



erinha

European Research Infrastructure
on Highly Pathogenic Agents

High Consequence Infectious Diseases in Central Eastern Europe: Gaps & Cooperation Opportunities

Excellence driven research:
The national node BSL-3/4 capacity in
Hungary



ERINHA.EU

Zoltan KIS

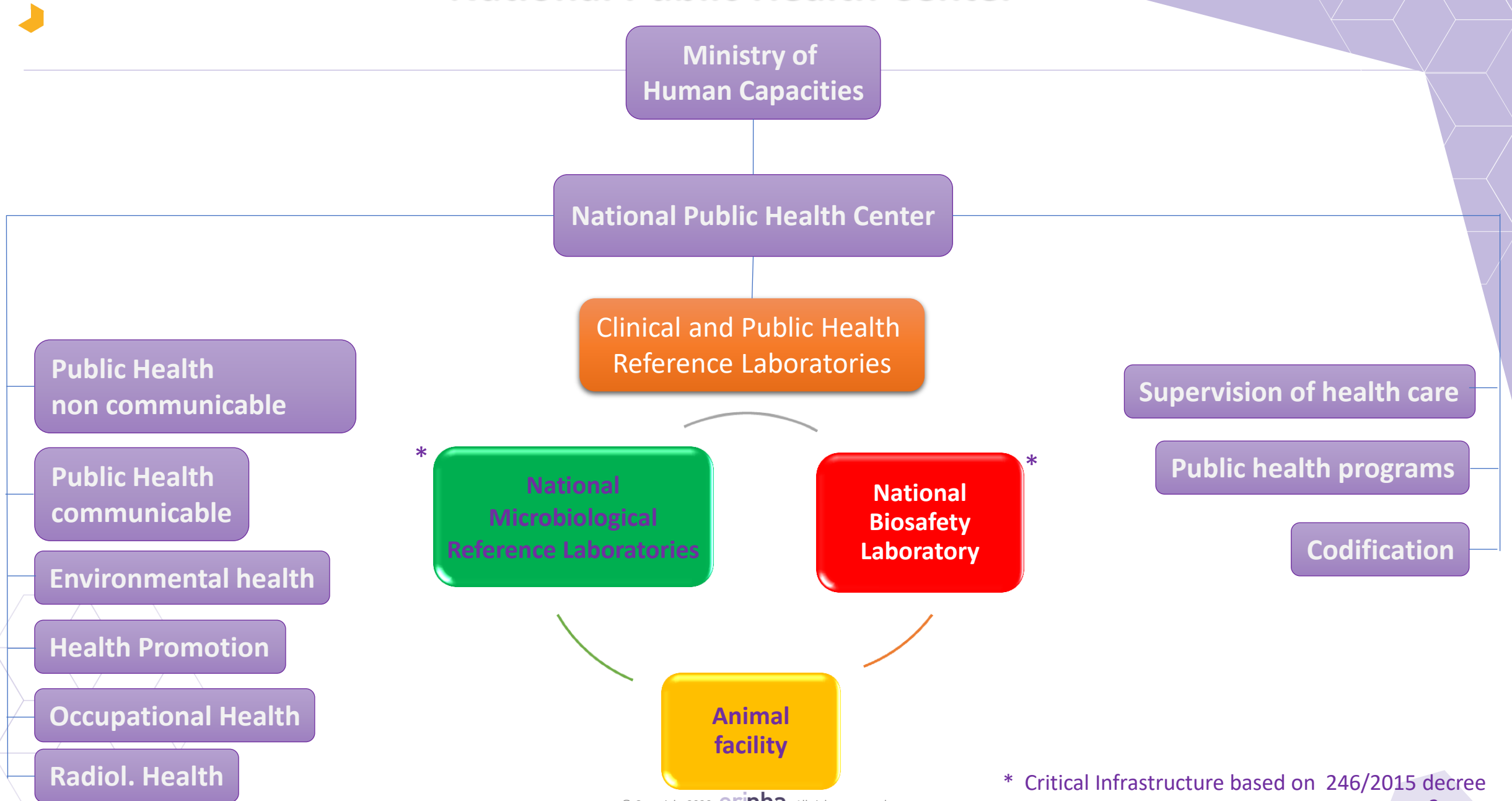
Head of laboratory

National Biosafety Laboratory

Hungarian ERINHA node

National Public Health Center

National Public Health Center



Predecessor of National Biosafety Laboratory: The smallpox laboratory

Possible smallpox cases in Hungary in the 1950's and 60's

Built in 1967, first head of laboratory: Dr. Iván Hollós

Rationale of building the laboratory: smallpox outbreak in Yugoslavia in 1972 – 38 cases / 8 deaths.



