

# Department of Pharmaceutical Technology

## Faculty of Pharmacy

MU

Brno



# ***Curriculum vitae***

prof. PharmDr. Mgr. David Vetchý, Ph.D.

## **Educational background**

- 1995 Faculty of Science, MU, Organic Chemistry, (Mgr.)
- 1999 Faculty of Pharmacy, Veterinary and Pharmaceutical University (VFU), Pharmacy, (Mgr.)
- 2002 Faculty of Pharmacy, VFU, Pharmaceutical Technology - Galenic Pharmacy, (PharmDr.)
- 2002 Faculty of Pharmacy, VFU, Pharmaceutical Technology - Galenic Pharmacy, (Ph.D.)
- 2009 VFU, habilitation performed, Pharmaceutical Technology - Galenic Pharmacy, (doc.)
- 2021 Charles University, completed the appointment procedure, Pharmaceutical Technology, (prof.)

## **Positions**

- 1996 – 2020: Department of Pharmaceutics, Univ. of Veter. and Pharm. Sciences, Brno, Czech R.
- since 2003: Expert adviser for pharmaceutical industry
- since 2012: Head - Department of Pharmaceutics/Department of Pharmaceutical Technology, Univ. of Veter. and Pharm. Sciences/Masaryk University, Brno, Czech R.
- since 2021: Dean – Faculty of Pharmacy, MU

## **Teaching activities**

Pharmacy study programme:

Physical chemistry, Theory of medical forms, Methods of evaluation and forming formulation files of the drugs, Industrial Pharmacy, Medical forms and Biopharmacy, Advanced drug delivery,

## **Publications**

author or co-author of more than 80 original papers, more than 15 finished grant projects

# Department of Pharmaceutical Technology – research

– Pharmaceutical technology deals with the incorporation of a drug substance into a dosage form so that the drug substance ideally reaches the right place at the right time and in the right amount, and pharmaceutical technology methods can also be used interdisciplinarily (e.g. systems for diagnostic, cosmetic and other purposes)

## – Academic staff:



prof. PharmDr. Mgr.  
David Vetchý, Ph.D.  
head

### – Associate Professors:



Assoc. Prof.  
PharmDr.  
Aleš Franc, Ph.D.



Assoc. Prof. PharmDr.  
Jan Gajdziok, Ph.D.



Assoc. Prof. PharmDr.  
Kateřina Kubová, Ph.D.



Assoc. Prof.  
PharmDr. Ruta  
Masteiková, CSc.



Assoc. Prof. Mgr. Jan  
Muselík, Ph.D.

## – Assistant professors:



PharmDr. Jakub  
Vysloužil, Ph.D.



Mgr. Sylvie Pavloková,  
Ph.D.



PharmDr. Miroslava  
Pavelková, Ph.D.



PharmDr. Jiří Zeman,  
Ph.D.



PharmDr. Jan Elbl,  
Ph.D.



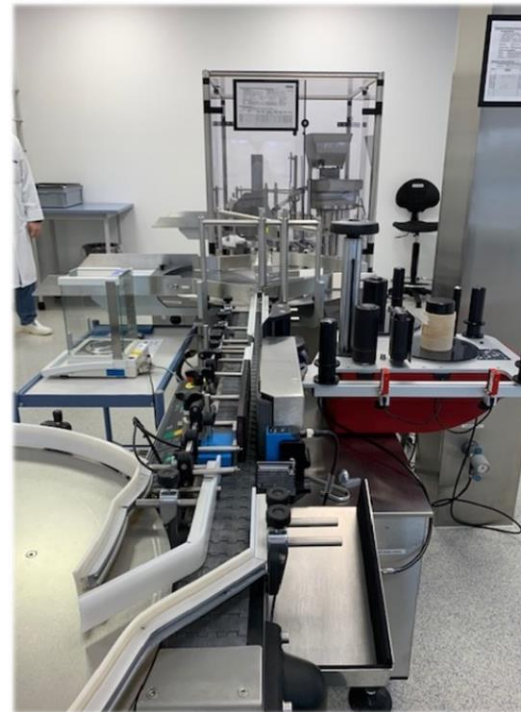
PharmDr. Kateřina  
Teplá, Ph.D.



