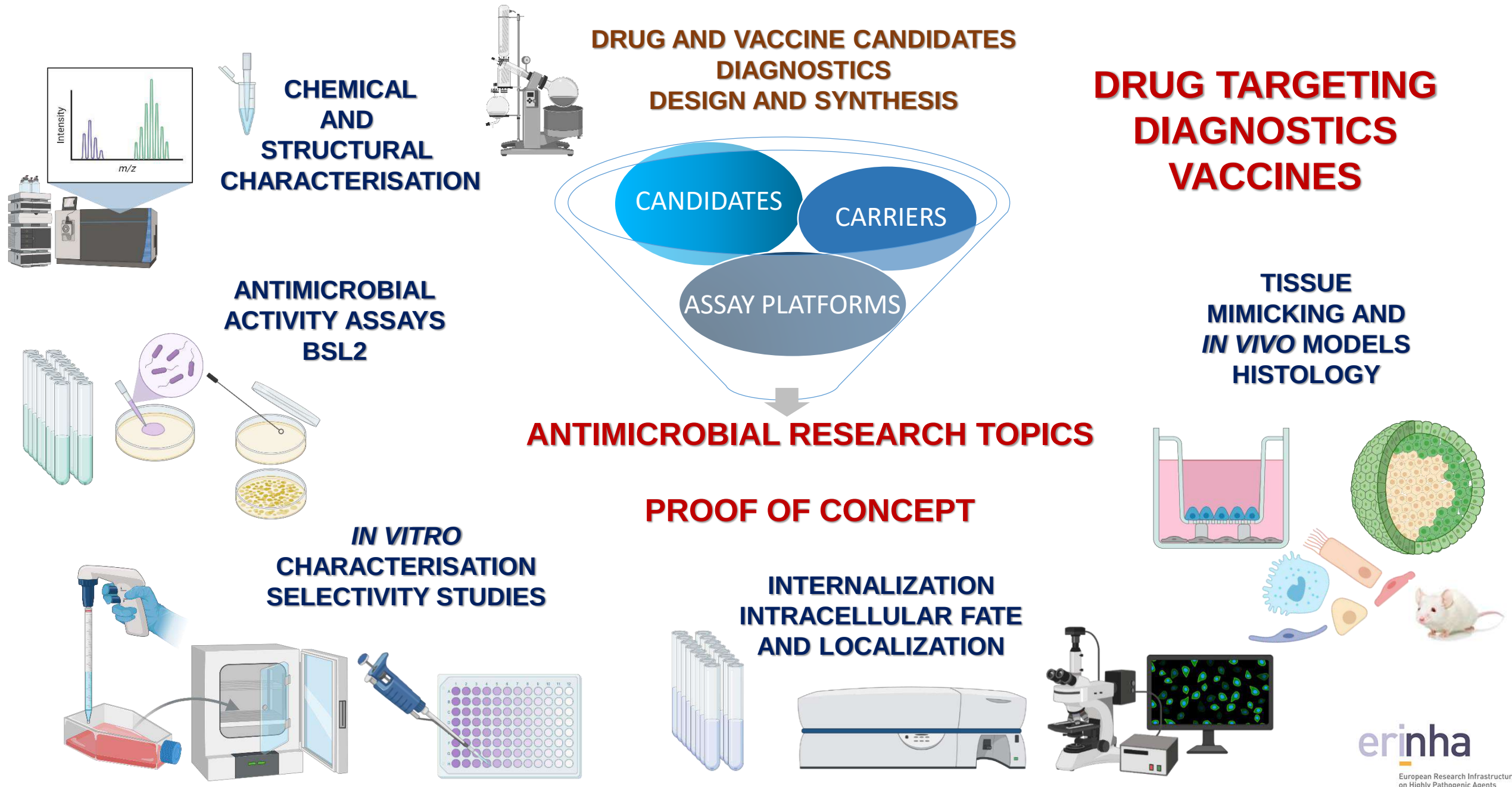
**RESEARCH GROUP OF PEPTIDE CHEMISTRY, EÖTVÖS LORÁND RESEARCH NETWORK,
EÖTVÖS LORÁND UNIVERSITY**

**HIGH CONSEQUENCE INFECTIOUS DISEASES IN CENTRAL EASTERN EUROPE: GAPS
& COOPERATION OPPORTUNITIES**

ONLINE WORKSHOP; 25 NOVEMBER, 2021.

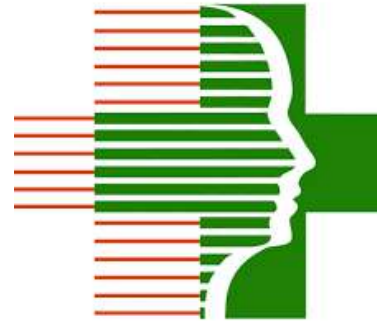


IMPORTANCE OF THE ACCESS OF BSL3 AND BSL4 FACILITY FOR RESEARCHERS



BSL3 AND BSL4 FACILITIES, NATIONAL BIOSAFETY LABORATORY - NATIONAL PUBLIC HEALTH CENTER, BUDAPEST

NEW *IN VITRO* AND *IN VIVO* ASSAY PLATFORMS FOR COLLABORATING RESEARCHERS



Zoltán KIS
Bernadett PÁLYI

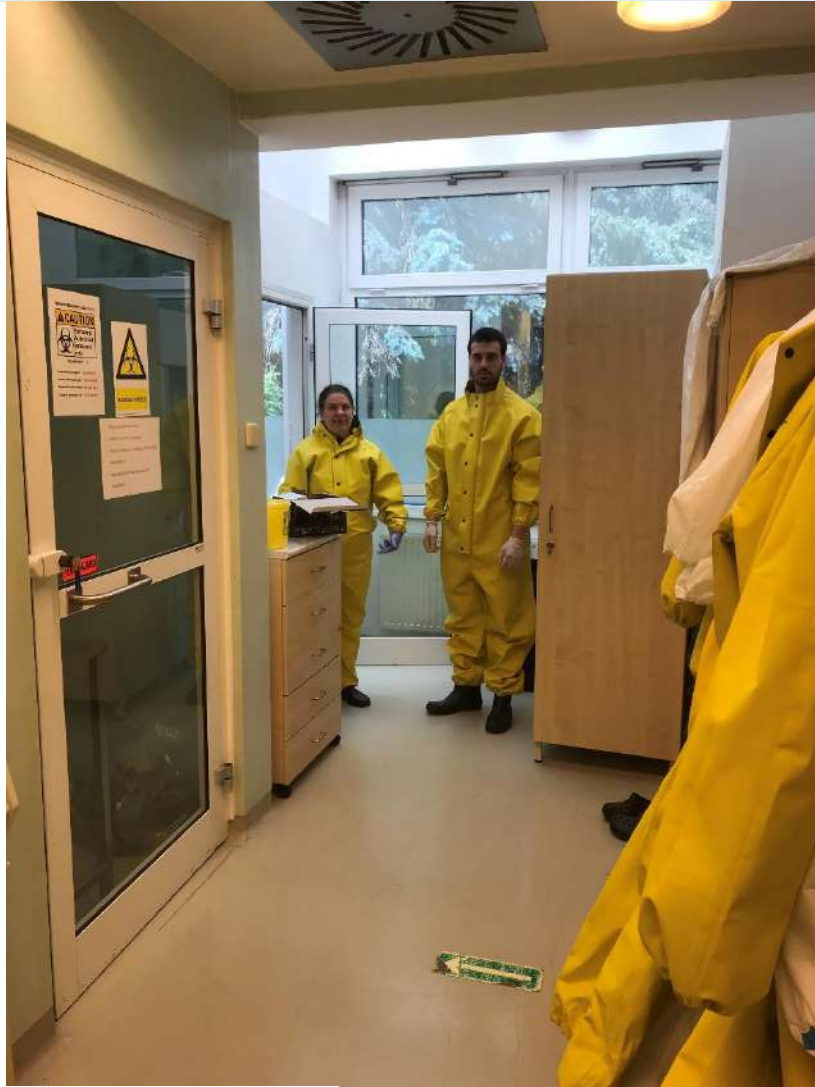
Judit HENCZKÓ
Nóra MAGYAR



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European Research Infrastructure
on Highly Pathogenic Agents

TRAINING IN NATIONAL BIOSAFETY LABORATORY, NATIONAL PUBLIC HEALTH CENTER, BUDAPEST



TRAINING ELEMENTS

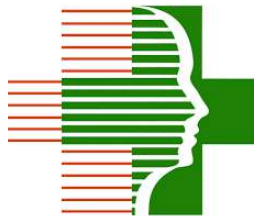
BIOSAFETY PROFESSIONALS

STANDARDIZED TRAINING WORKFLOW AND METHODOLOGY FOR PERSONNELS WORKING IN HIGH-CONTAINMENT LABORATORIES

- key concepts and knowledge
- technical competence
- building a culture of risk assessment-based safety through competency training
- enhance understanding and recognition of potential biological hazards
- methods for controlling these hazards

REQUIREMENTS

ADVANCED CELL CULTURE
AND *IN VITRO* ASSAYS SKILLS
FELASA CERTIFICATE
(OPTIONAL, *IN VIVO* STUDIES)



EXAMS TO GET CERTIFICATE



RESEARCH GROUP OF PEPTIDE CHEMISTRY
EÖTVÖS LORÁND RESEARCH NETWORK (ELKH)
INSTITUTE OF CHEMISTRY, EÖTVÖS LORÁND UNIVERSITY



DEPARTMENT OF LABORATORY ANIMAL SCIENCE AND ANIMAL PROTECTION
DEPARTMENT OF PATHOLOGY
UNIVERSITY OF VETERINARY MEDICINE, BUAPEST

Kinga FODOR, Gyula BALKA



LABORATORY OF INTERFACES AND NANOSTRUCTURES
INSTITUTE OF CHEMISTRY, EÖTVÖS LORÁND UNIVERSITY, BUDAPEST

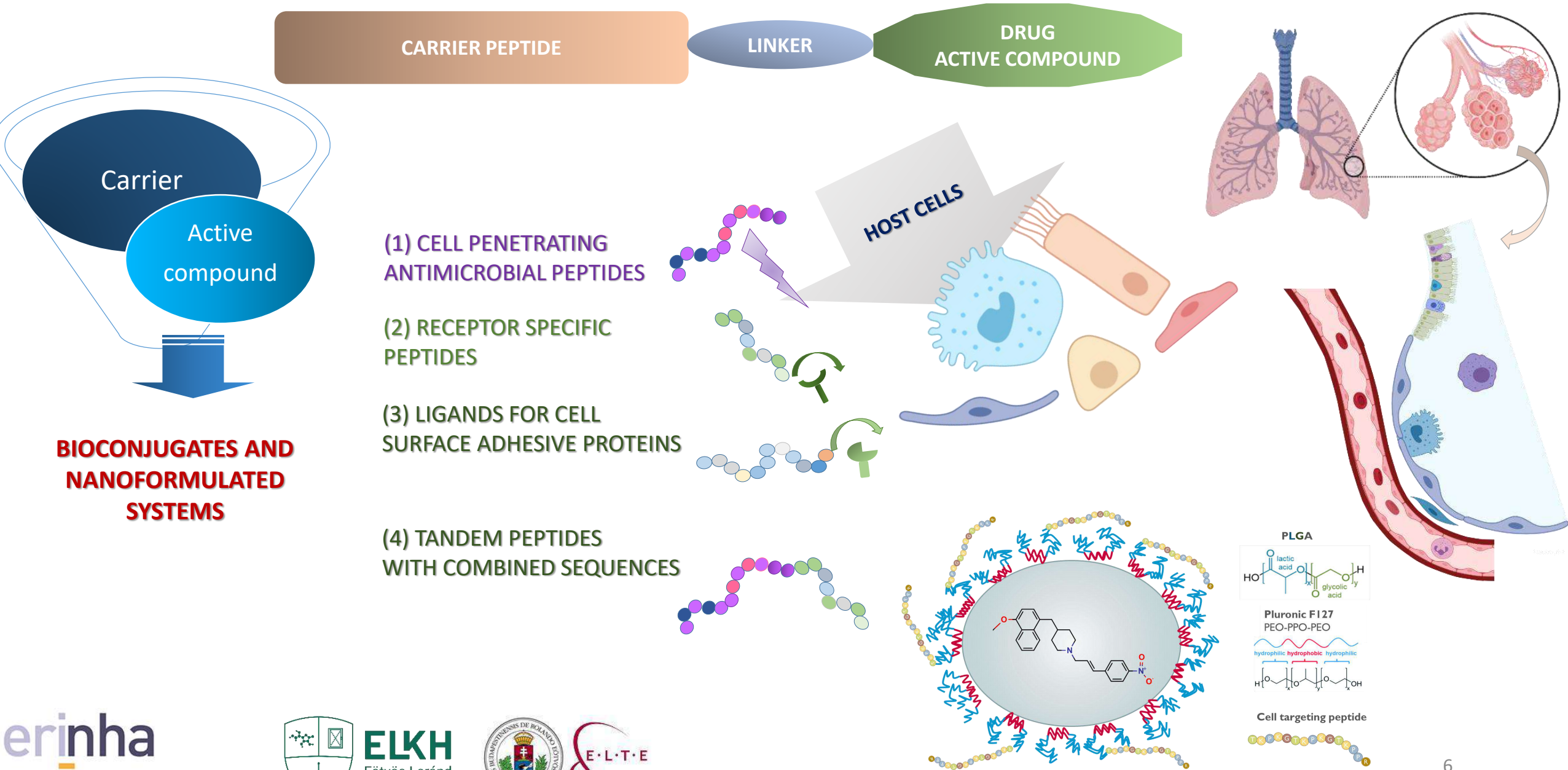
Éva KISS, Ágnes ÁBRAHÁM, Gergő GYULAI



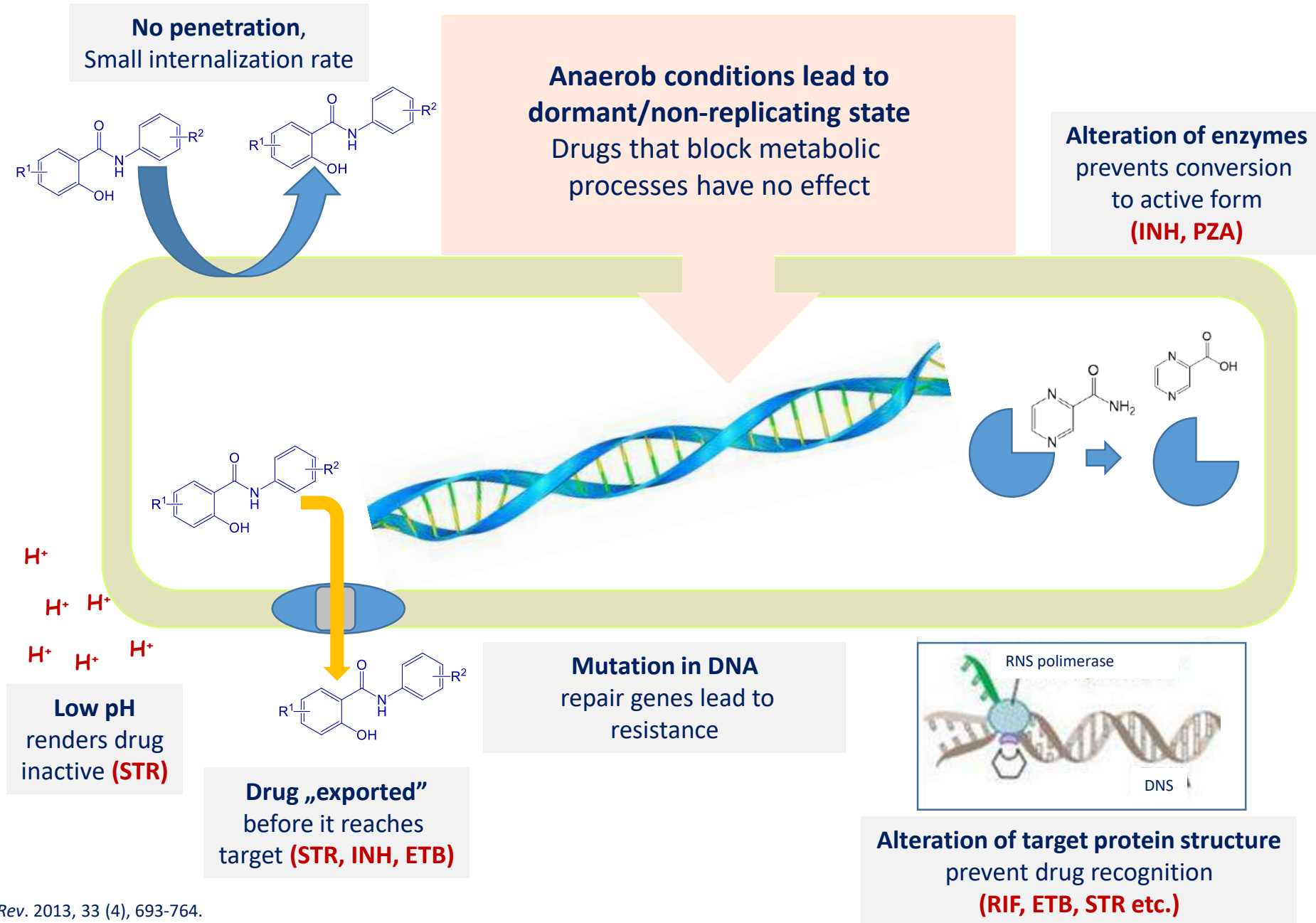
NATIONAL KORÁNYI INSTITUTE OF PULMONOLOGY, BUDAPEST