Establishment of National Biosafety Laboratory



Planned and built 2002-2006



Prof. G. Berencsi

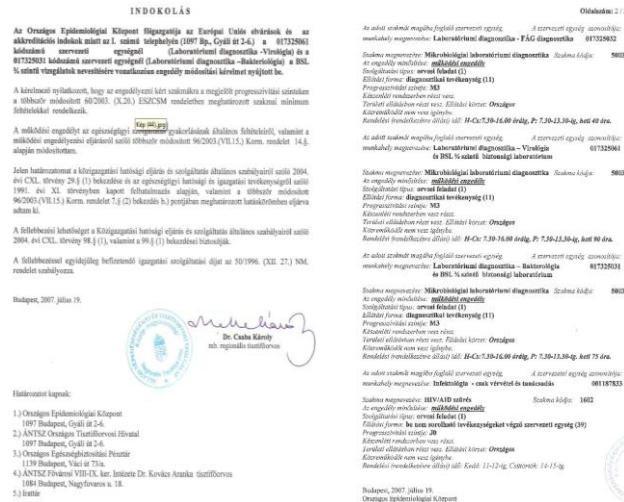
2006 – Commissioning of use



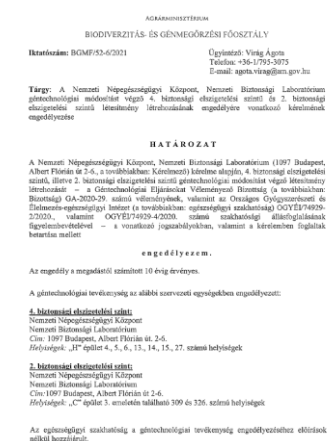
HATÁROZAT

Az Országos Tisztifőorvosi Hivatal (1097 Bp. Gyáli út 2-6.) részére a Bp. IX. Gyáli út 2-6. sz. 38293/33 hrsz. alatti ingatlanán álló „H” épületben a VIII-1199/5/2003 sz. 2003. július 10-ai építési engedély határozat szerint kialakított biztonsági laborra a használatbavételi engedélyt megadom.

2007 - Operational permission



2021 - GMO permission



Decree 18/1998 (VI. 3) of the Ministry for Public Welfare „on the epidemic control actions necessary to prevent infectious diseases and epidemics”

Governmental Decree 246/2015 on the identification, designation and protection of critical health systems and facilities

EMMI Decree 18/2019 (VI.6) about the Organisational and Operational Rules of National Public Health Center

Appointed as National Poliovirus Essential Facility

Governmental Decree 1543/2017 (VIII.18) about joining to ERINHA RI



National Biosafety Laboratory

Two independently operating unit

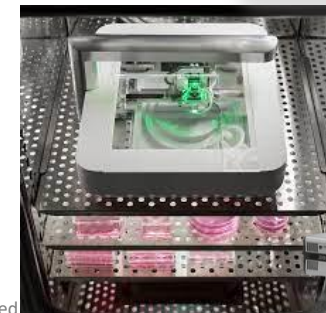
two room BSL-3+ laboratory (one room with BSC-3 for work with *B. anthracis*)

three room BSL-4 laboratory (one room dedicated for working w animals), 6 person / simultaneously

Equipped with standard laboratory equipment (CO₂ incubators, BSC-2s, ultra-deep freezers, ELISA reader, microscopes, etc.