# prof. PharmDr. Mgr. David Vetchý, Ph.D.



- Topic:
- Preparation and evaluation of parenteral lyophilized preparations

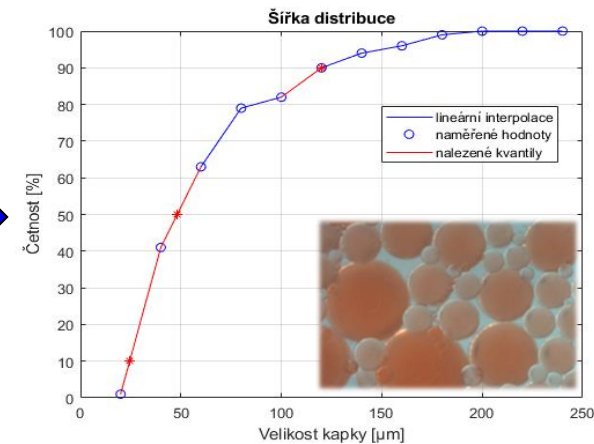
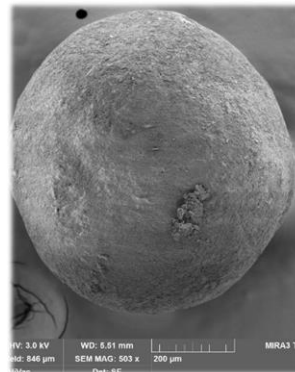


# Assoc. Prof. PharmDr. Kateřina Kubová, Ph.D.



## – Topics:

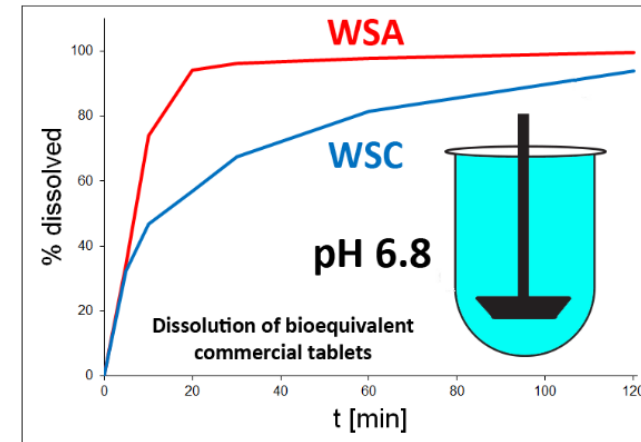
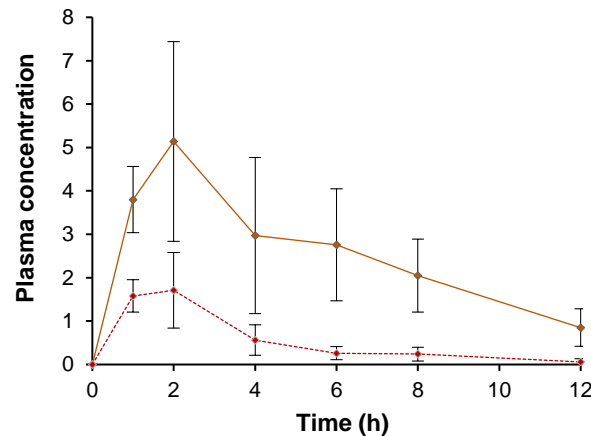
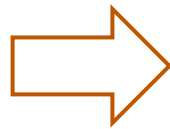
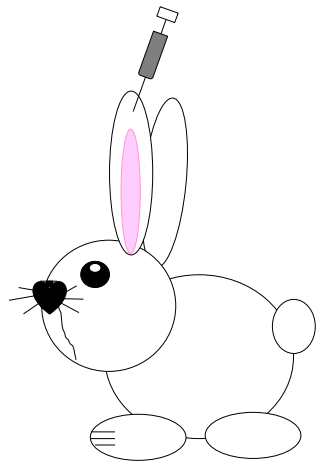
- Self-emulsifying pellets for increasing the bioavailability of drugs with problematic solubility and controlled drug delivery
- Study of biocompatible polymer particles by ssNMR
- Limiting the *burst effect* of a readily water-soluble drug incorporated into a sustained-release dosage form