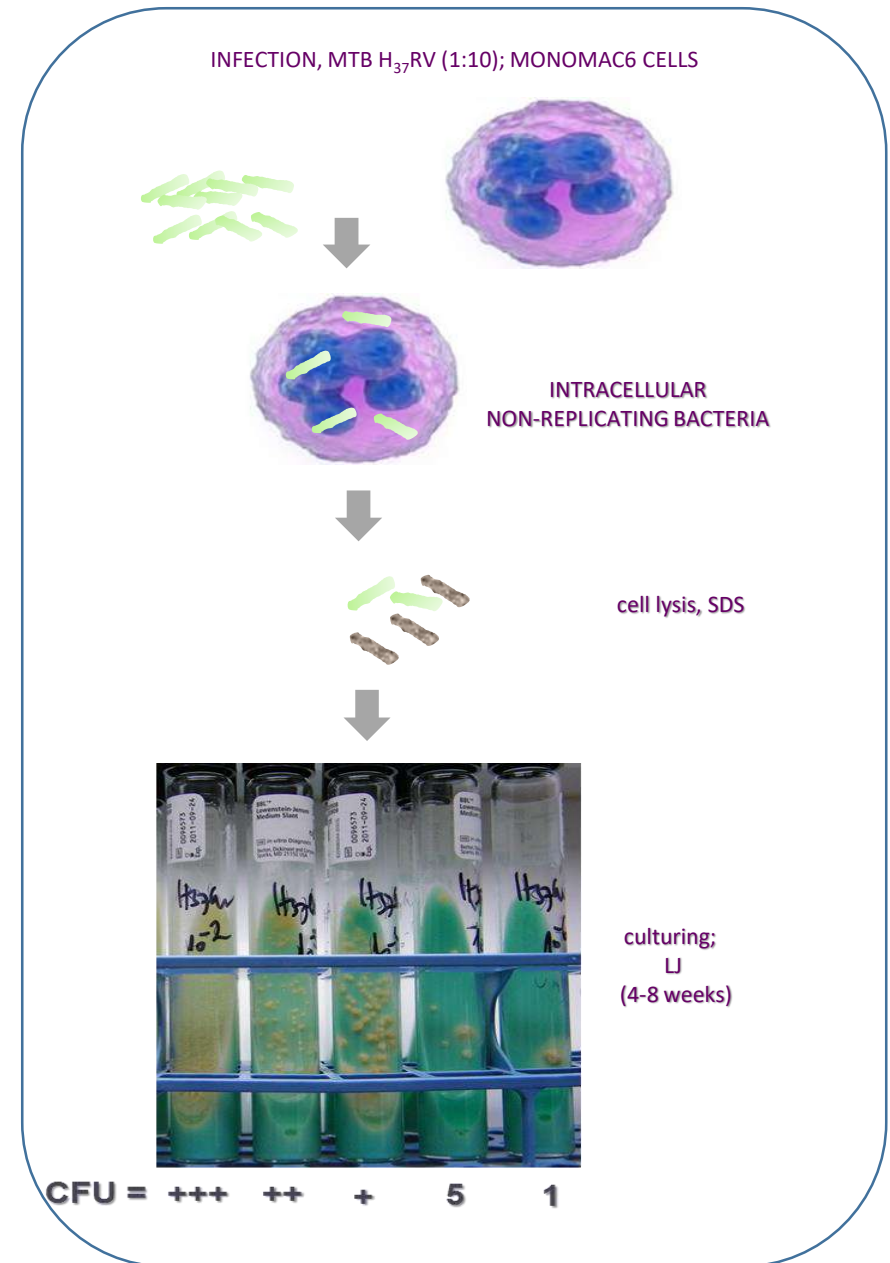
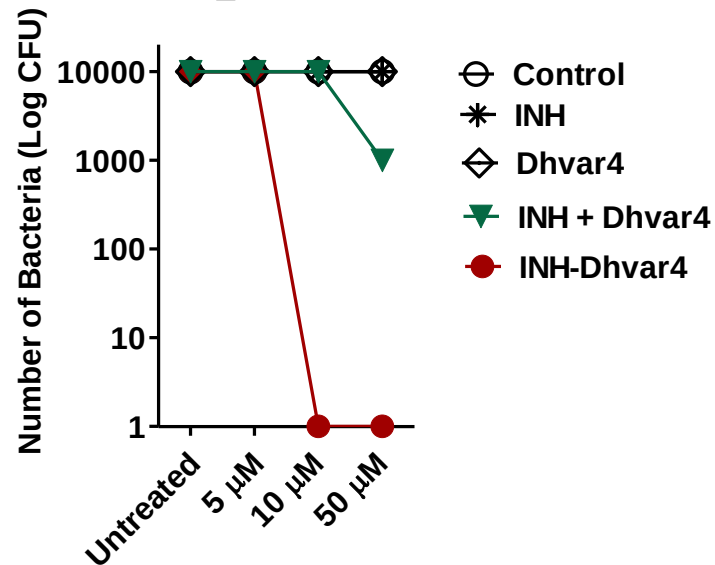
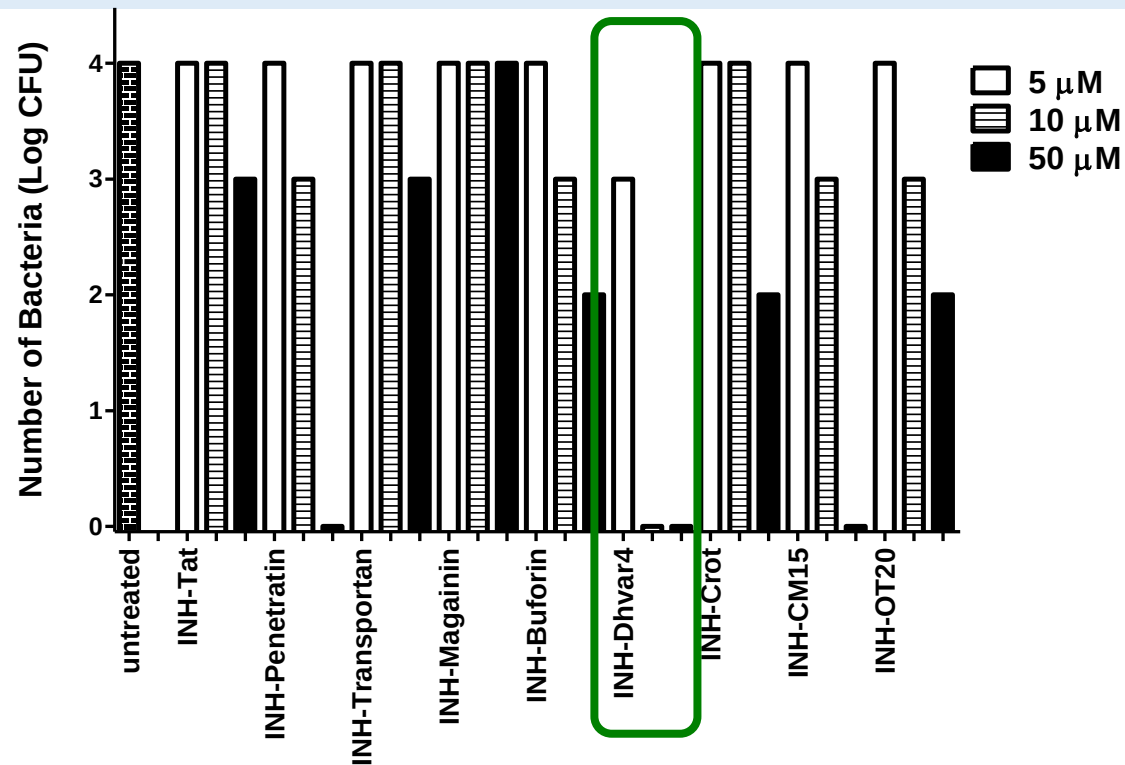
Eleonóra SZABÓ, Zsuzsanna SENONER, Sándor DÁVID

HOST CELL SPECIFIC TARGETING OF INTRACELLULAR PATHOGENS

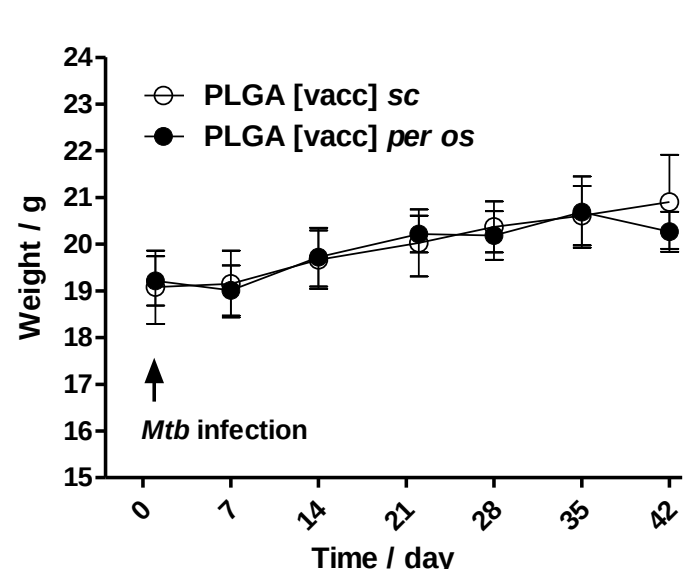
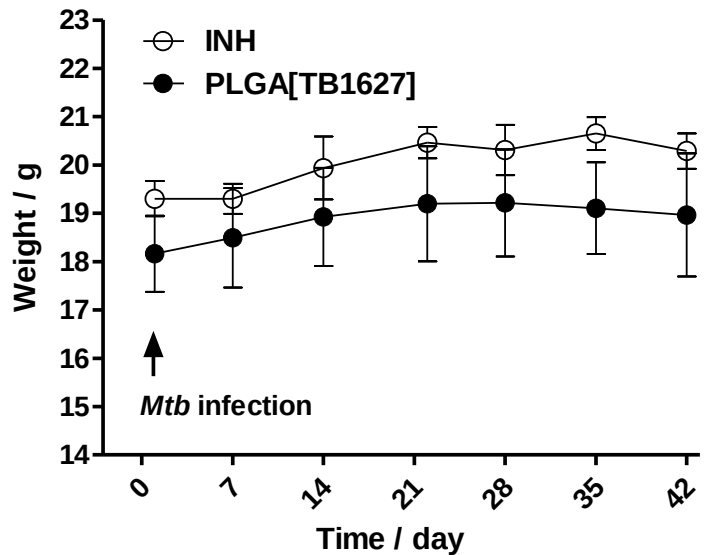
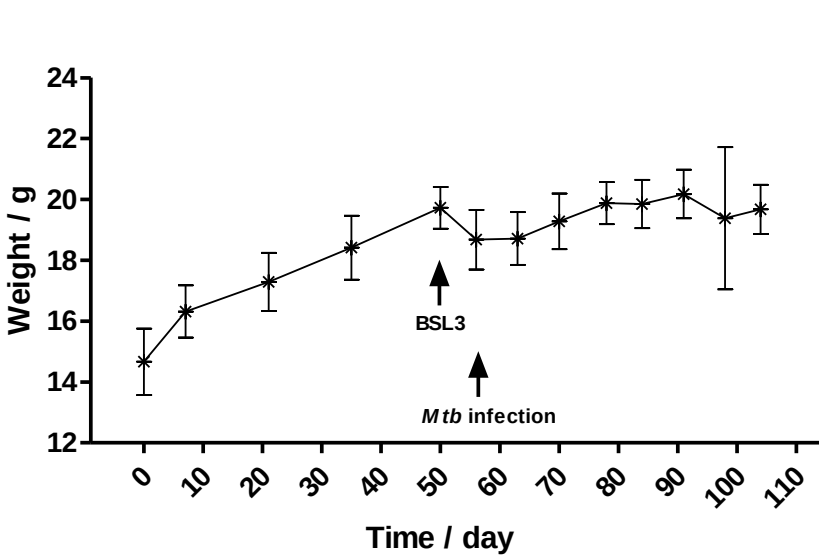


MYCOBACTERIUM TUBERCULOSIS PERSISTENCE, LATENCY, RESISTANCE



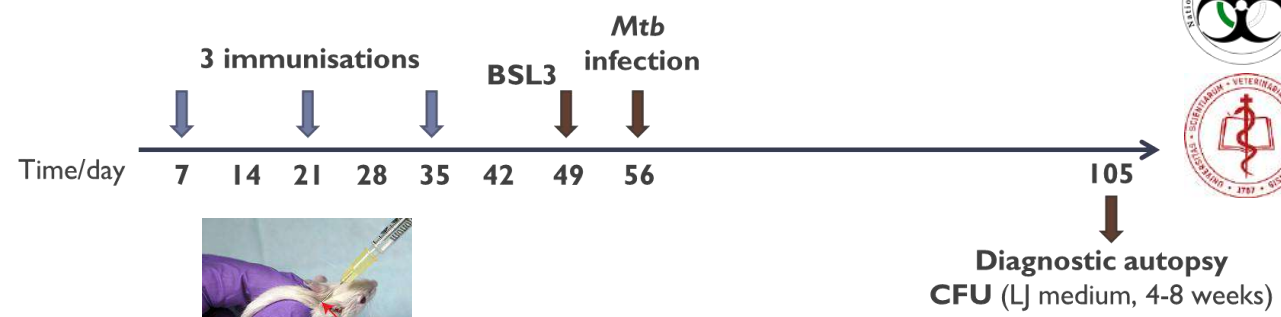


SLOW PROGRESSING AND SYSTEMIC DISEASE FOR PROLONGED SETUP

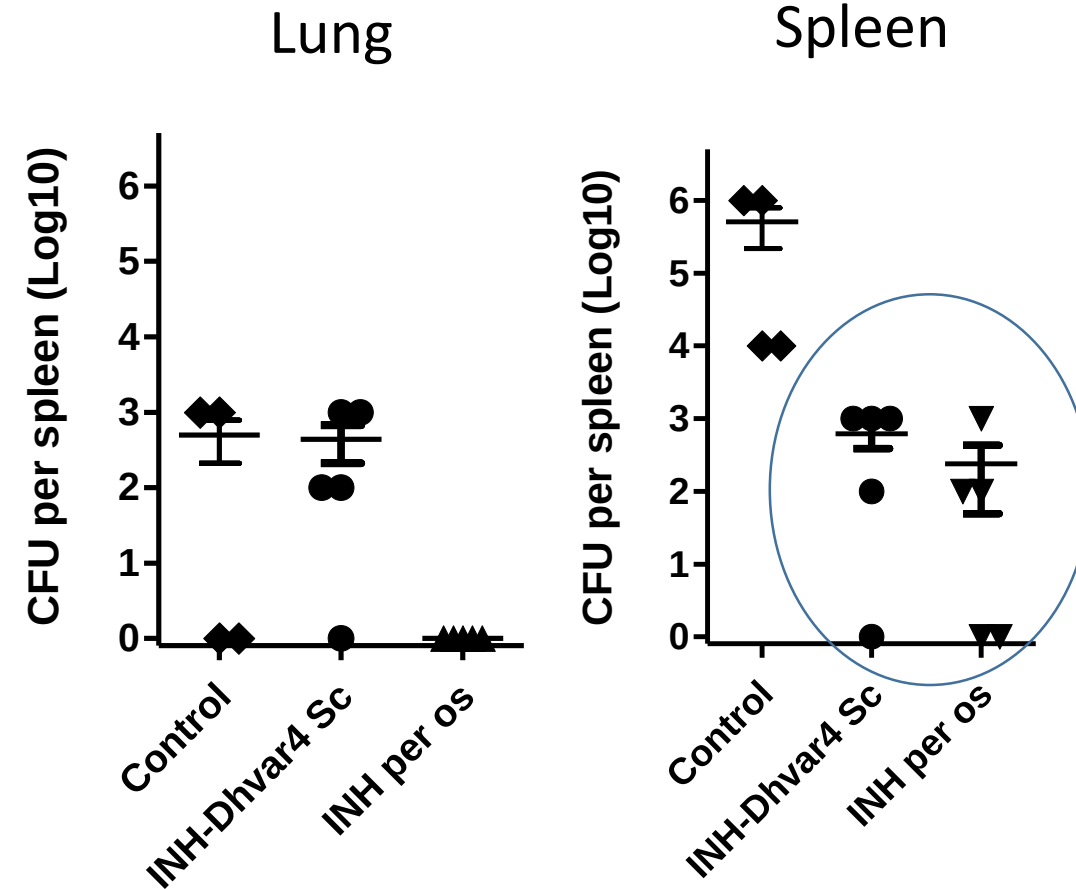
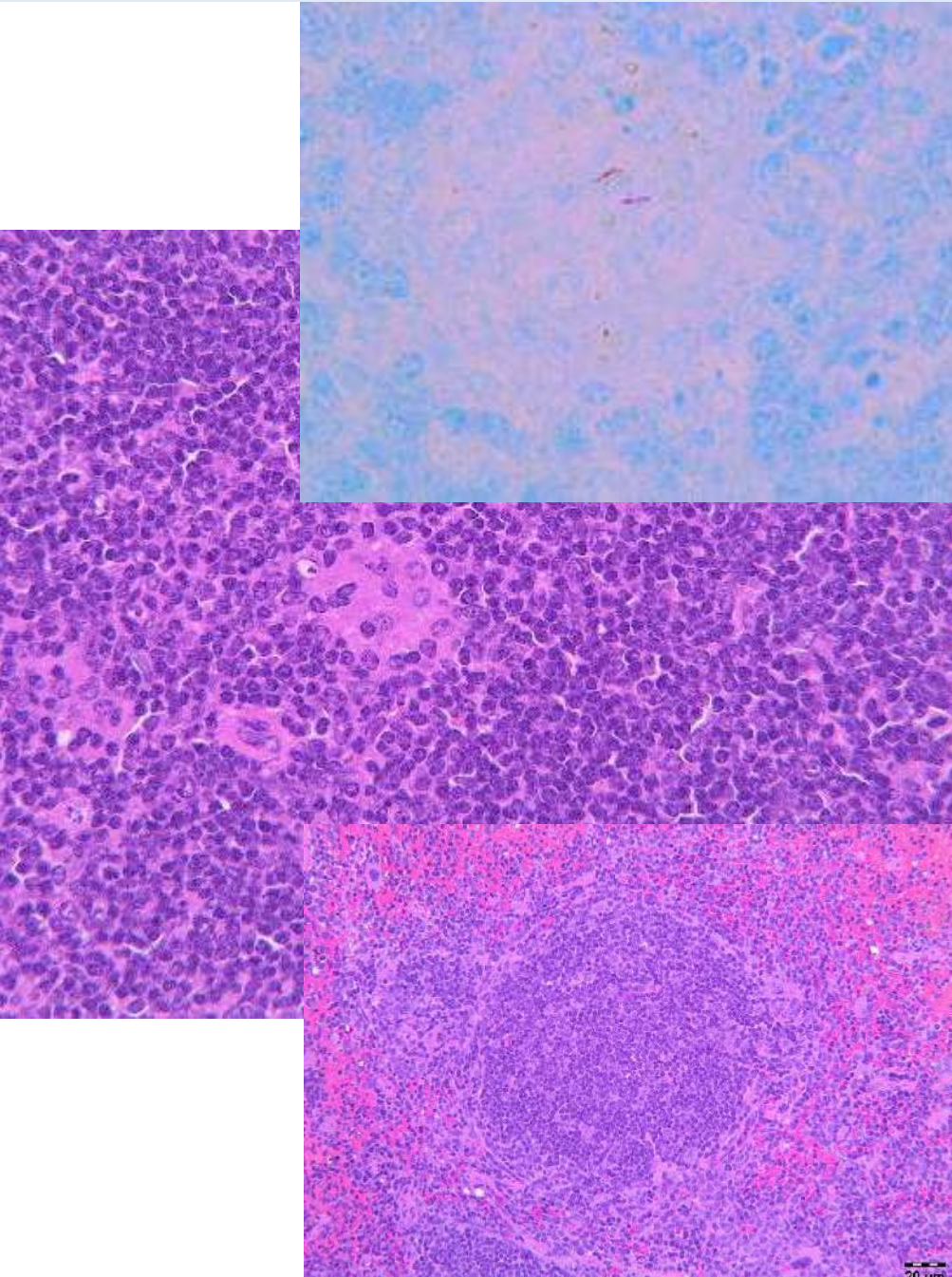


INTRAPERITONEAL (IP) ROUTE

TO TEST THE LONG-TERM ACTIVITY OF NOVEL ANTITUBERCULOTI AND VACCINE CANDIDATES.