Special equipment:

- Biocontainment IVC for rat / hamster (24 cages)
- Biocontainment IVC for rat/hamster (6 cages)
- Biocontainment IVC for mice (48 cages)
- Biocontainment IVC for mice (12 cages)
- Biocontainment IVC for mice (56 cages)
- TEM SEGA
- Sorvall MTX-150 ultracentrifuge with different rotors
- Leica DMI8, Nikon Ts2R inverse fluorescence microscope
- BBI xCUBIO Fermenter
- Luminex MagPix
- Live-cell imaging - CytoSMART Omni



Main duties

Detect highly pathogenic agents

Provide diagnostic material

Maintain microbial strain collection

Research on highly pathogenic agents

Provide containment capacity

Provide training on national and international level

National and international connections



An European Mobile Laboratory (EMLab)

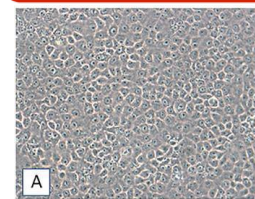
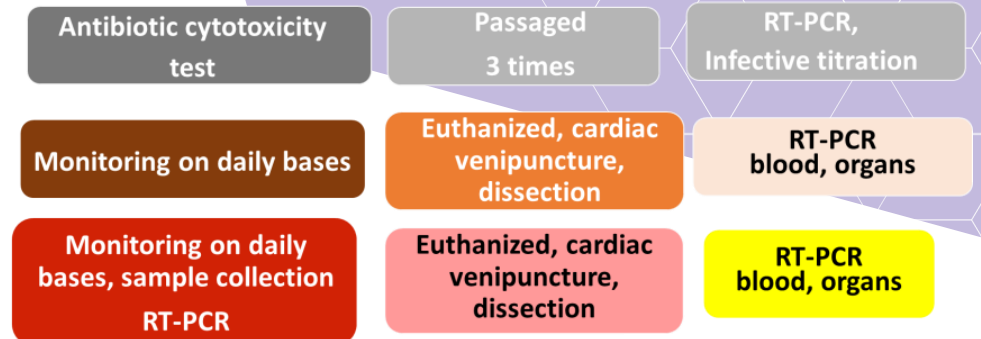
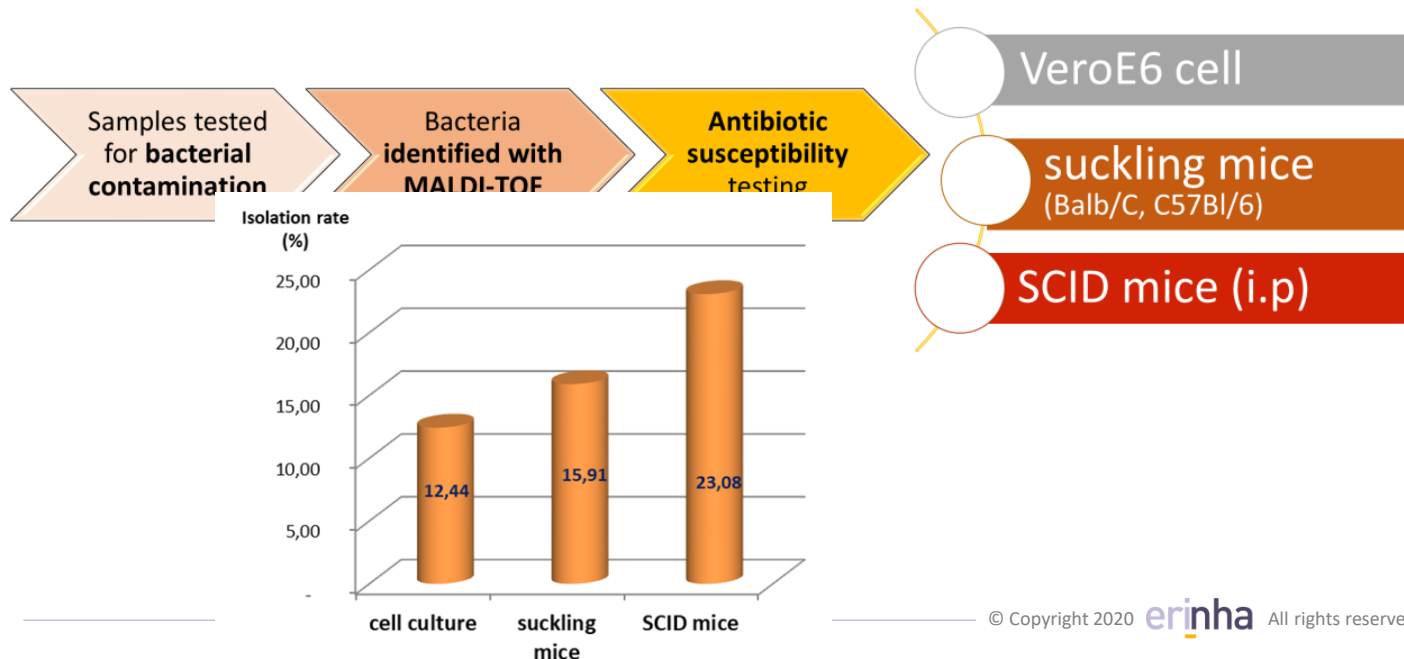
EVIDENT Project (Ebola Virus Disease - correlates of protection, determinants of outcome, and clinical management)