# Assoc. Prof. Mgr. Jan Muselík, Ph.D.



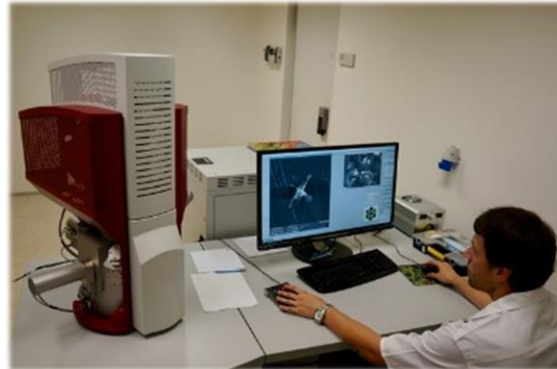
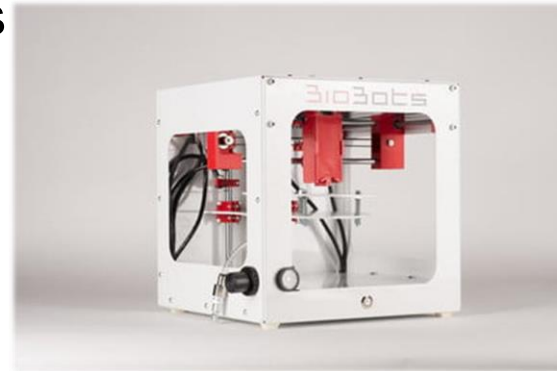
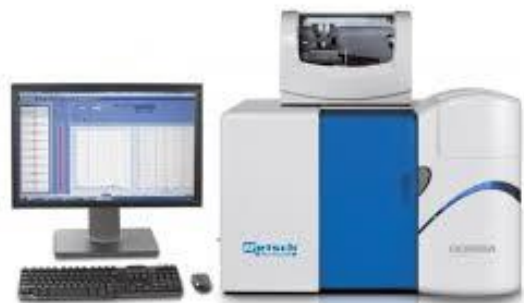
- **Topics:**
- Safety of treatment - drug-drug interactions
- *In vivo* drug release from dosage forms
- Evaluation of dosage forms *in vitro*



# Assoc. Prof. PharmDr. Jan Gajdziok, Ph.D.



- **Topics:**
- Microparticle systems for drug delivery to the lungs
- 2D and 3D printing of dosage forms
- Spray lyophilization

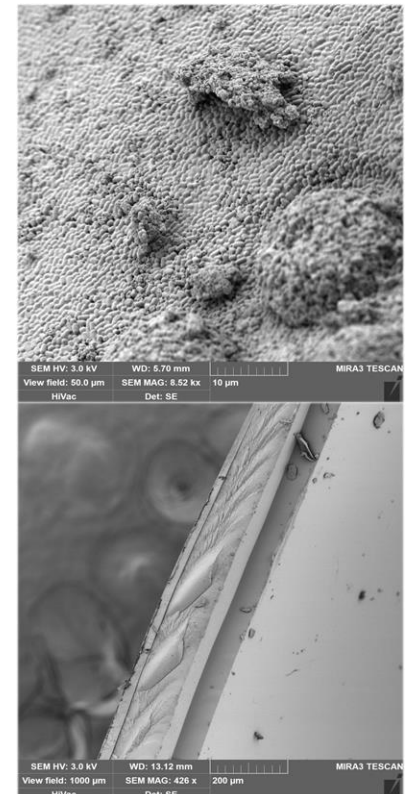
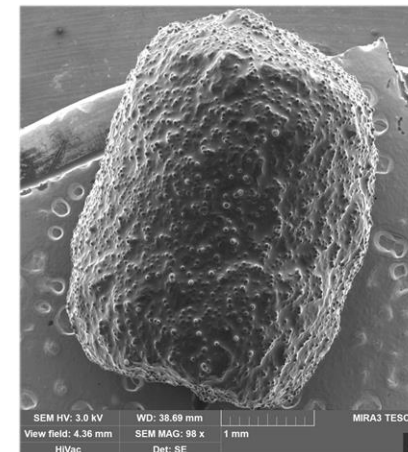


**MUNI  
PHARM**



# Assoc. Prof. PharmDr. Aleš Franc, Ph.D.

- **Topics:**
- A dosage form for the transport of biological material into the digestive tract
- Powder coating of pharmaceutical products
- Preparation of veterinary premixtures for clinical trials