IN VIVO ACTIVITY OF NEW COMPOUNDS ON BALB/C MURINE MODEL



Improved intracellular killing efficacy was measured for the INH-PEPTIDE conjugate compared to free INH

IN VIVO NEW FORMULATION

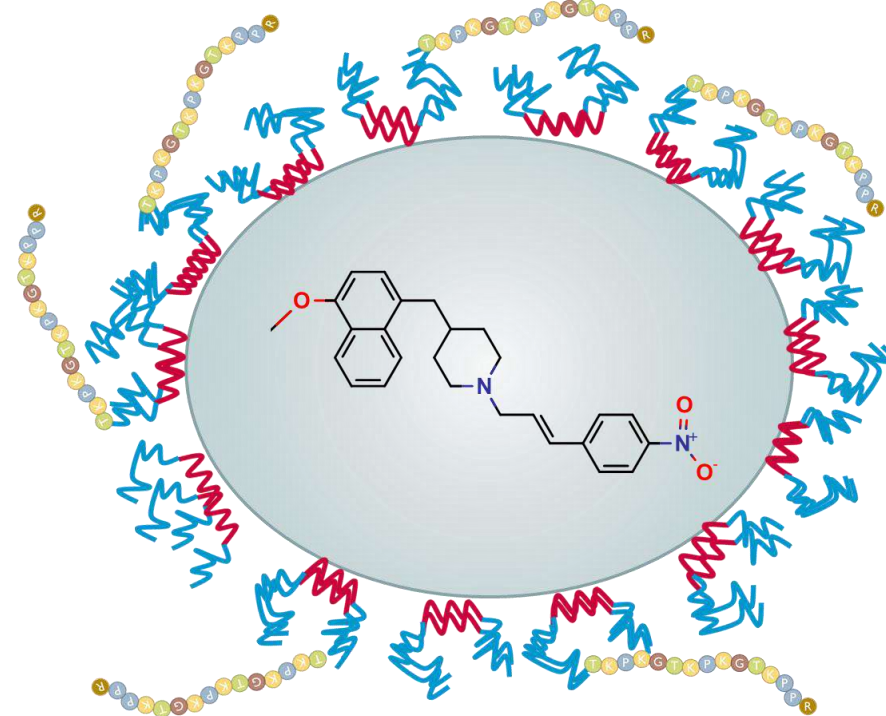
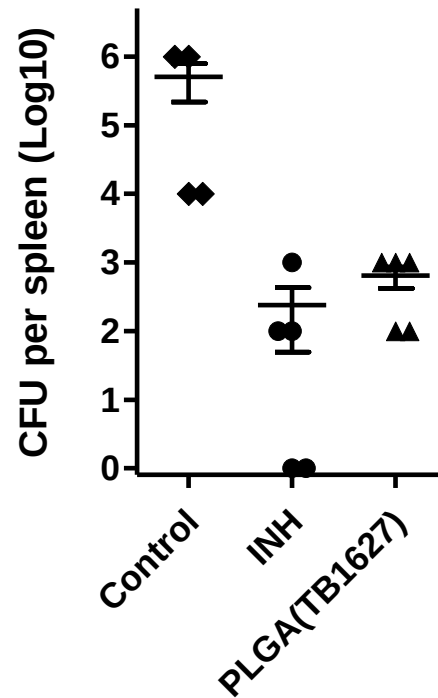
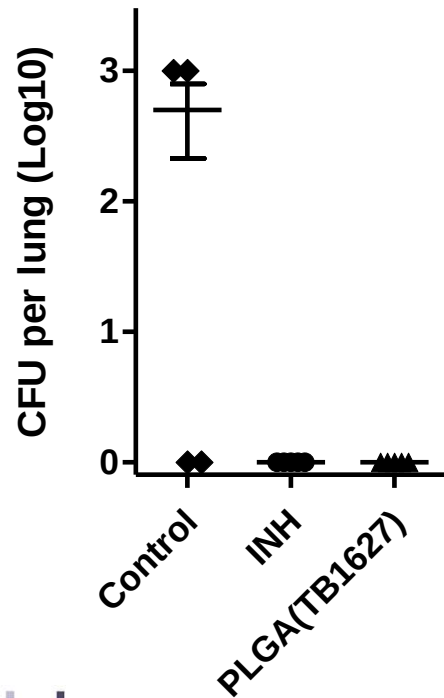
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European Research Infrastructure
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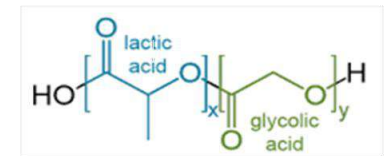


Treatment: 10-times, *per os* administration in 100 μ l PBS

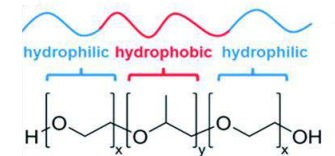
- Control
- INH group: 20 mg/kg bw
- PLGA (TB1627) group: 2.5 mg/kg bw



PLGA



Pluronic F127
PEO-PPO-PEO



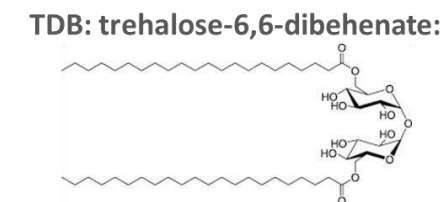
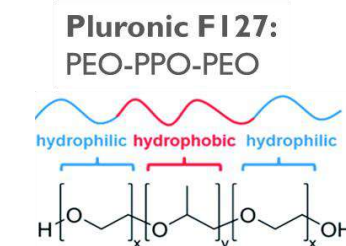
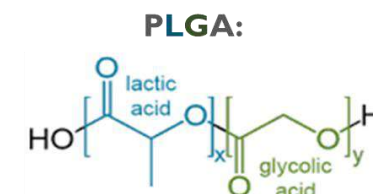
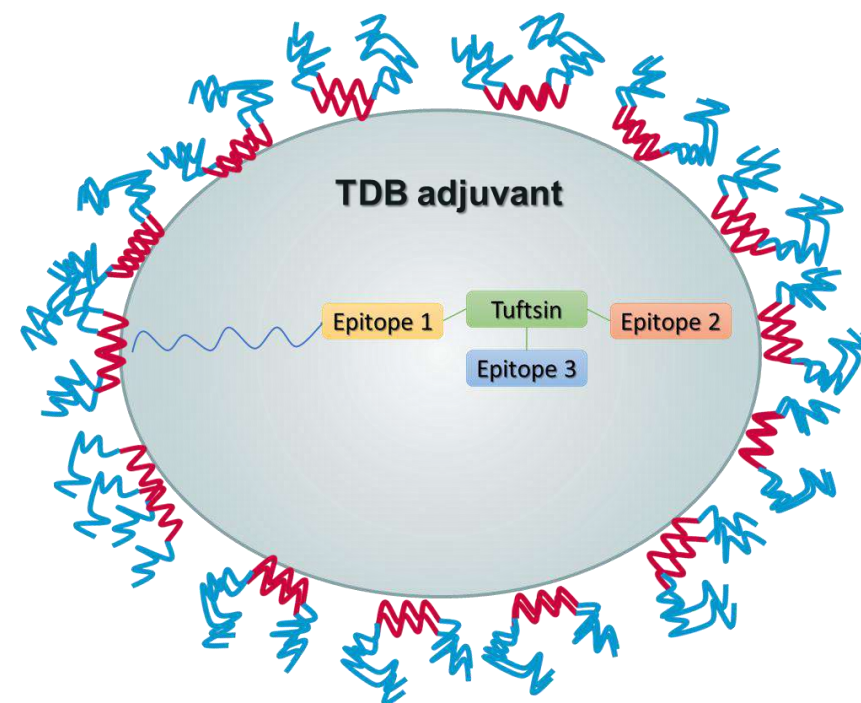
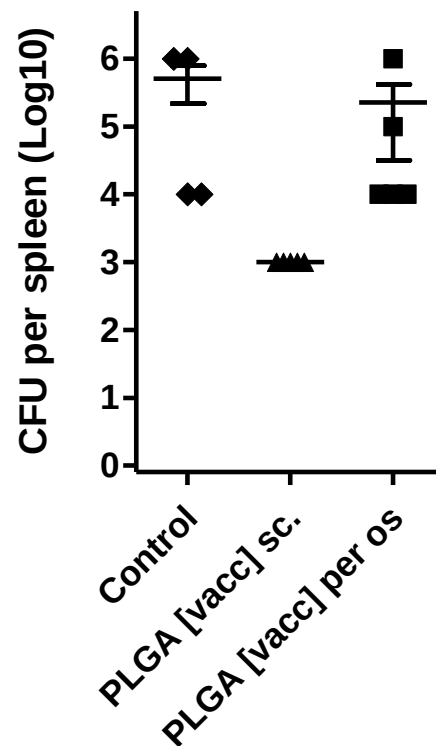
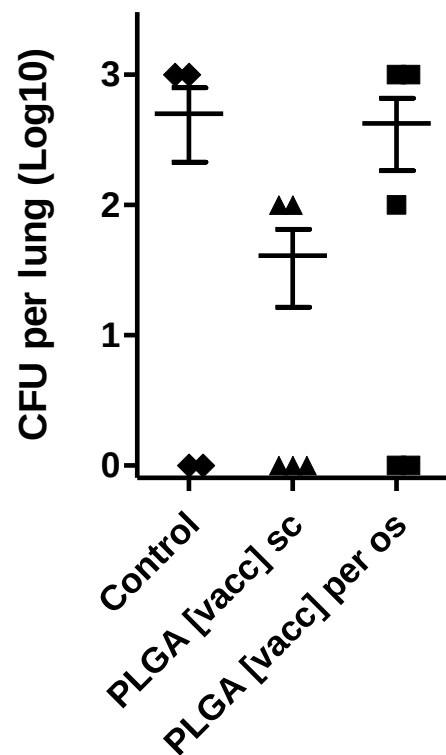
Cell targeting peptide





Immunisation: 50 µg peptide content / 100 µl PBS, *sc.* / *per os* administration

- Control (PBS, *sc.*)
- PLGA [vacc], *sc.*
- PLGA [vacc], *per os*



SLOW PROGRESSING IN VIVO MURINE MODEL



EXPERIMENTAL DESIGN AND VALIDATION TO EVALUATE VACCINE AND TREATMENT EFFICACY



Prague, 2019



frontiers
in Immunology

ORIGINAL RESEARCH
published: 12 November 2021
doi: 10.3389/fimmu.2021.750111

Novel Assay Platform to Evaluate Intracellular Killing of *Mycobacterium tuberculosis*: *In Vitro* and *In Vivo* Validation

Kata Horváti^{1,2}, Kinga Fodor³, Bernadett Pályi⁴, Judit Henczkó⁴, Gyula Balka⁵,
Gergő Gyulai⁶, Éva Kiss⁶, Beáta Biri-Kovács², Zsuzsanna Senoner⁷ and Szilvia Bősze^{1,6}

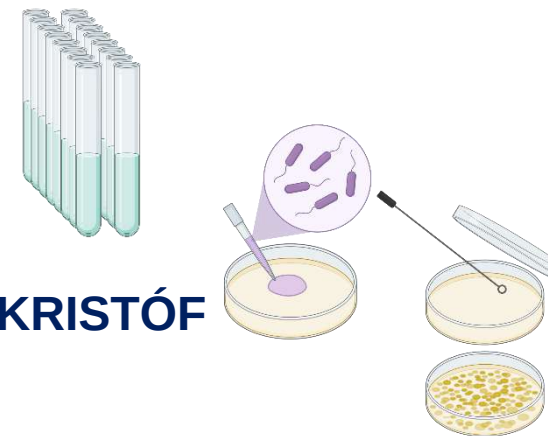
Frontiers in
Immunology

IMPACT FACTOR 7.561
CITESCORE 8.1

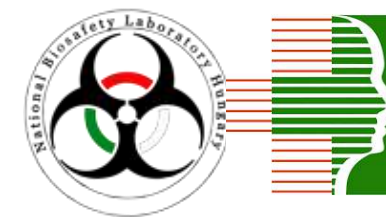
NEW MEMBERS IN THE COLLABORATION WITH NBL OF NPHC



**INSTITUTE OF MEDICAL MICROBIOLOGY
SEMMELWEIS UNIVERSITY, BUDAPEST**



Orsolya DOBAY, Andrea HORVÁTH, Katalin KRISTÓF



**DEPARTMENT OF PLANT ANATOMY, INSTITUTE OF BIOLOGY,
EÖTVÖS UNIVERSITY**

**Gábor M. KOVÁCS, Imre BOLDIZSÁR, Ildikó IMREFI,
Péter BEREK-NAGY, Sándor CSÍKOS, Dóra VARGA**



**DEPARTMENT OF BIOLOGICAL PHYSICS, INSTITUTE OF PHYSICS,
EÖTVÖS UNIVERSITY**

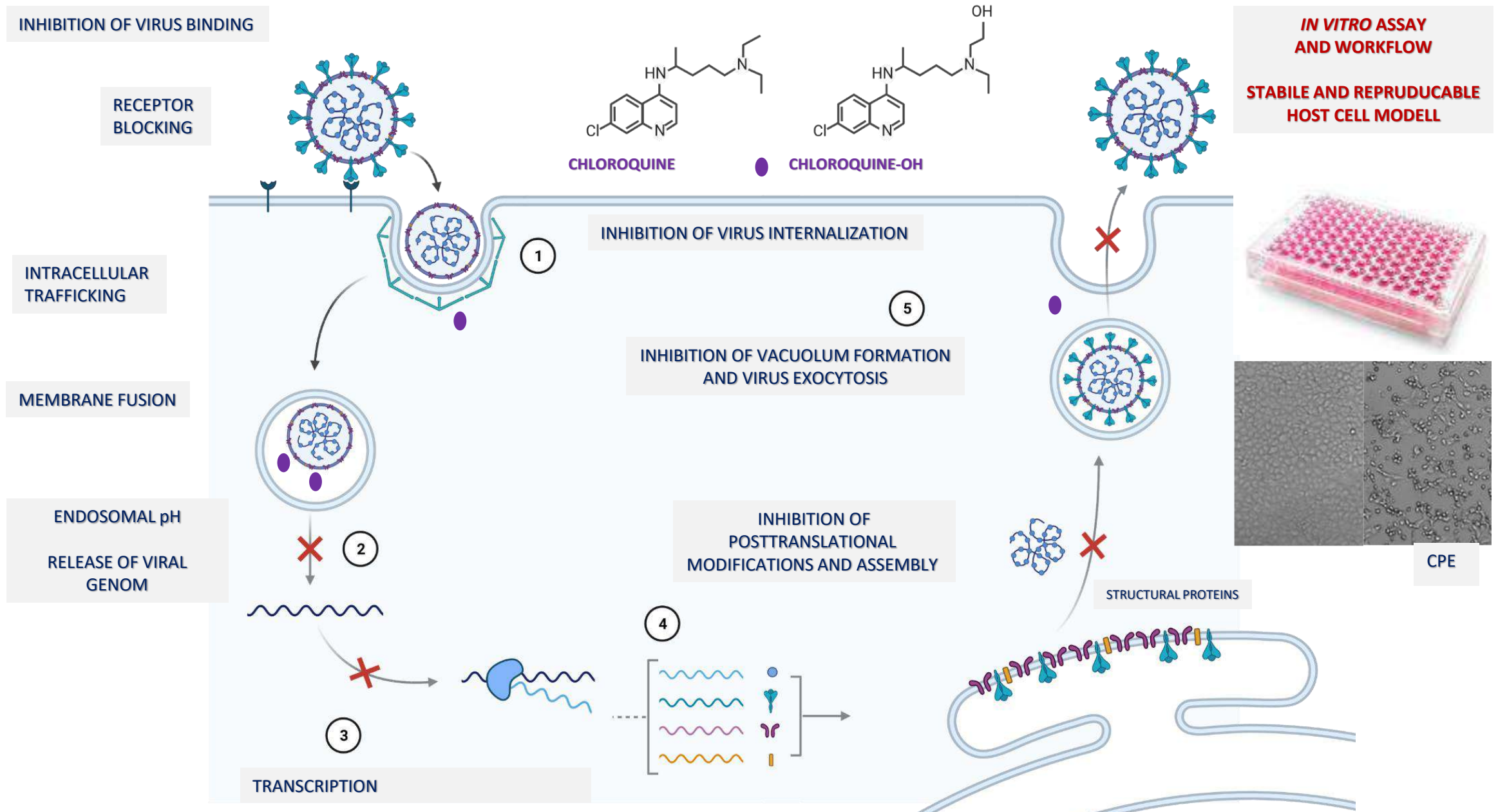
András CZIRÓK, Előd MÉHES, Júlia TÁRNOKI-ZÁCH