Working in remote laboratory – field experience

Set up new diagnostic method – use of capillary blood for EVD diagnosis

Determination of Ebola virus stability in different matrices

Determination of infectivity in specimens collected on the field



Nipah virus research

ICONIM - Immune Control Of Nipah virus Infection in Mice

- ERINHA-Advance TNA call supported, project leader: INSERM
- Task
 - Studying Nipah virus infection in different KO mice strain

Vaccine against Nipah virus

Development of a Nipah measles vector vaccine (MV-NIV) to be used in outbreaks situation in children and adults exposed population.

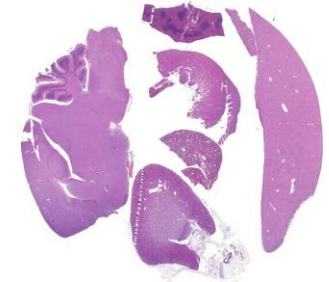
Univ. Tokyo - Coalition for Epidemic Preparedness Innovations (CEPI) funded project

Task: Proof of Conception study of MeV-NIV vaccine – in vivo efficacy study

Animal: golden syrian hamsters

Challenge study, determining infective titer in different organs, measure of antibody level (MeV, NiV), neutralization test (NIV-Malaysia, NIV-Bangladesh

Histopathology – involved University of Veterinary Medicine, Dept. Pathology