# Assoc. Prof. PharmDr. Ruta Masteiková, CSc.

- **Topics:**
- Cosmetic preparations (compilation work)
  - Technological aspects of deodorants and antiperspirants



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Google Scholar



Scopus

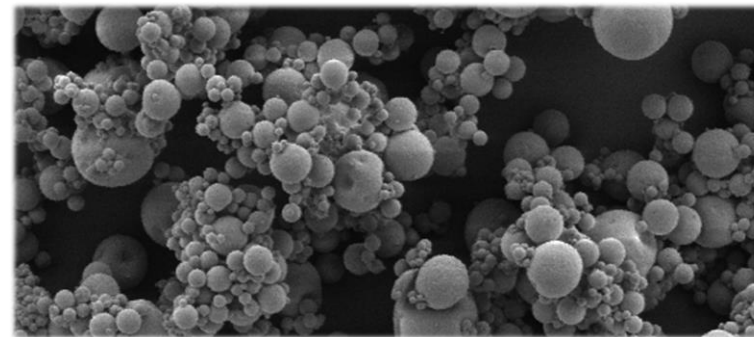
MUNI  
PHARM

# PharmDr. Jakub Vysloužil, Ph.D.



## – Topics:

- Use of microparticles as carriers of hormonally active substances in controlled fish reproduction
- Development and optimization of the dynamic dissolution method and its possible applications
- Microparticles as a depot dosage form of antidepressants
- Dose dumping from a pharmaceutical technology perspective (compilation work)
- Microfluidic technology and its application in pharmaceutical technology (c.w.)

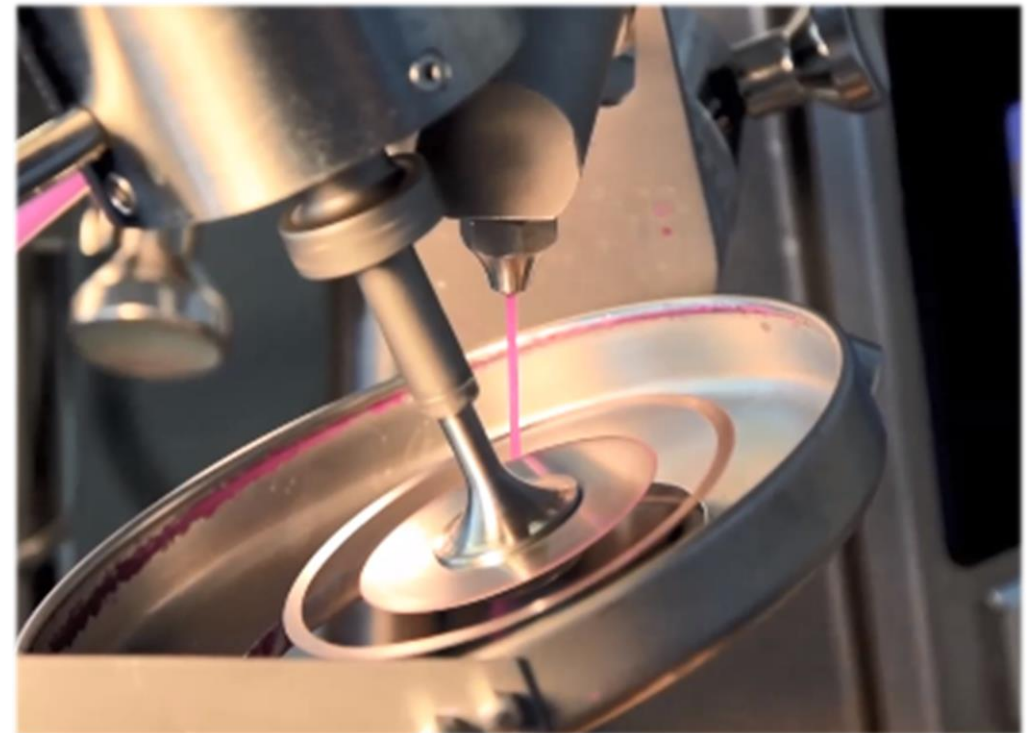
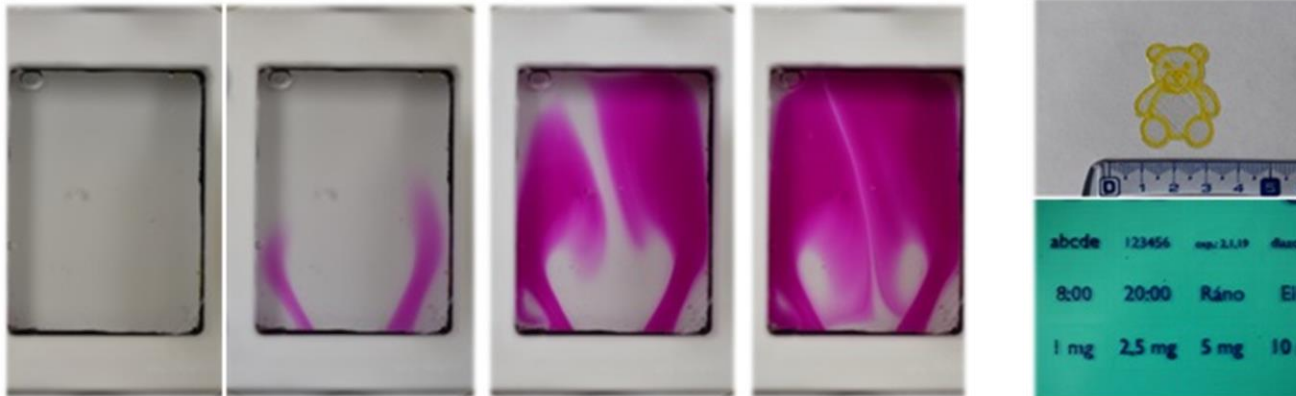