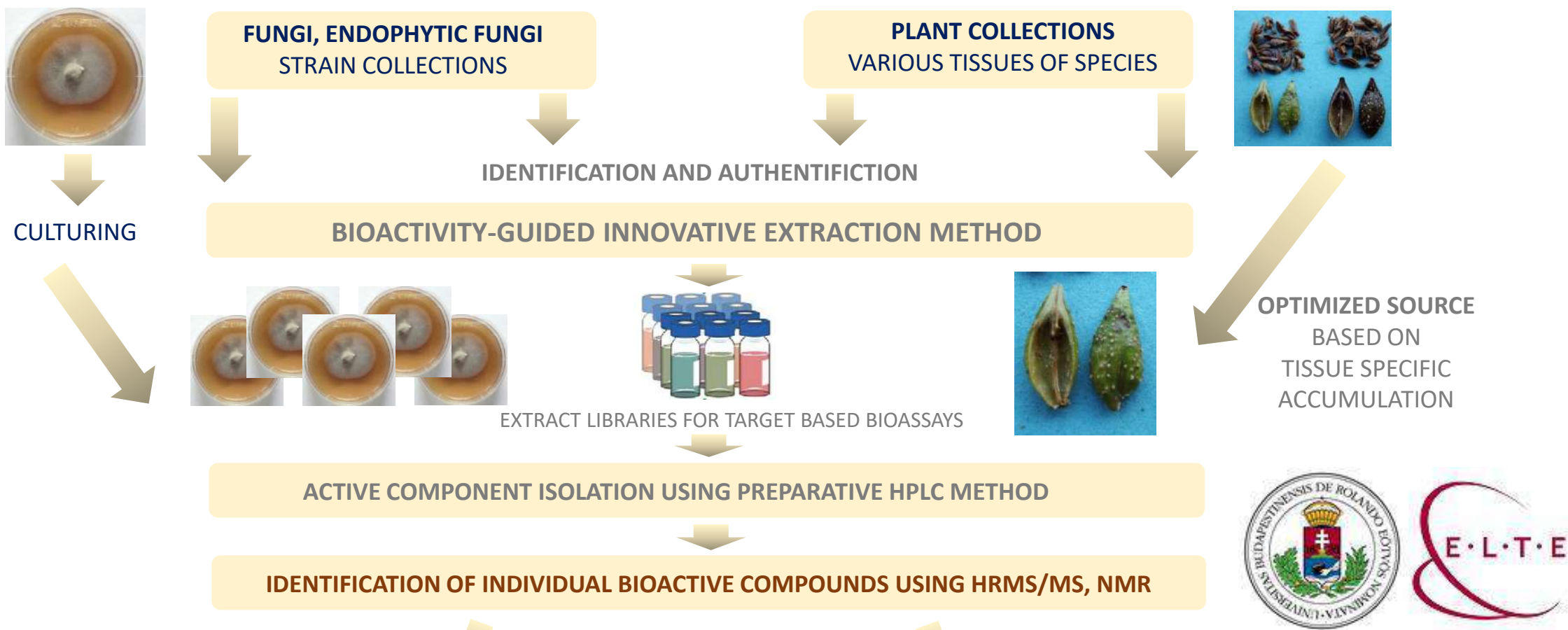
**FACULTY OF MEDICINE
IN HRADEC KRÁLOVÉ**
Charles University

**DR. JARMILA VINŠOVÁ
DR. MARTIN KRÁTKÝ
VÁCLAV PFLÉGR**

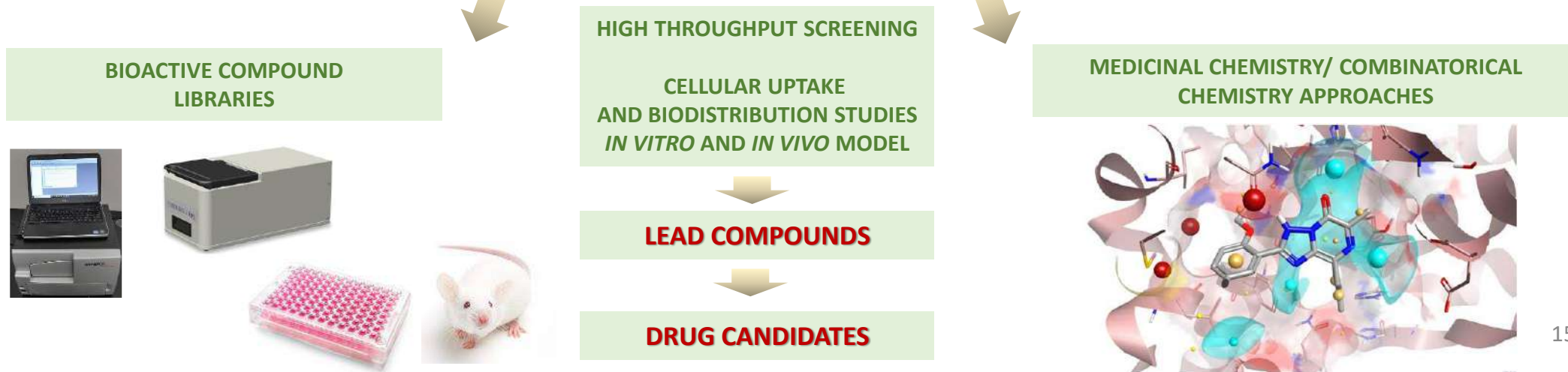




DRUG DISCOVERY

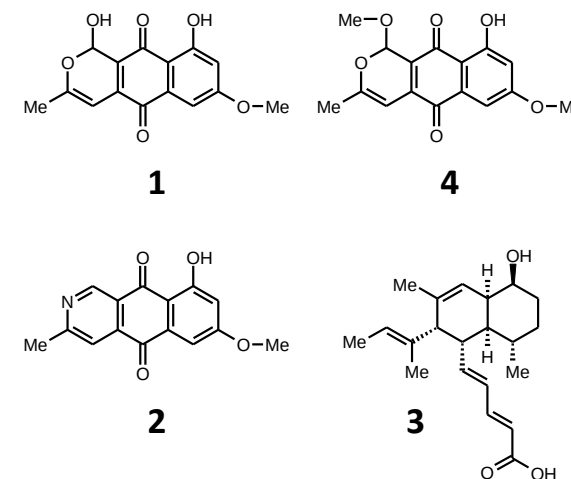


DRUG DEVELOPMENT

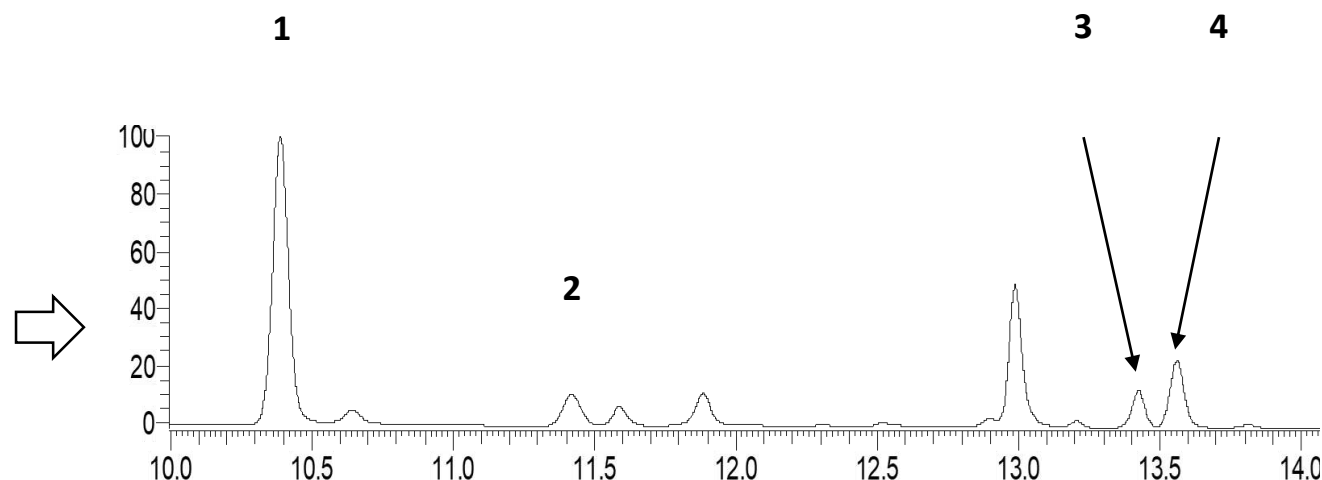


ISOLATION AND IDENTIFICATION OF FUNGI METABOLITES

Darksidea sp.



CULTURE „A”



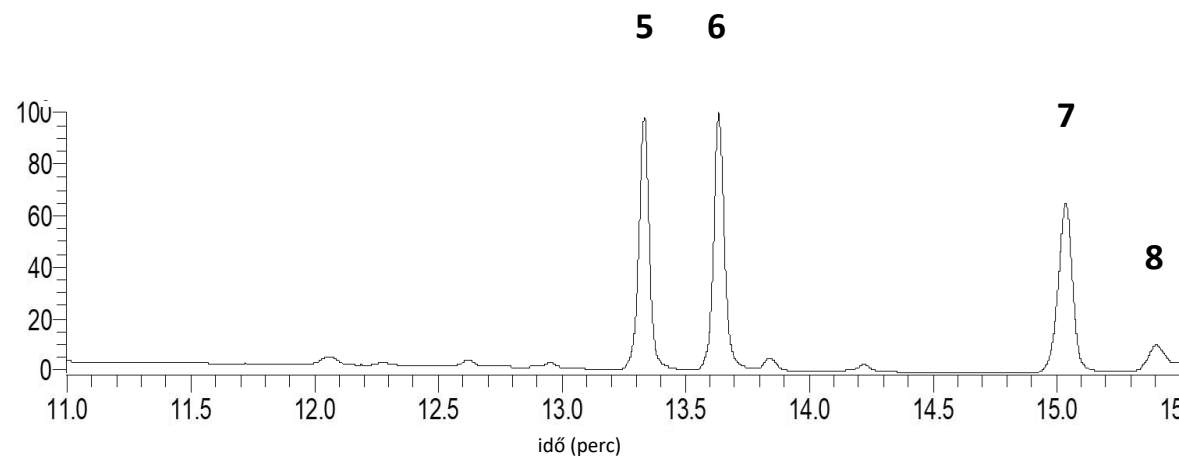
MeOH extract, HPLC-UV chromatogram ($\lambda=230-600$ nm)

1-4: isolated, identified compounds



ISOLATION AND IDENTIFICATION OF FUNGI METABOLITES

Darksidea sp.

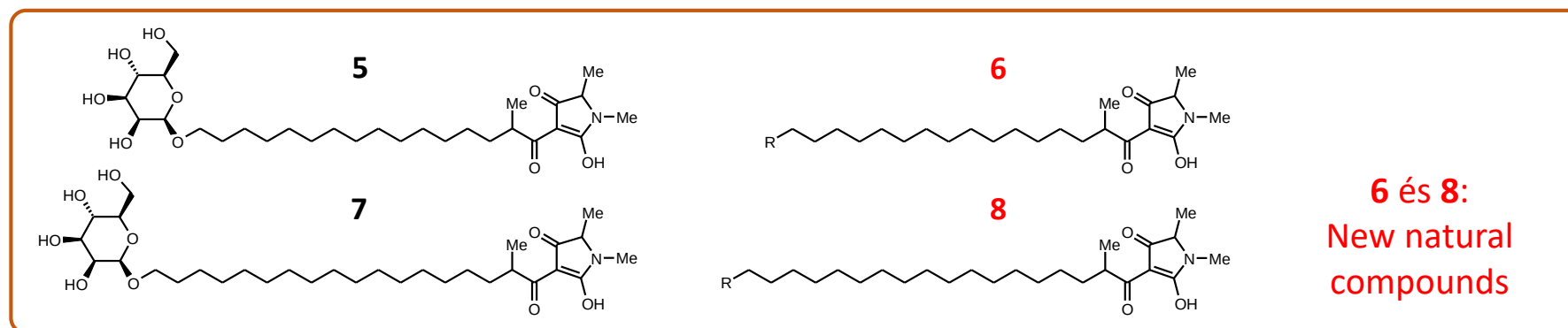


MeOH extract, HPLC-UV chromatogram ($\lambda=230-600$ nm)

5-8: isolated, identified compounds

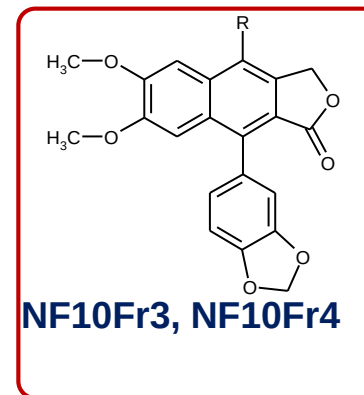
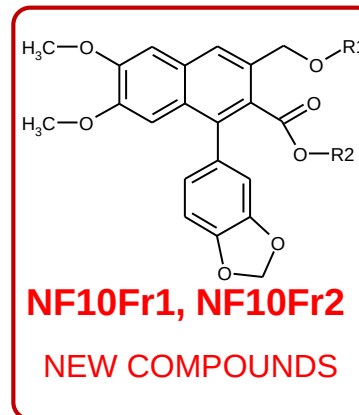
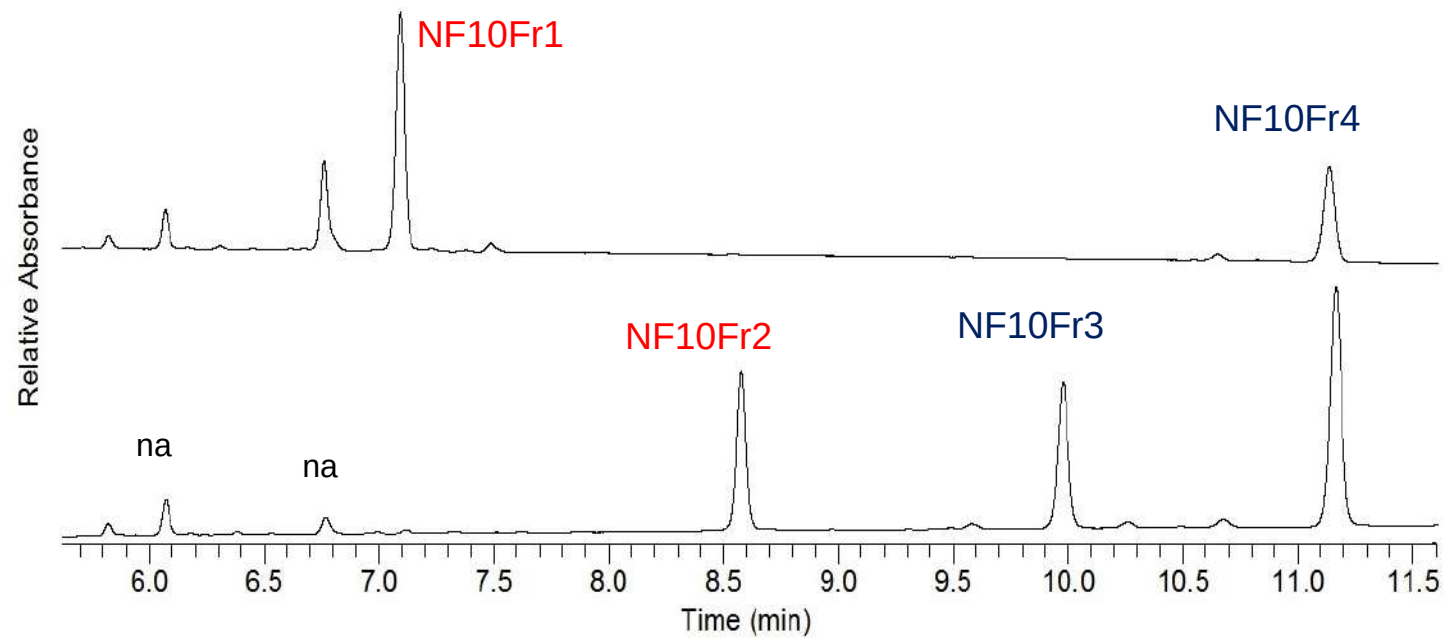


CULTURE „B”