Imaging capacities

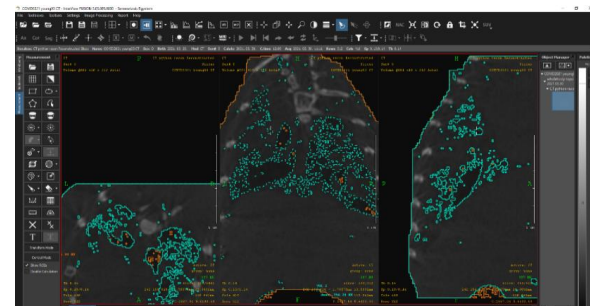
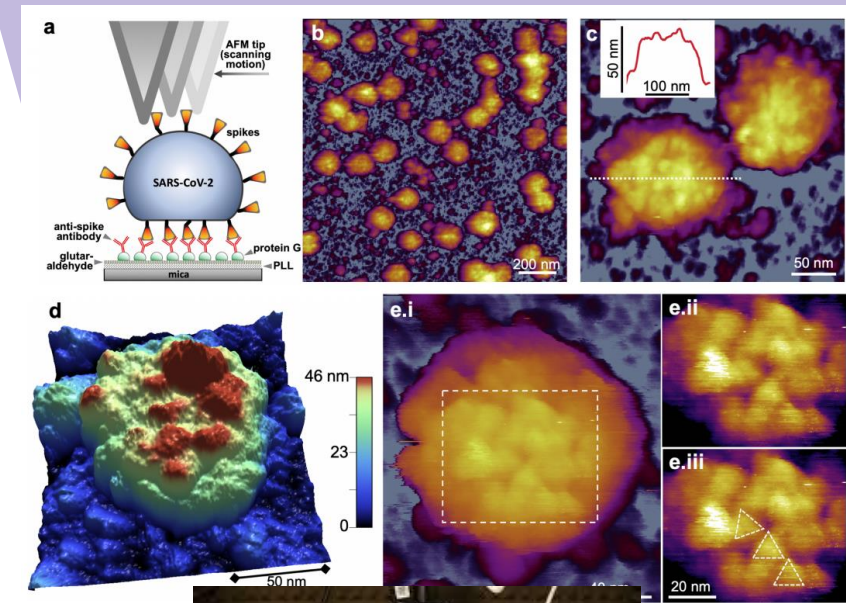
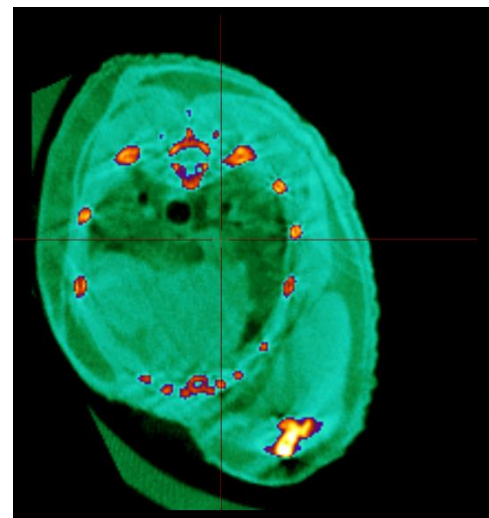
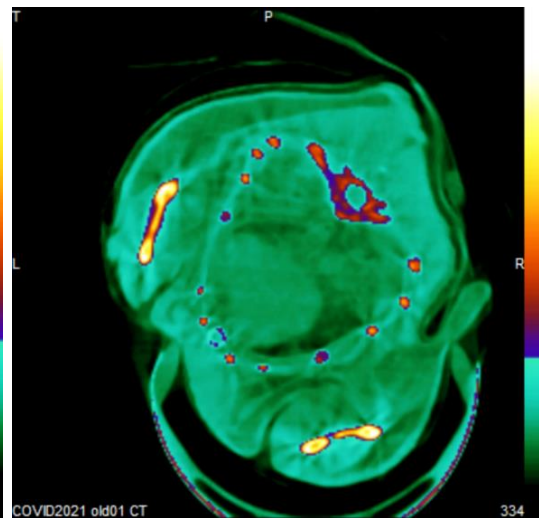
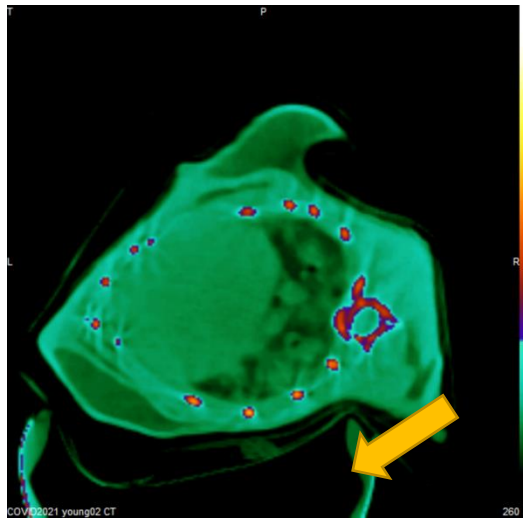
▶ Studying pathogenecity of different SARS-CoV-2 variants using in vivo bioimaging

Cooperation partner: Semmelweis University, Dept. Biophysics and Radiation Biology; CROmed Ltd; and Hungarian Centre of Excellence for Molecular Medicine In Vivo Imaging Advanced Core Facility

Young hamster's lung
Infected with SARS-CoV-2 alfa

Old hamster's lung
Infected with SARS-CoV-2 alfa

Young hamster's lung
Infected with SARS-CoV-2 orig.



Mediso® PET-MRI 3T



Applied molecular methods

Molecular detection set up for RG3/4 bacteria and viruses

Several platforms – NA extractions to detection

Applied sequencing platforms

ABI Sanger sequencing

Illumina MiSeq/NextSeq 550

Amplicon based seqencing

Metagenome sequencing (SISPA)

Oxford Nanopore long-read sequencing

SARS-CoV-2 genomic surveillance

Adaptation studies (Ebola virus, CCHF virus)

Cooperation partners:

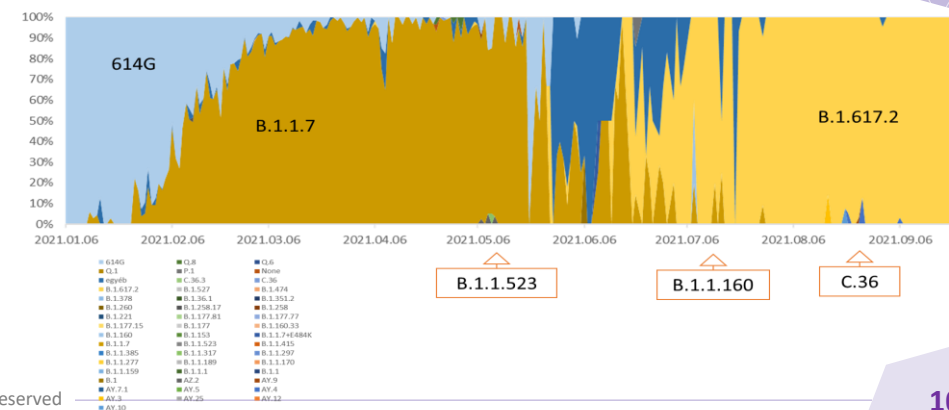
Univ Pécs, Bioinformatic Research Group

ELTE, Dept Physics of Complex Systems

Univ Vet Med., Centre for Bioinformatics



All SARS-COV-2 variants distribution over time



More research and development...

Vaccine development

Vaccine production (GMP production site)

Preclinical studies

In vivo testing of mAbs

Testing of disinfectants

Testing antivirals

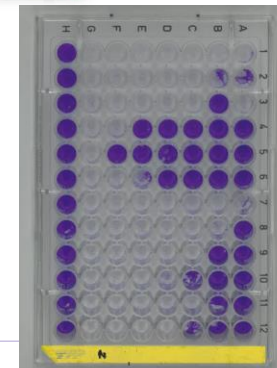
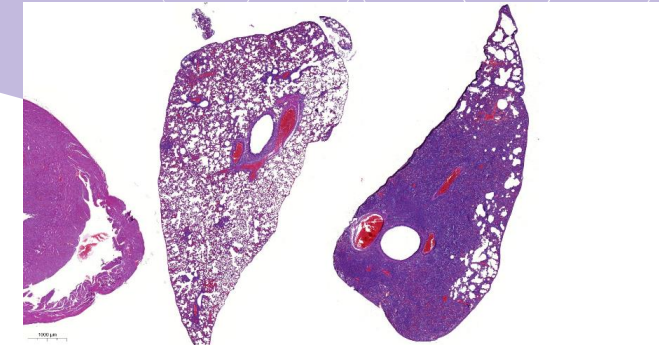
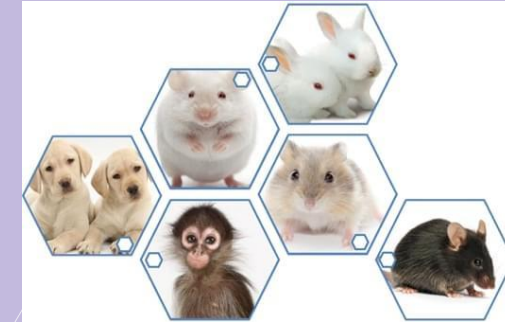
Complex new diagnostic method testing

Biobank – strain collection

Large scale serology studies

Cooperation partners:

- Debrecen University, National Vaccine Company, Fluart Innovative Vaccines Ltd.
- Semmelweis University, CROMed Ltd
- ELTE, ELKH
- Univ. Vet Medicine



Trainings

Trained at INMI, BNI, Ceva-Codaxia, Spietz, HPA,
Field training: EMLab

Provide training on the field of biosafety/biosecurity

- Don/Doff PPE
- Entry/exit NBL BSL3/4 laboratory
- Working under BSL condition using different methods (isolation, cultivation, serological and molecular methods)
- Animal handling/working
- Using equipment
- Emergency situation, etc

Trained external users/cooperation partners:

International: BNI, INMI, FLI,
National: ELTE, SE, ELKH, ÁOTE



International connections

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Highly Pathogenic Agents
Decree 1543/2017 (VIII.18)

SHARP
QUANDHIP

SHARP
Strengthened International HeAlth
Regulations & Preparedness in the EU

BSL-4 laboratory
networks



European Mobile
Laboratory Consortium



**Ebola Virus Disease - correlates
of protection, determinants of
outcome, and clinical
management**

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**European Virus
Archives**



**UN Office for
Disarmament
Affairs**

**UN Biological and Toxin
Weapon Convention**



**Emerging Viral Diseases-
Expert Laboratory Network**

The future...