**MUNI**  
**PHARM**

# PharmDr. Jan Eibl, Ph.D.



- **Topics:**
- Preparation of microparticles by jet-cutting
- Optimization of a dissociation methodology for the evaluation of orodispersible dosage forms



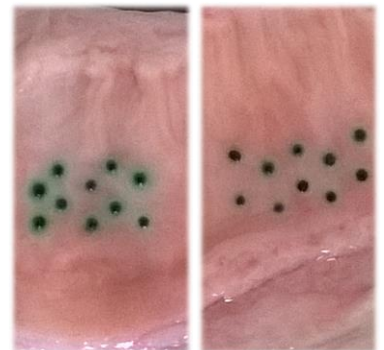
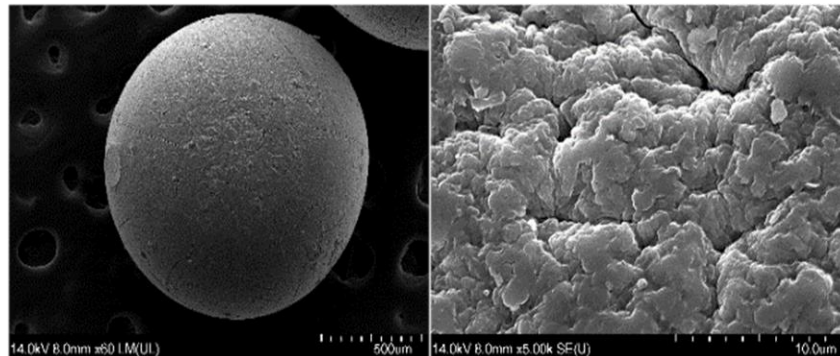