6 és 8:
New natural
compounds

ISOLATION AND IDENTIFICATION OF LIGNANS FROM *LINUM SP.*

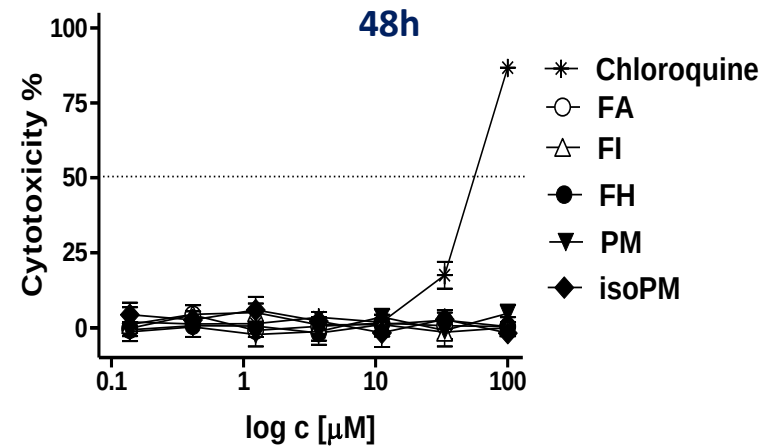
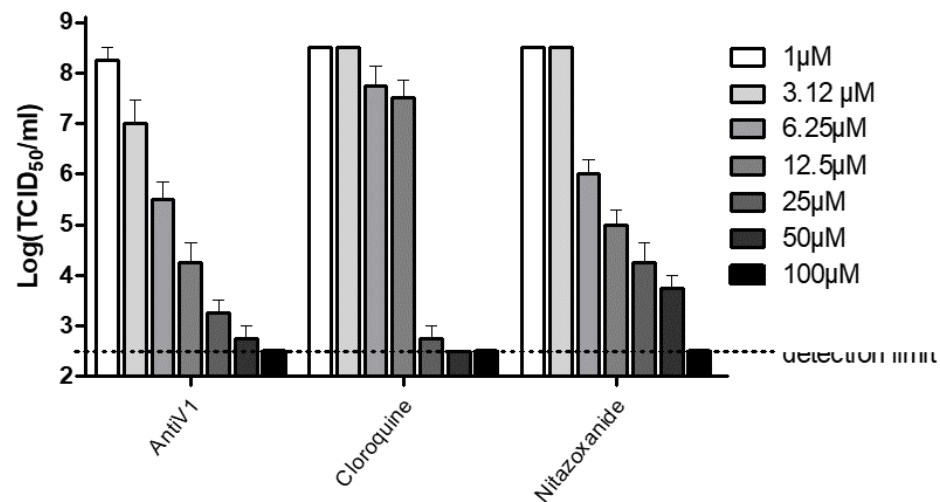
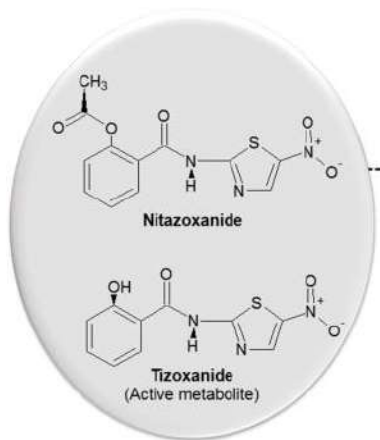
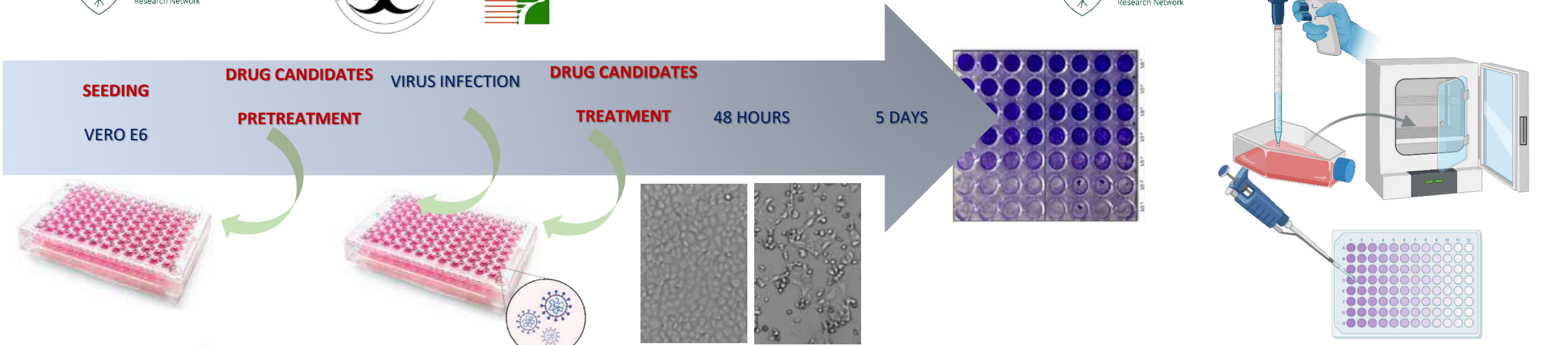


MeOH extract (A) in acidic conditions (B) HPLC-UV chromatogram ($\lambda=230-600$ nm)
N10Fr1 – N10Fr4: isolated, identified compounds

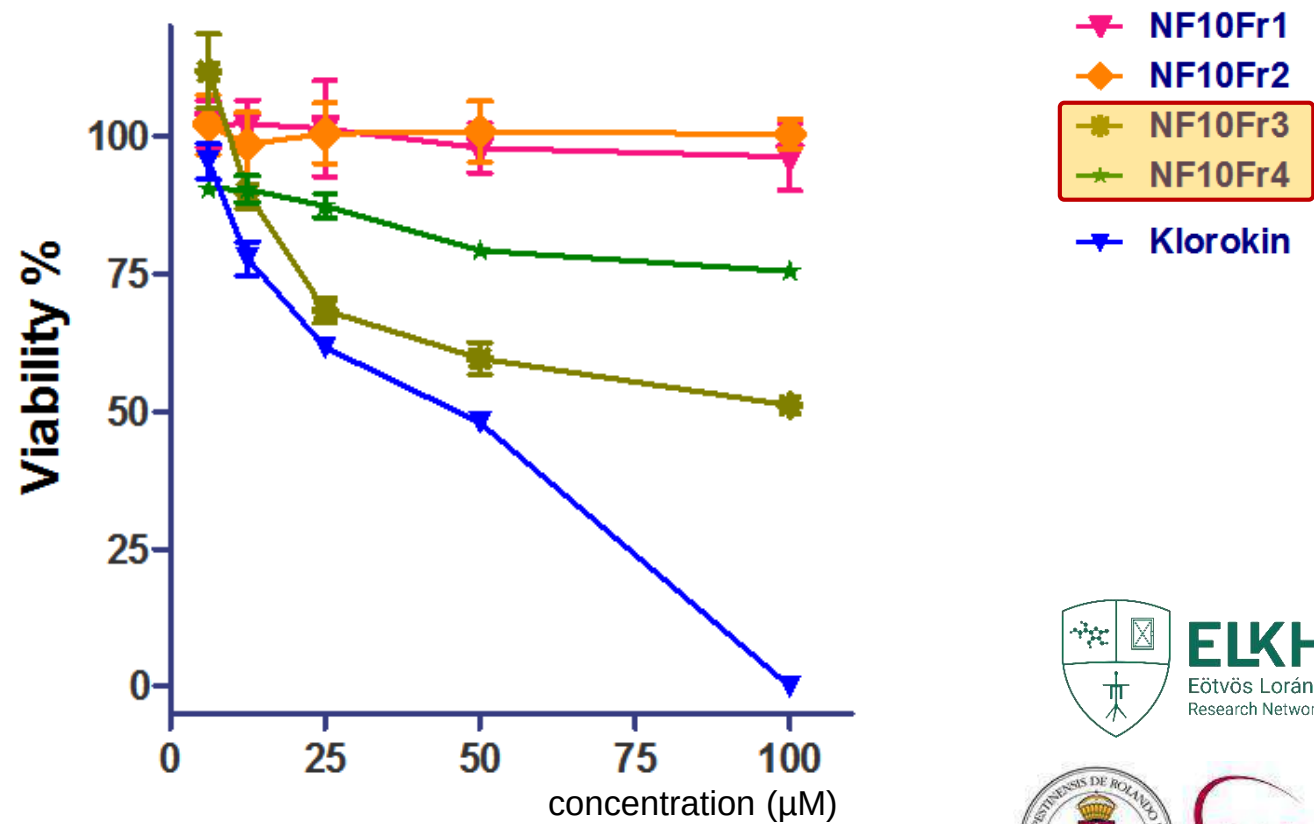
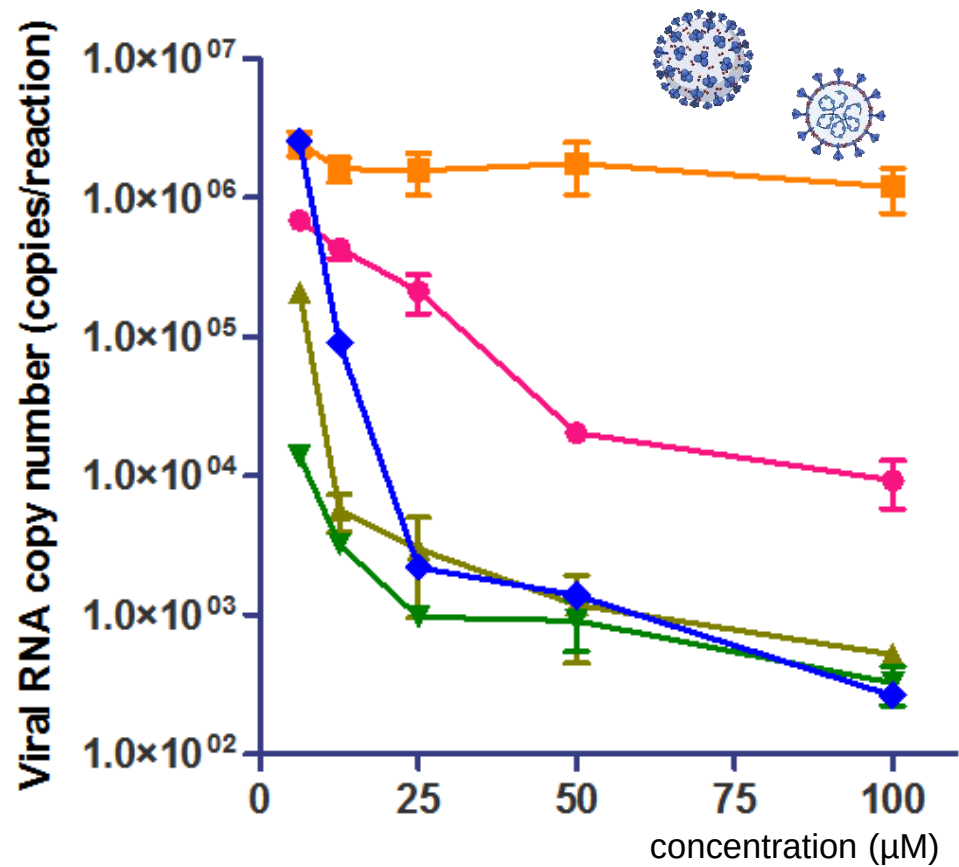
ANTIVIRAL ASSAY AND WORKFLOW



IN VITRO SELECTIVITY STUDIES

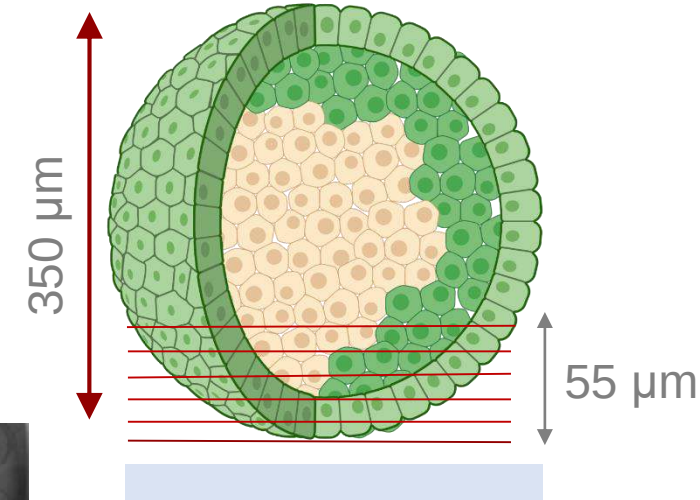
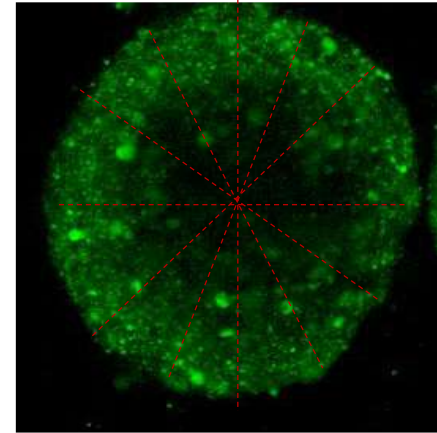
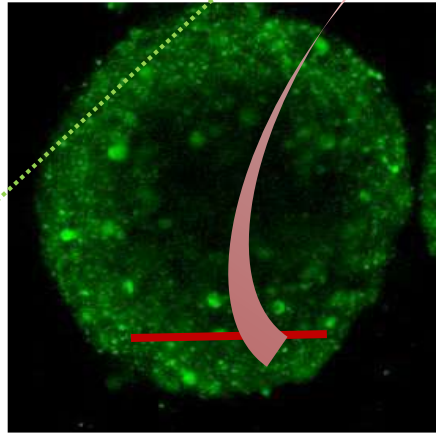
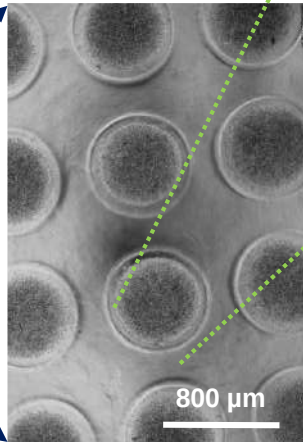
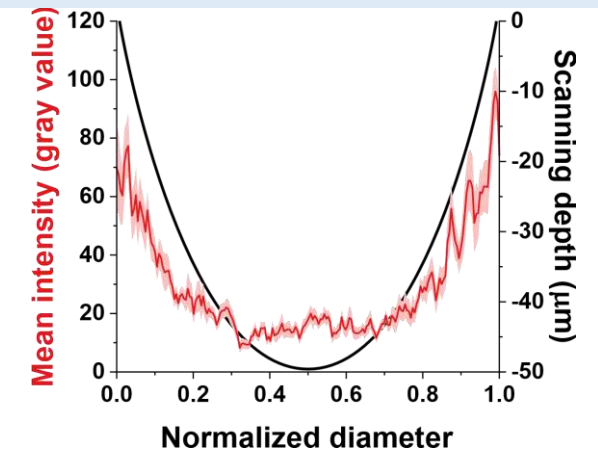
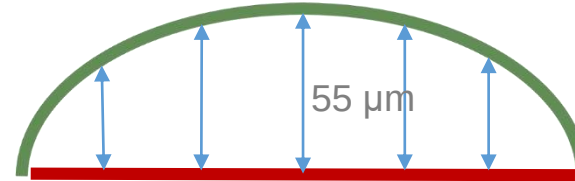
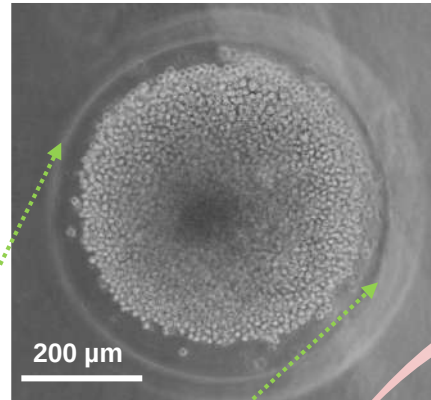


ANTIVIRAL ACTIVITY OF THE NEW NATURAL COMPOUNDS

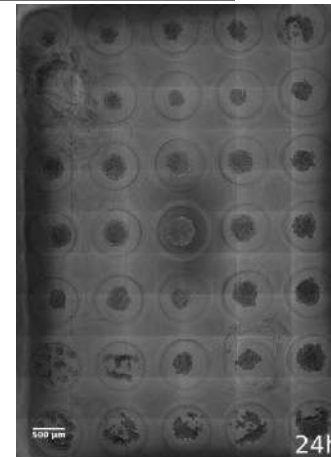
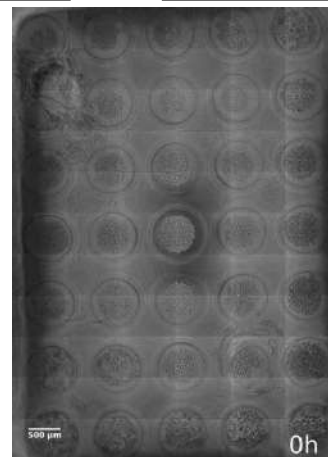
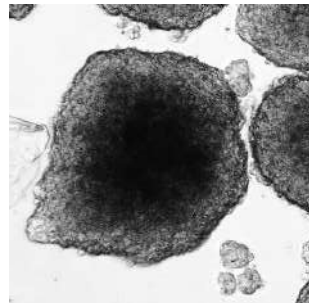
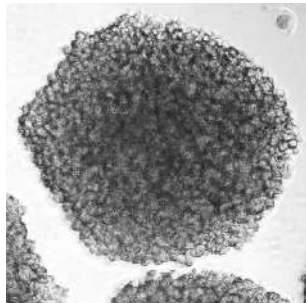
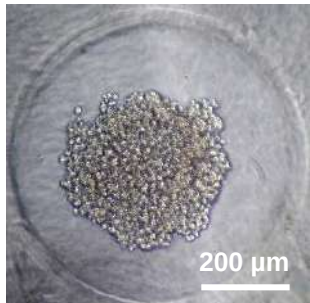