# PharmDr. Miroslava Pavelková, Ph.D.



## – Topics:

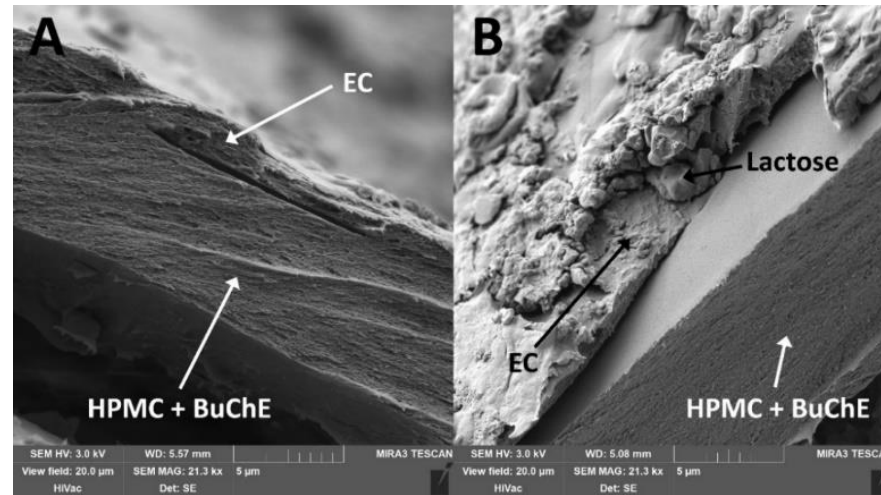
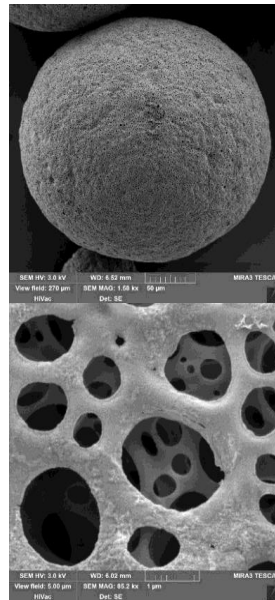
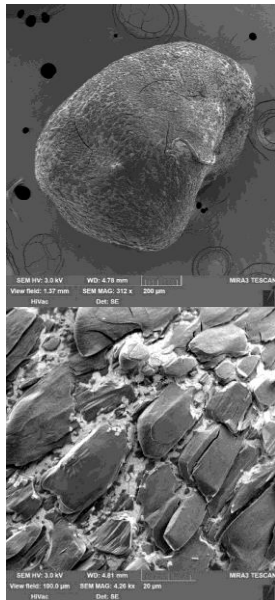
- Development and preparation of microparticulate dosage form
  - Biocompatible polymer-based microparticles for vaginal and colonic drug delivery
  - Addressing the problem of low bioavailability of drugs of natural origin
  - Biopolymers and their ability to control drug release in solid dosage forms
  - *Ex vivo* evaluation of mucoadhesiveness



# Mgr. Sylvie Pavloková, Ph.D.



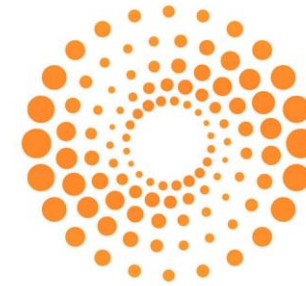
- **Topics:**
- Study of dosage forms using electron microscopy
- (Use of data analysis in pharmaceutical technology)



# PharmDr. Kateřina Tenorová, Ph.D.



- **Topics:**
- Cosmetic preparations (compilation work)
  - Technological aspects of deodorants and antiperspirants



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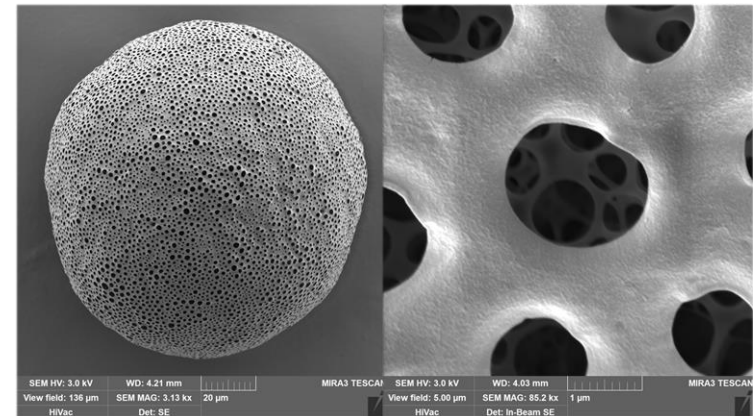
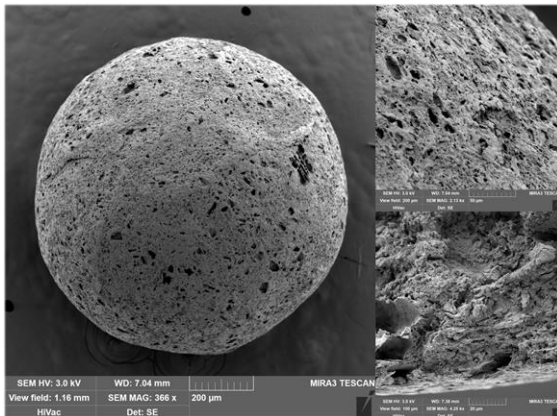