EFFECTIVITY AND NO CYTOTOXICITY ON HOST MODEL VERO E6 CULTURES

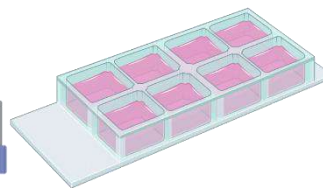
TISSUE MIMICKING SPHEROID SYSTEMS FOR PENETRATION AND INFECTION STUDIES



MONITORING THE SPHEROIDS



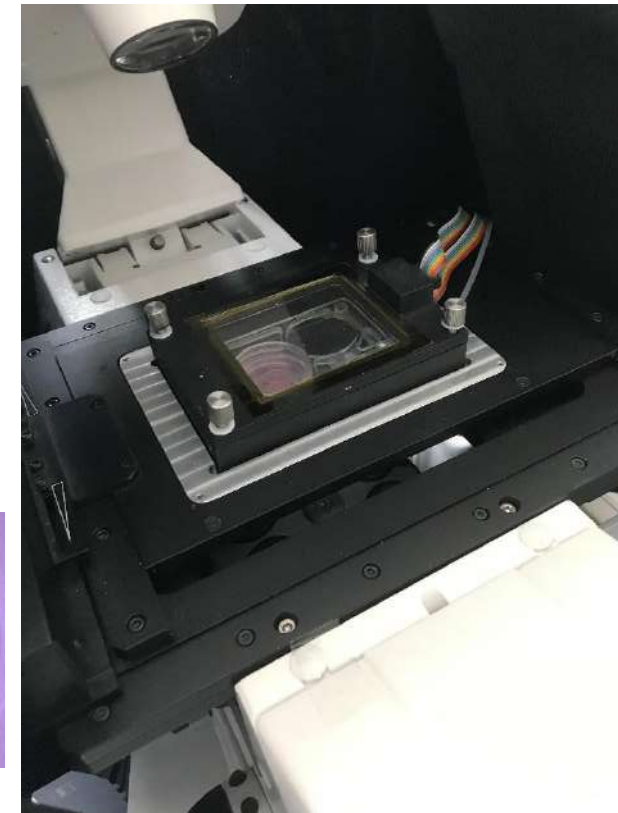
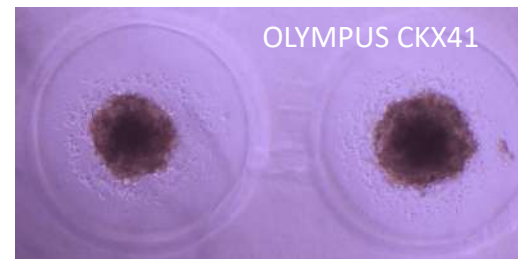
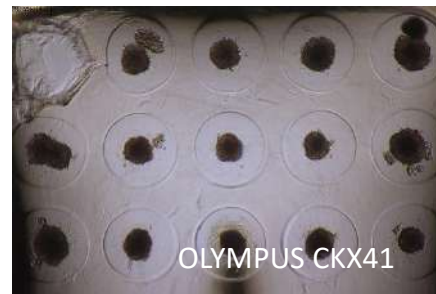
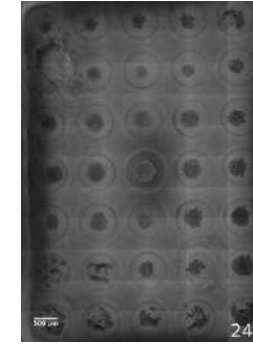
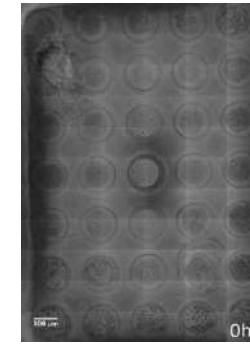
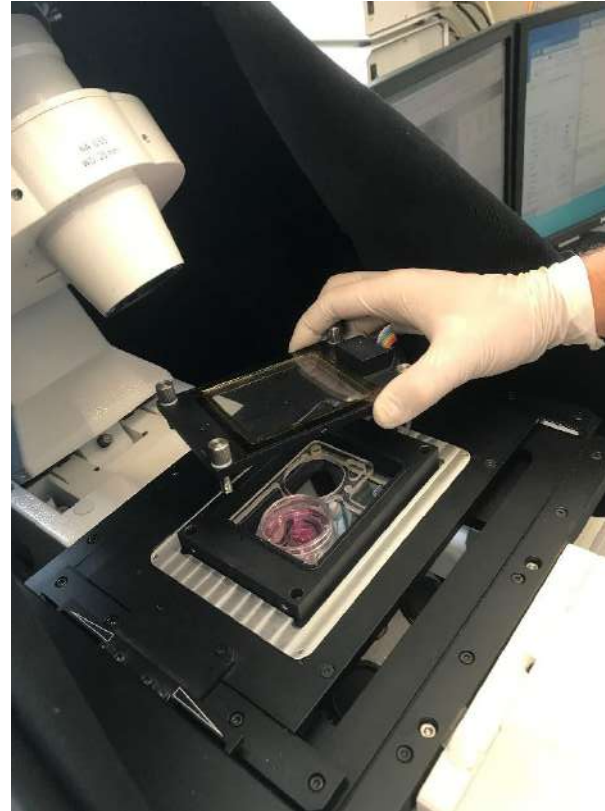
Baranyai Z, *J Med Chem.* 64(6):2982 (2021)
 Horváth L, *Eur J Pharm Biopharm* (2021) UNDER REVISION
 Horváti K, *Frontiers in Immunology* (2021) DOI=10.3389/fimmu.2021.750496



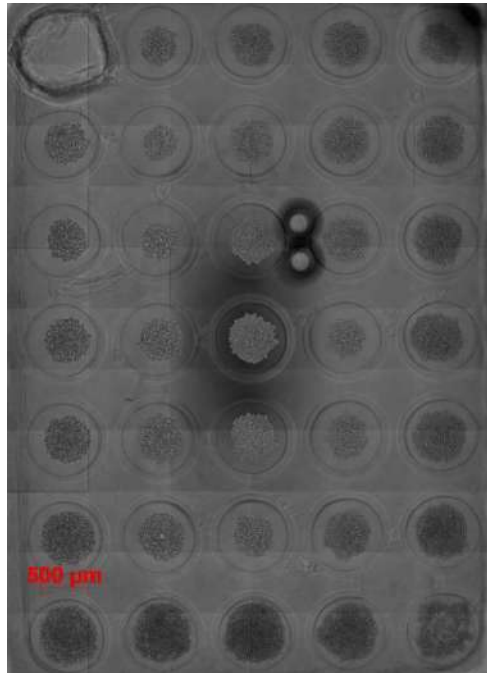
erinha

European Research Infrastructure
on Highly Pathogenic Agents

TISSUE MIMICKING SPHEROID SYSTEMS ARE SUITABLE FOR BSL2, BSL3 AND BSL4 LABORATORIES



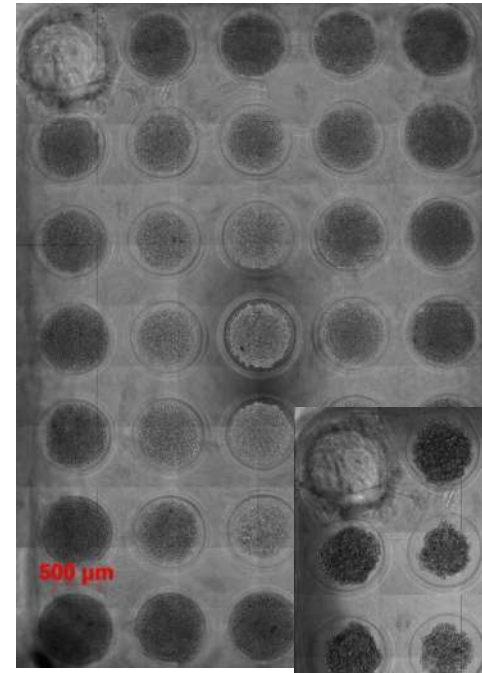
TISSUE MIMICKING SPHEROID SYSTEMS' MONITORING IS POSSIBLE IN BSL2, BSL3 AND BSL4 LABORATORIES



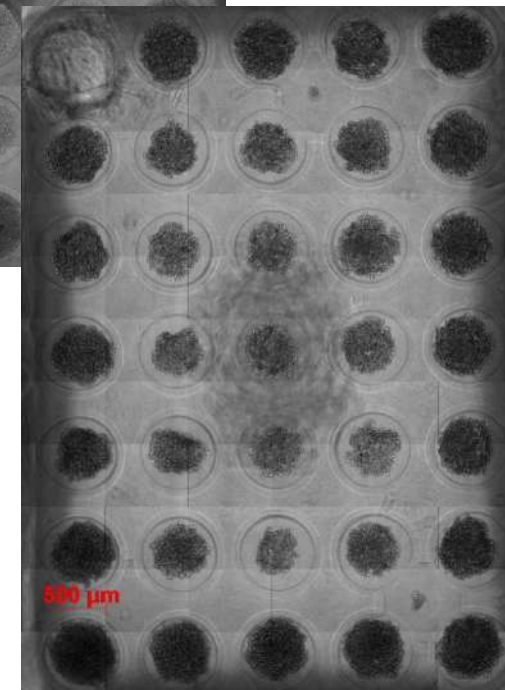
VERO E6 1ST DAY



2ND DAY



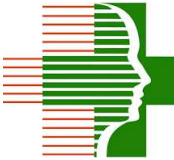
VERO E6 1ST DAY



2ND DAY

PRODUCTION
INFECTION
TREATMENT
NEUTRALIZATION, FIXATION

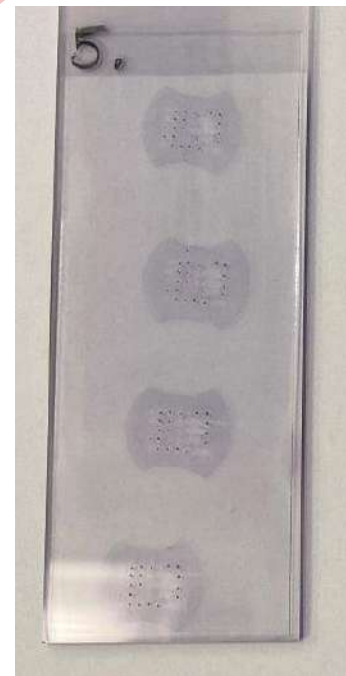
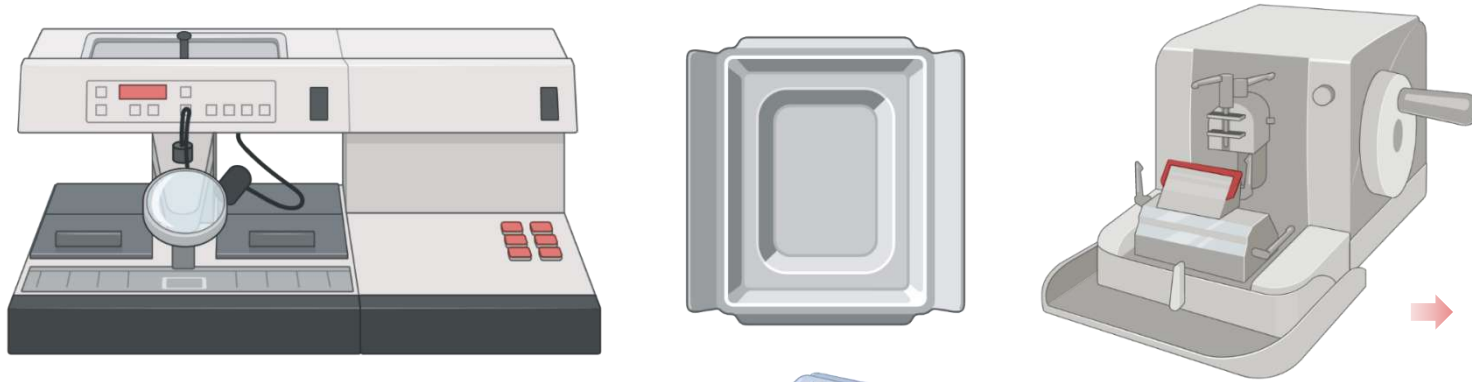
TISSUE MIMICKING SPHEROID SYSTEMS' TREATMENT IS POSSIBLE IN BSL2, BSL3 AND BSL4 LABORATORIES



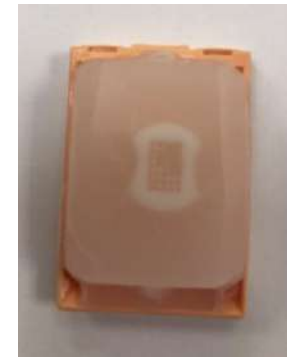
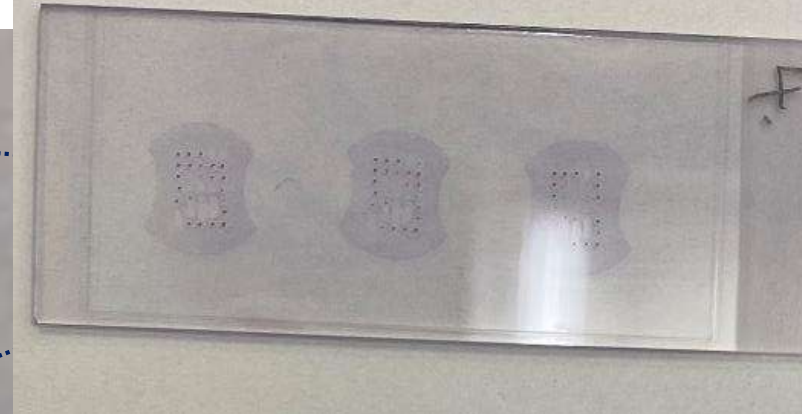
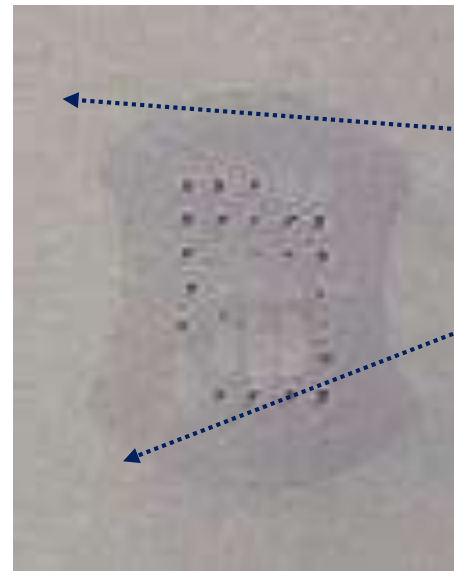
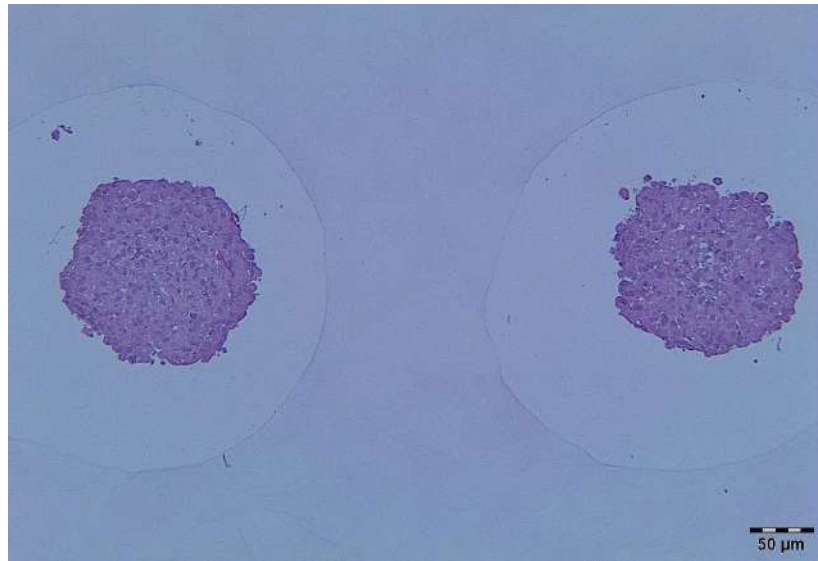
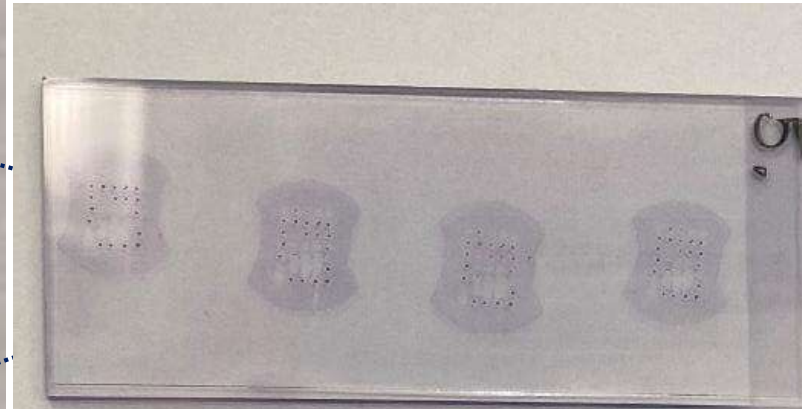
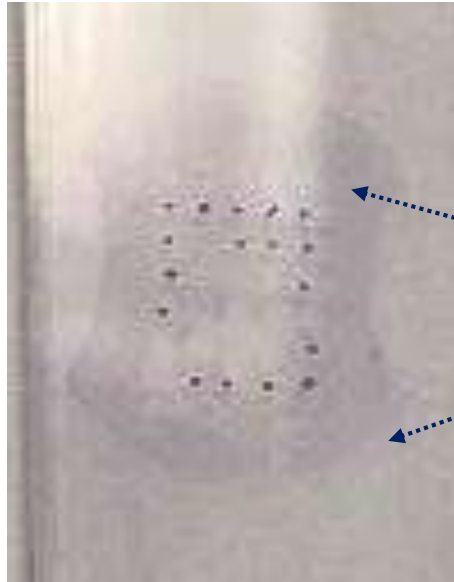
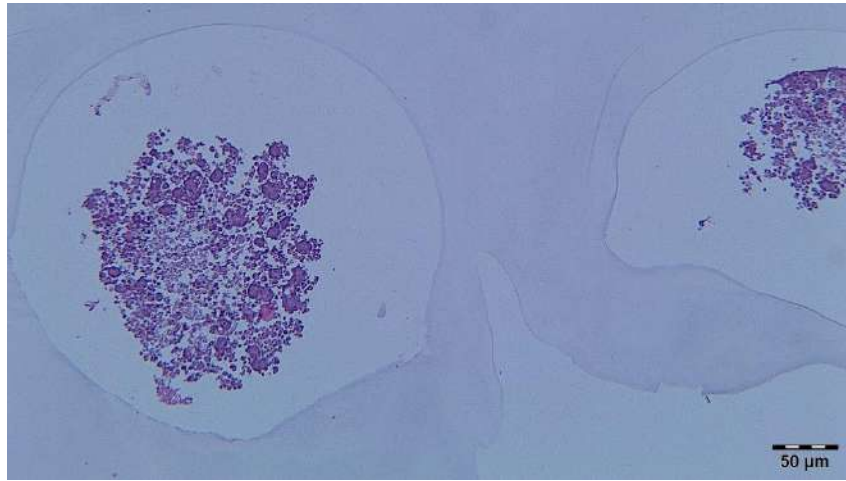
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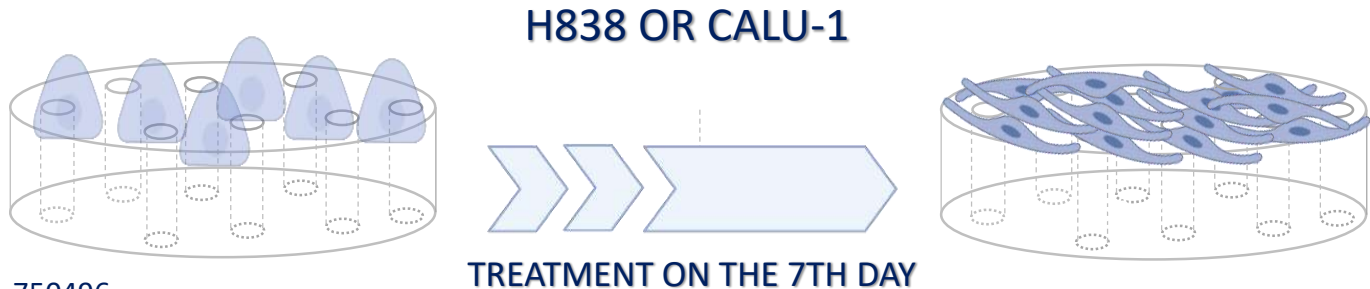
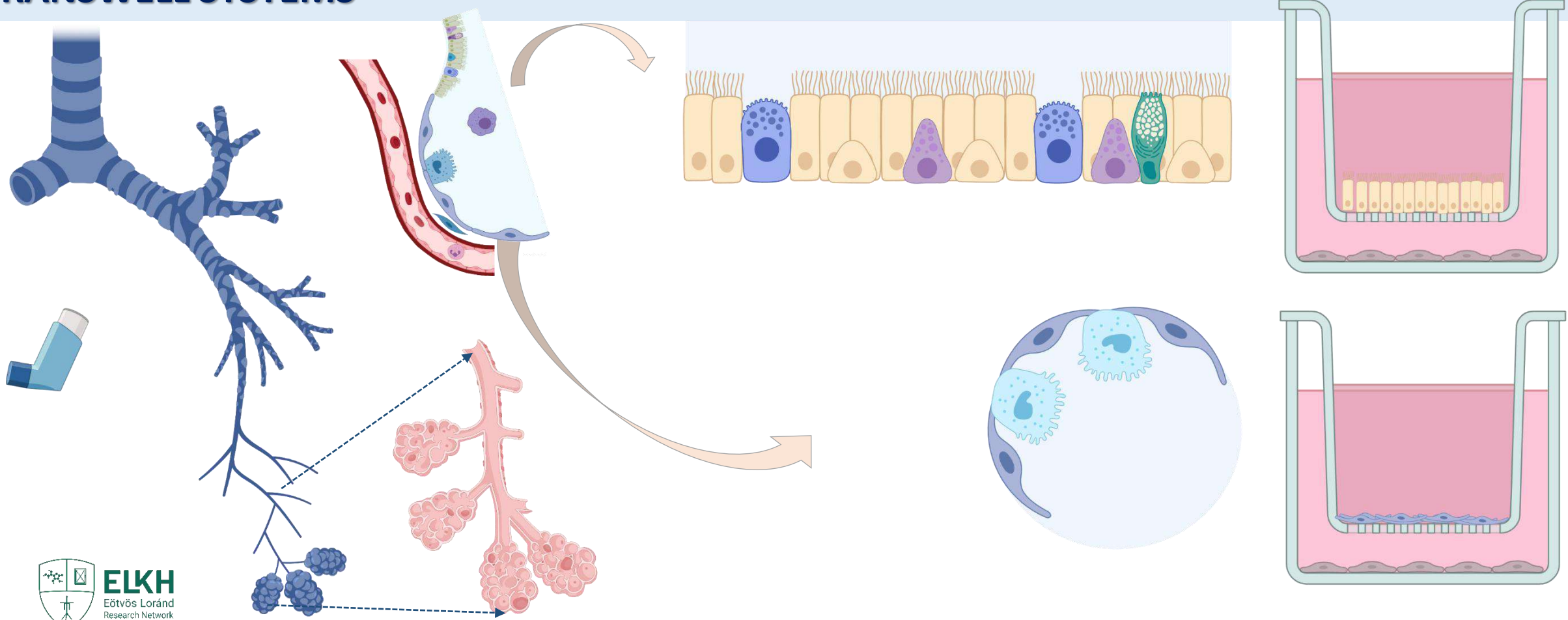
HISTOLOGY STUDIES OF SPHEROID SAMPLES AFTER DIFFERENT TREATMENTS