# PharmDr. Jiří Zeman, Ph.D.



## – Topics:

- Second generation detection tubes for continuous and repeated monitoring of nerve agents and other toxic substances
  - Preparation and evaluation of porous composite pellets
  - Preparation and evaluation of porous microparticles



# Test tubes for determination of cholinesterase inhibitors



TUBES.mpg

# ***Research activities of our Department of Pharmaceutics***

## **Formulation, development and evaluation of human and veterinary dosage forms**

Main target is preparation of dosage forms with poorly soluble and hardly absorbable APIs; and formulation of dosage forms with controlled release.

## **Innovation and optimization of technological processes**

mixing, granulation, pelletization, microparticles preparation, compressing and coating of dosage units.

### **Solid dosage forms:**

*Powders and blends:* grinding, micronizing, mixing.

*Granulates:* dry, wet, fluid bed and thermoplastic granulation.

*Tablets:* immediate released (uncoated and coated) and controlled released (matrix and coated)

*Hard capsules:* filling and coating.

*Pellets:* extrusion/spheronization, rotary agglomeration with layering.

*Microparticles:* gelation and evaporation techniques

*Mucoadhesives:* tablets, multilayer films/patches.

*Lipid formulations:* liquisolid systems, SEDDS, SMEDDS.

### **Liquids and semisolids:**

*Solutions, emulsions, suspensions, ointments, creams, gels, pastes*



# *Research activities of our Department of Pharmaceutics*

**Scale-up and technology transfers.**

**Stability studies (performance and evaluation).**

**Faraday pail:** powders charge measurement.

**Laser diffraction:** particle size analysis.

**Thermal analysis:** DSC (evaluation of polymorphism).

**HPLC:** API determination in solid, semisolid, liquid dosage form and evaluation of extracts and food supplements. Experience with measurement of saccharides and polysaccharides (size-exclusion chromatography).

**Evaluation of natural products:** measurement of oxidation activity (DPPH, TEAC, peroxy nitrite scavenging activity), determination of total phenolic, flavon and flavanone compounds.

**Process optimization:** Design Experiment and Multivariate Analysis.

**Statistic evaluation:** experimental – clinical and technological data with statistical evaluation: PCA, PLS, L-PLS, LDA etc.

# ***Technological equipment located in Department of Pharmaceutical Technology***



**Laboratory Fluid Bed Processor Uniglatt**  
(drying, granulation and coating - top spraying and wurster)



**Multi Roto Processor Aeromatic**  
(drying, granulation and coating – top, tangential spraying and wurster, rotoagglomeration)