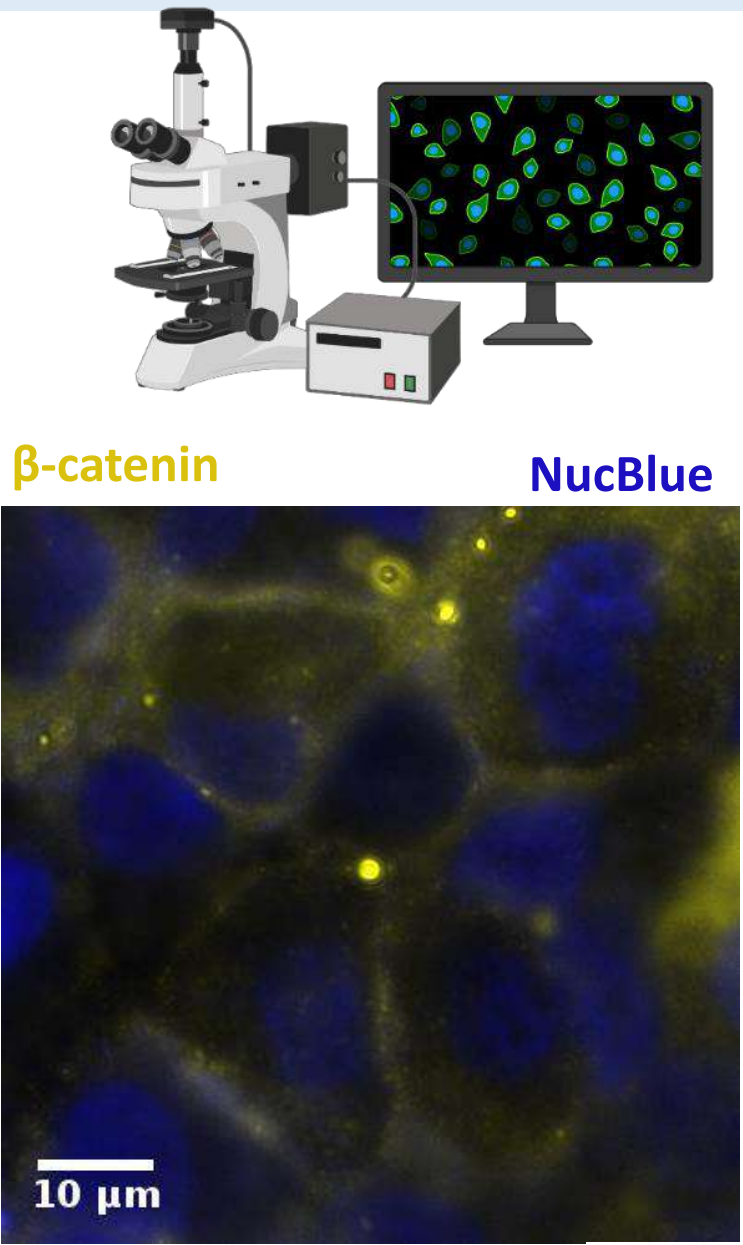
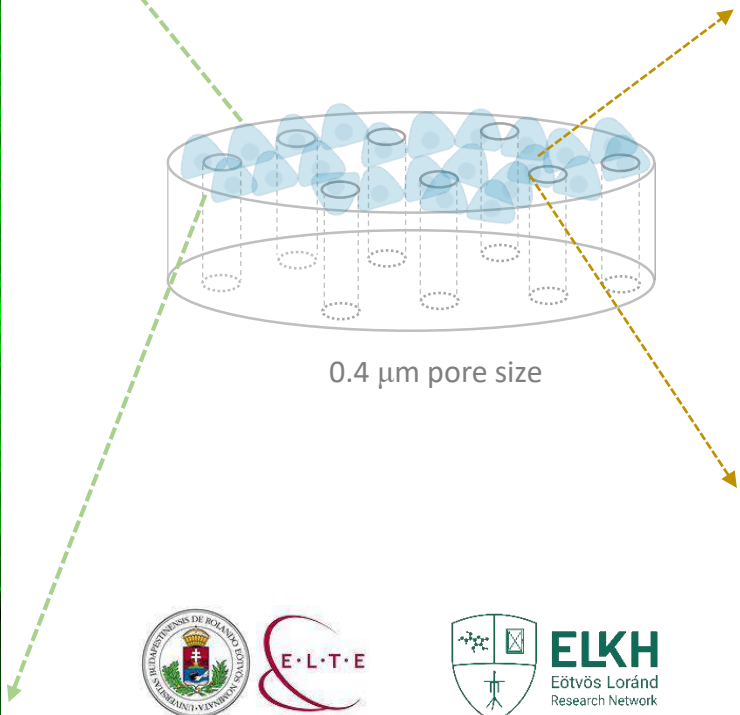
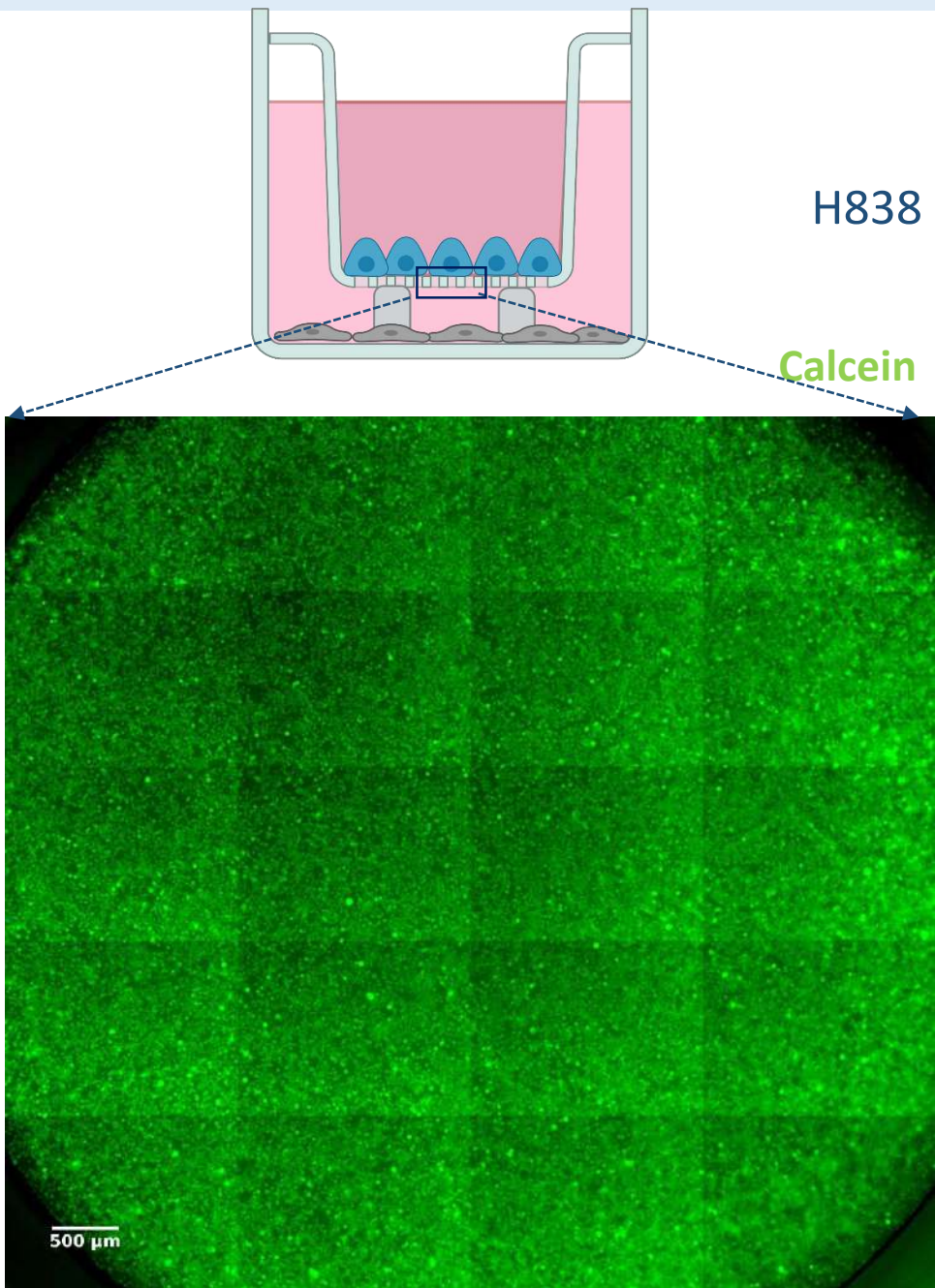
HISTOLOGY STUDIES OF SPHEROID SAMPLES AFTER DIFFERENT TREATMENTS



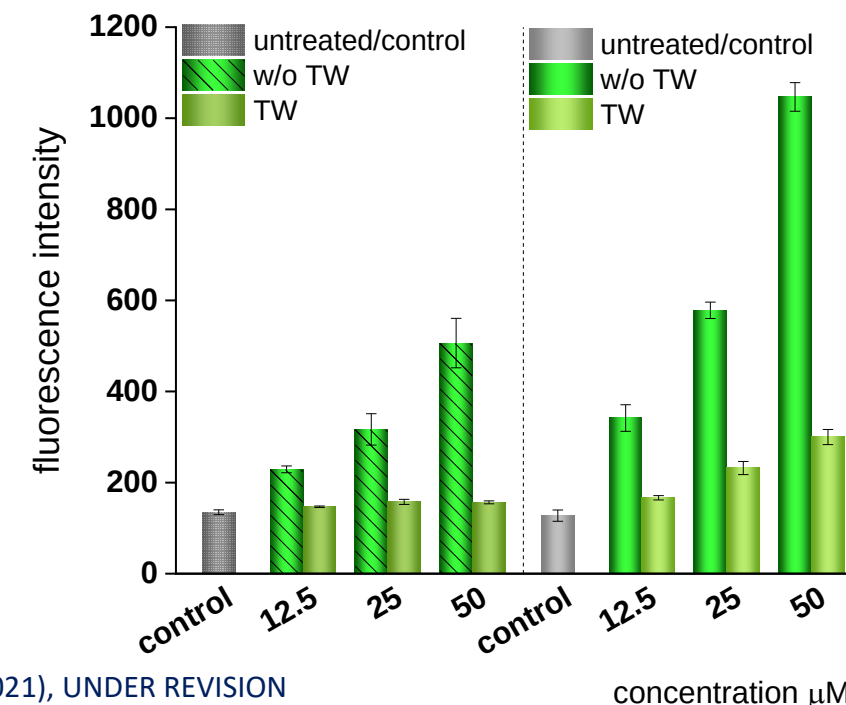
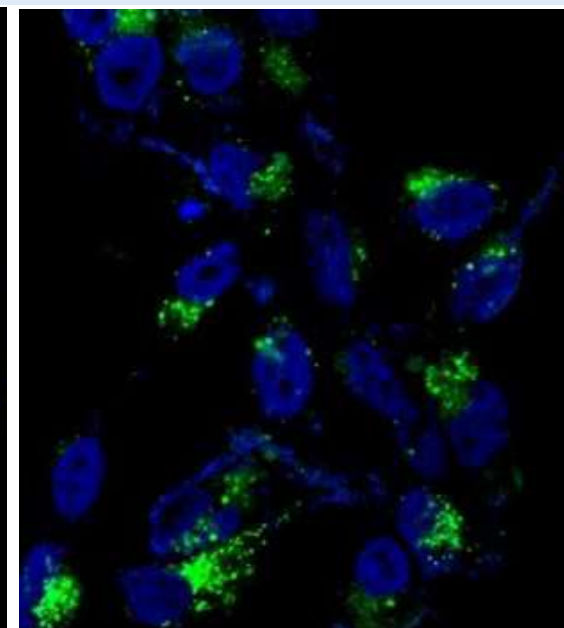
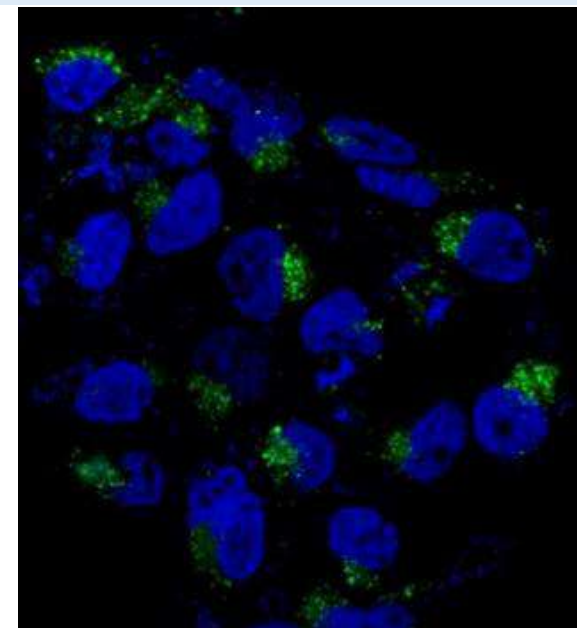
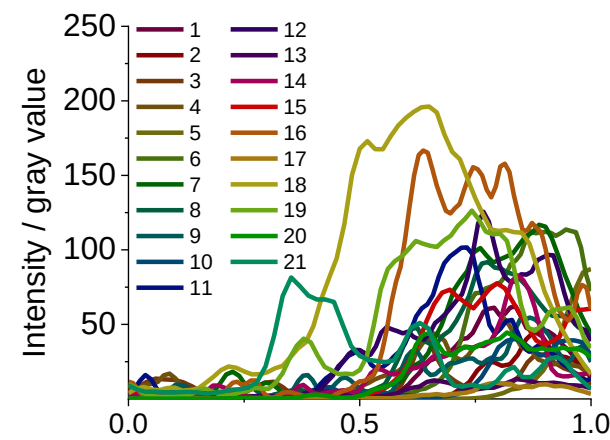
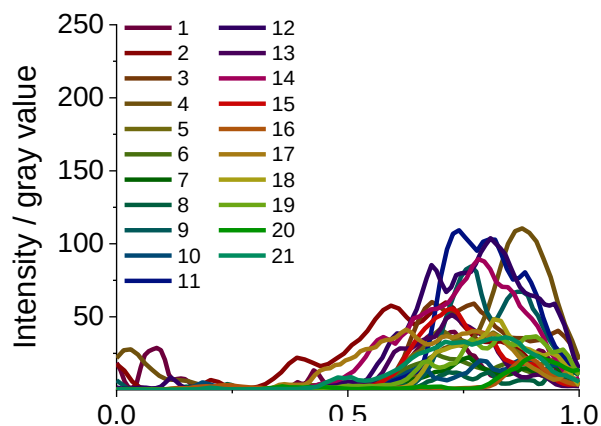
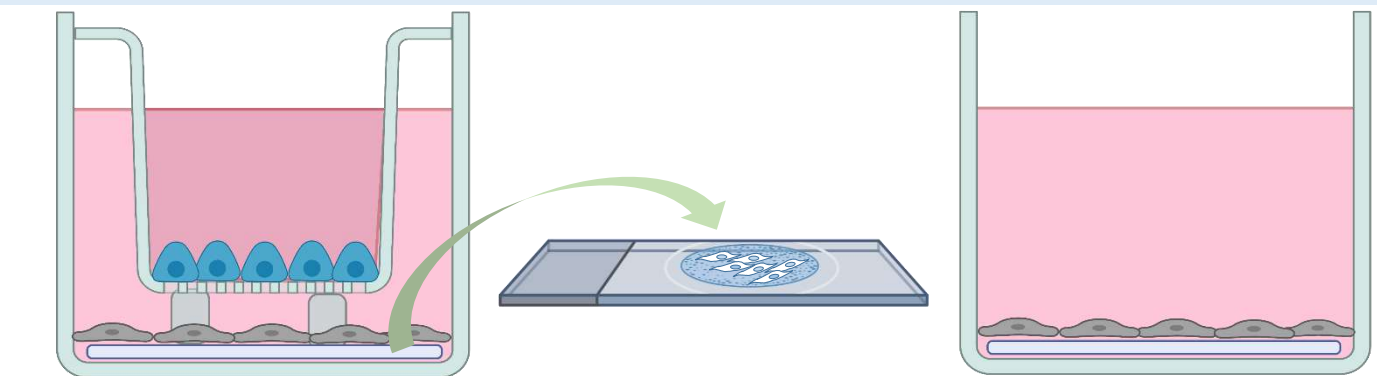
ALVEOLAR AND BRONCHIAL BARRIER MODELS: SUBMERGED, COCULTURE AND NONCONTACT TRANSWELL SYSTEMS



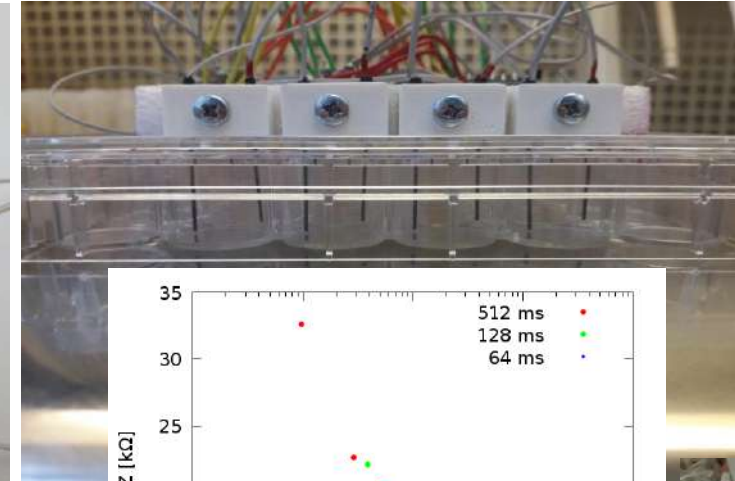
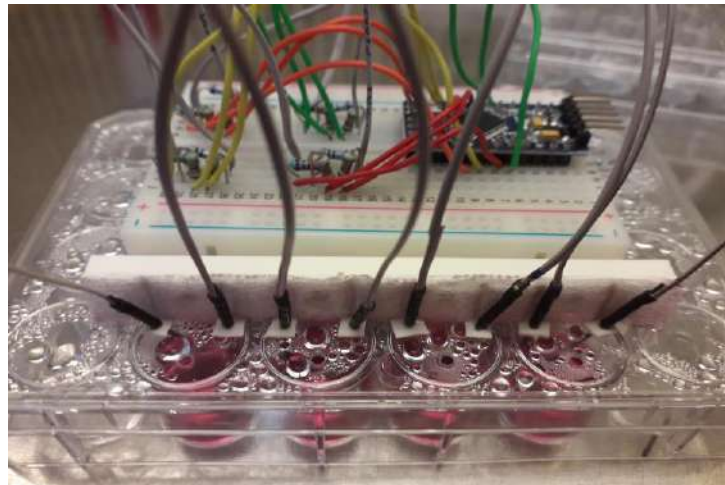
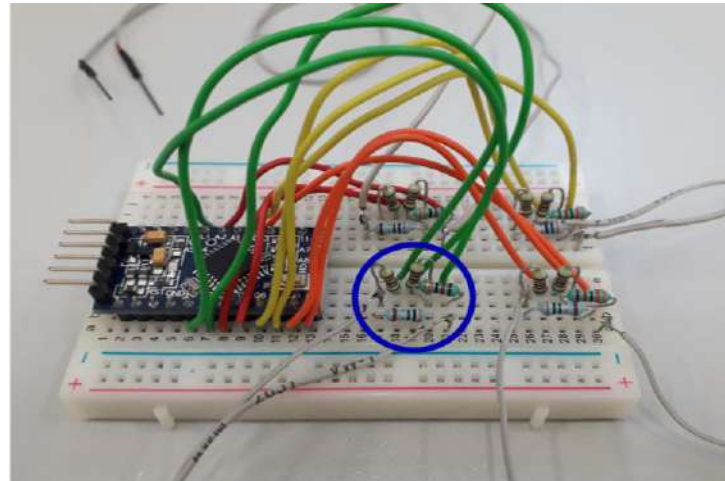
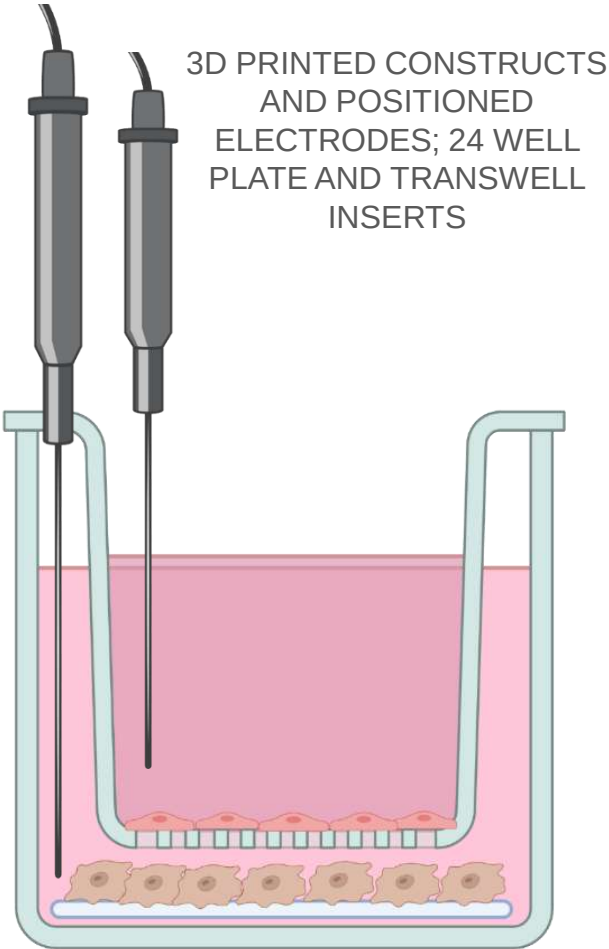
MONITORING THE TRANSWELL SYSTEM



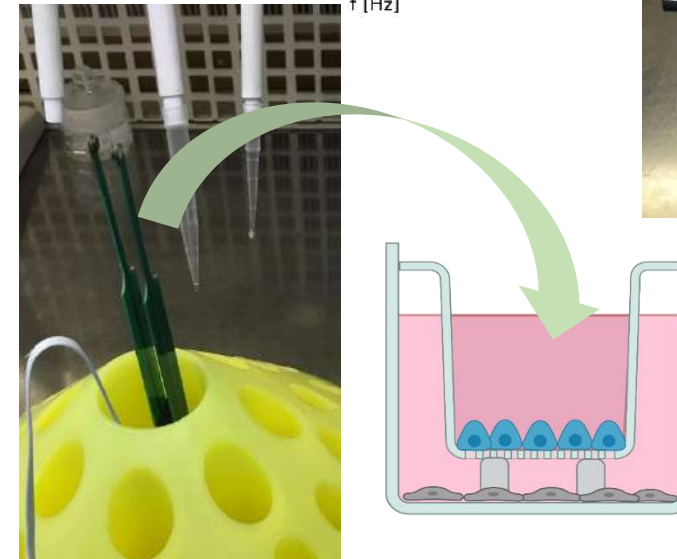
PENETRATION PROFILE OF A CARRIER PEPTIDE ON THE ALVEOLAR INTERFACE MODEL



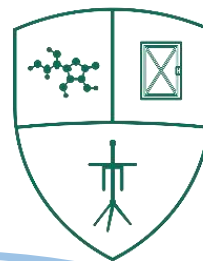
TRANSEPITHELIAL/TRANSENDOTHELIAL ELECTRICAL RESISTANCE (TEER) MEASUREMENTS



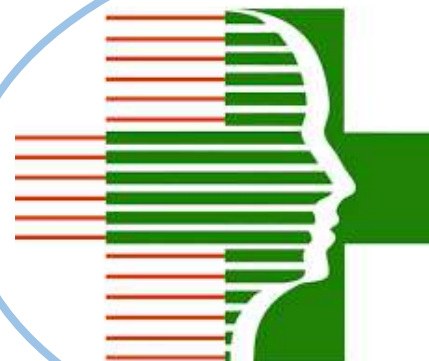
**THE MEASUREMENT OF TEER ACROSS A CELLULAR MONOLAYER
IS A RAPID, NON-INVASIVE METHOD
FOR QUANTIFYING BARRIER CELL LAYER INTEGRITY
NO NEED FOR FLUORESCENT LABELING**



COLLABORATOR GROUPS AND DEPARTMENTS WORKING WITH NBL OF NPHC



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Magdolna Sütöri-Diószei ⁶, Bernadett Pályi ⁷, Zoltán Kis ⁷, Béla Noszál ² and Imre Boldizsár ^{1,*}



ORIGINAL RESEARCH
published: 12 November 2021
doi: 10.3389/fimmu.2021.750496



Novel Assay Platform to Evaluate Intracellular Killing of *Mycobacterium tuberculosis*: In Vitro and In Vivo Validation

Kata Horváti^{1,2}, Kinga Fodor³, Bernadett Pályi⁴, Judit Henczkó⁴, Gyula Balak⁵,
Gergő Gyulai⁶, Éva Kiss⁶, Beáta Biri-Kovács², Zsuzsanna Senoner⁷ and Szilvia Bősze^{1,4*}



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Review

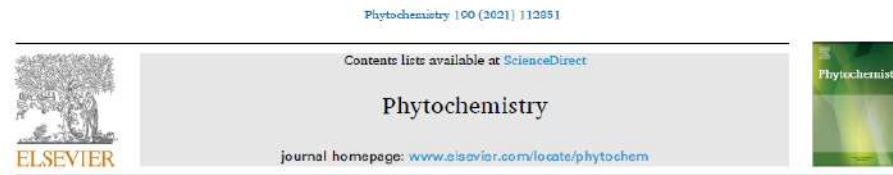
Natural Compounds as Target Biomolecules in Cellular Adhesion and Migration: From Biomolecular Stimulation to Label-Free Discovery and Bioactivity-Based Isolation

Beatrix Péter^{1,*}, Imre Boldizsár^{2,3}, Gábor Kovács^{3,4}, Anna Erdei^{5,6}, Zsuzsa Bajtai^{5,6}, Alexandra Vörös¹,
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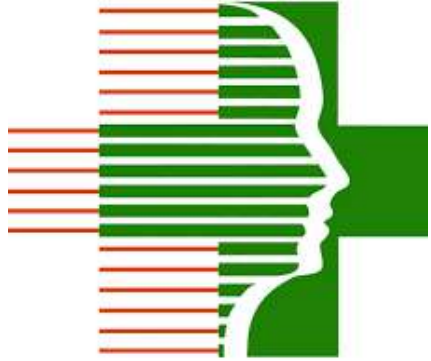
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The SARS-CoV-2 Variants of Concern

Key mutations in the spike protein are shown, but mutations in other areas of the genome have been identified and are currently under investigation. Mutations occur on all spike protein subunits.



B.1.1.7

Discovered:
Dec. 14 2020



B.1.351

Discovered:
Dec. 18 2020



P.1

Discovered:
Dec. 4 2020



B.1.526

Discovered:
Nov. 2020



B.1.427

Discovered:
Dec. 2020



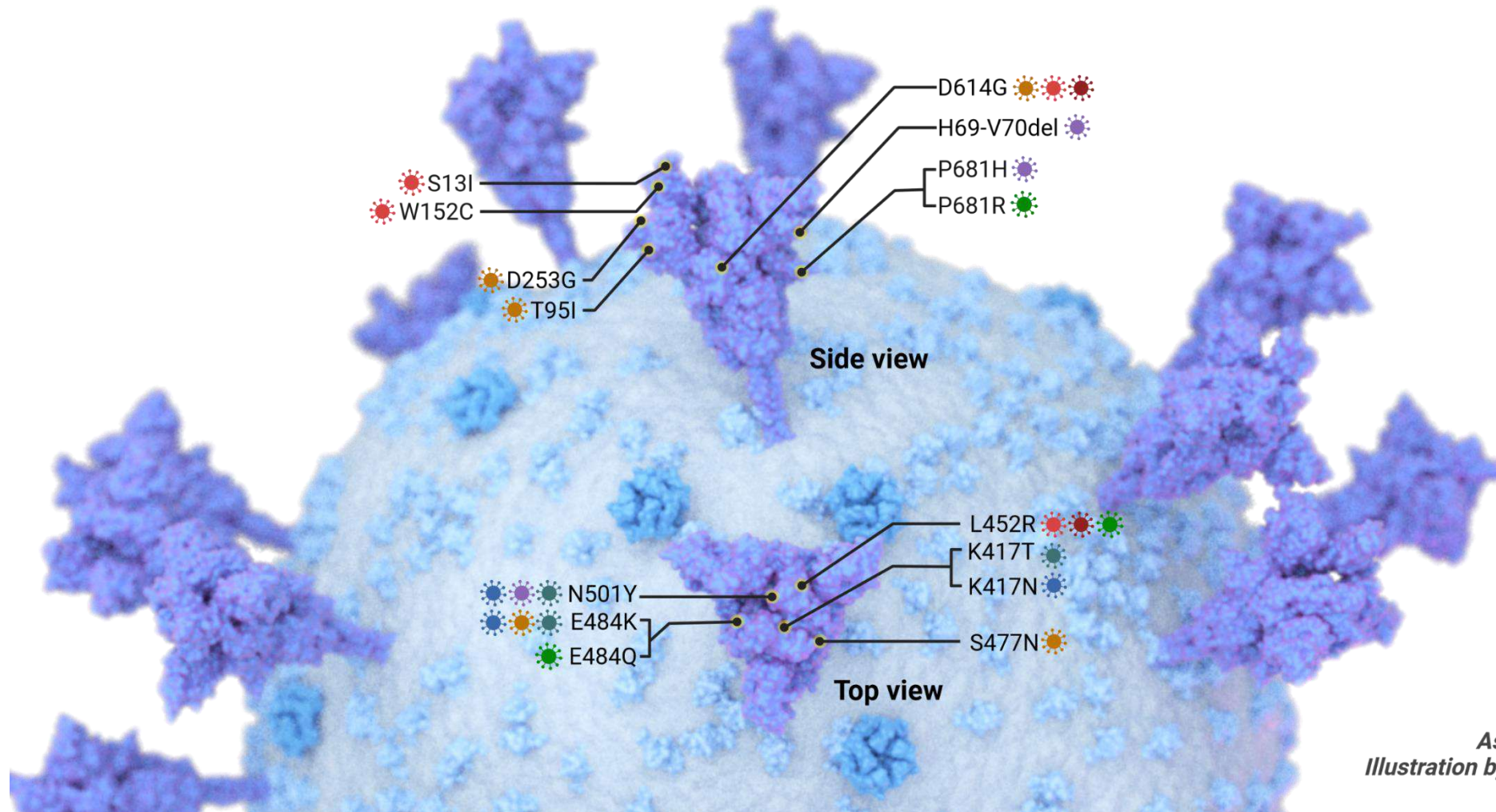
B.1.429

Discovered:
Nov. 2020



B.1.617

Discovered:
Oct. 2020



*As of May 2021
Illustration by Emily Taylor*