# ***Technological equipment located in Department of Pharmaceutical Technology***



Excenter Tablet Press Korsch EK 0



Pan Coater Erweka

# ***Technological equipment located in Department of Pharmaceutical Technology***



Pelletizing Plate Erweka



Ball Mill Retsch



# ***Technological equipment located in Department of Pharmaceutical Technology***



Pearl Mill Dyno-mill

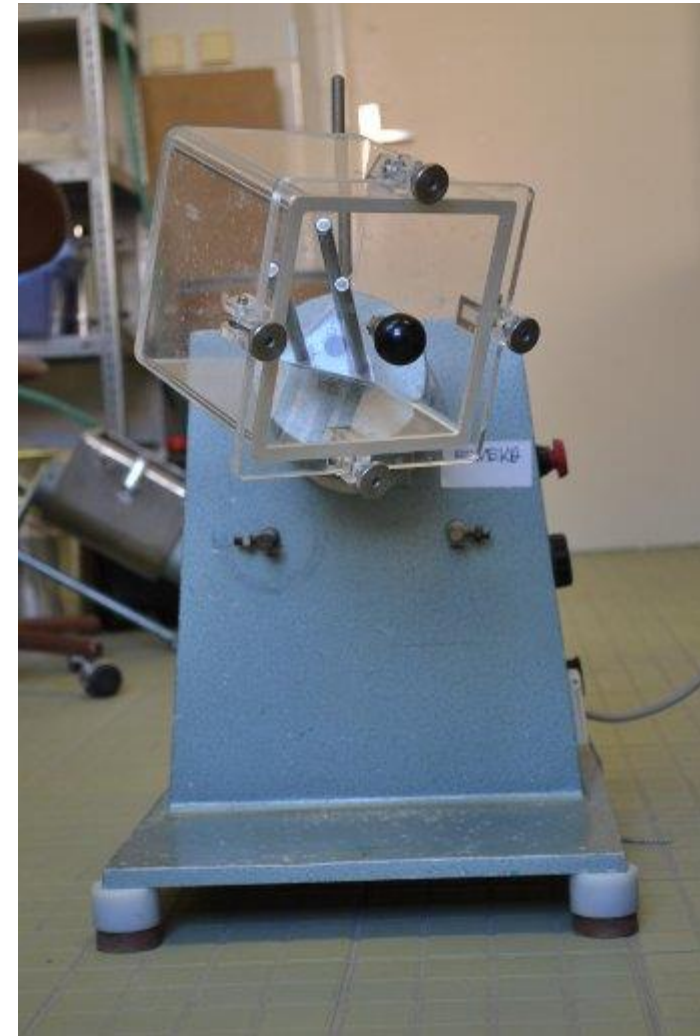


Oscillatory Mill Erweka

# *Technological equipment located in Department of Pharmaceutical Technology*



Roll Mill Erweka



Cubic Blender Erweka

# ***Technological equipment located in Department of Pharmaceutical Technology***



Turbula Blender



Mixer IKA



# *Technological equipment located in Department of Pharmaceutical Technology*



Sigma Blender Erweka



Cito-unguator 2000



# ***Technological equipment located in Department of Pharmaceutical Technology***



Linear Dossier Pump



Sieve Analyzer Retsch

## *Technological equipment located in Department of Pharmaceutical Technology*



Tapped Density Tester Erweka

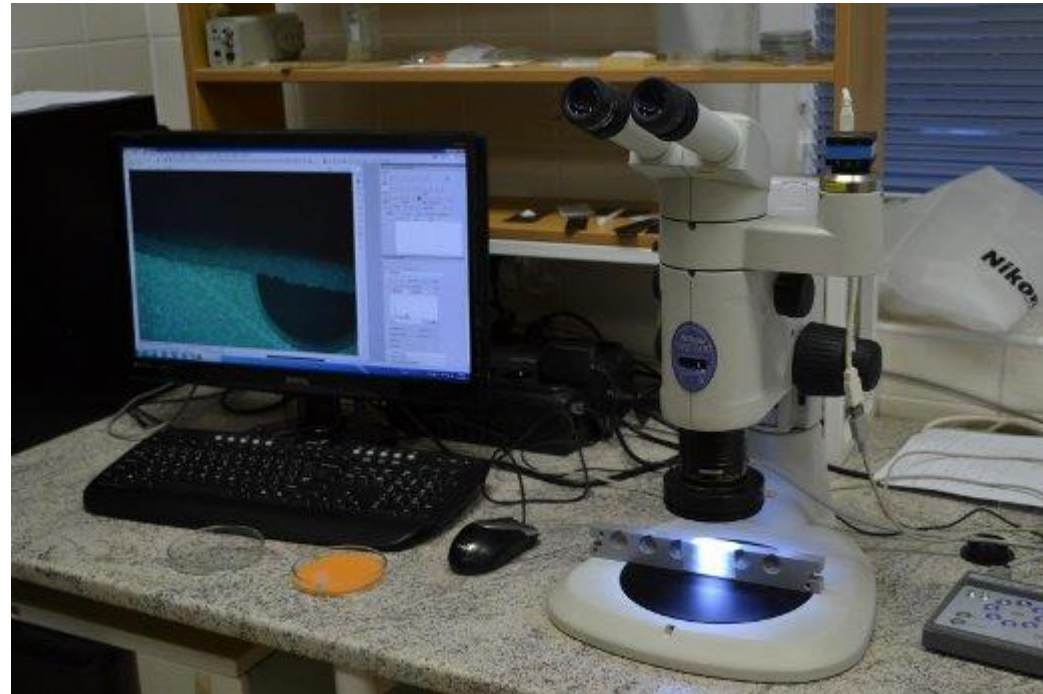
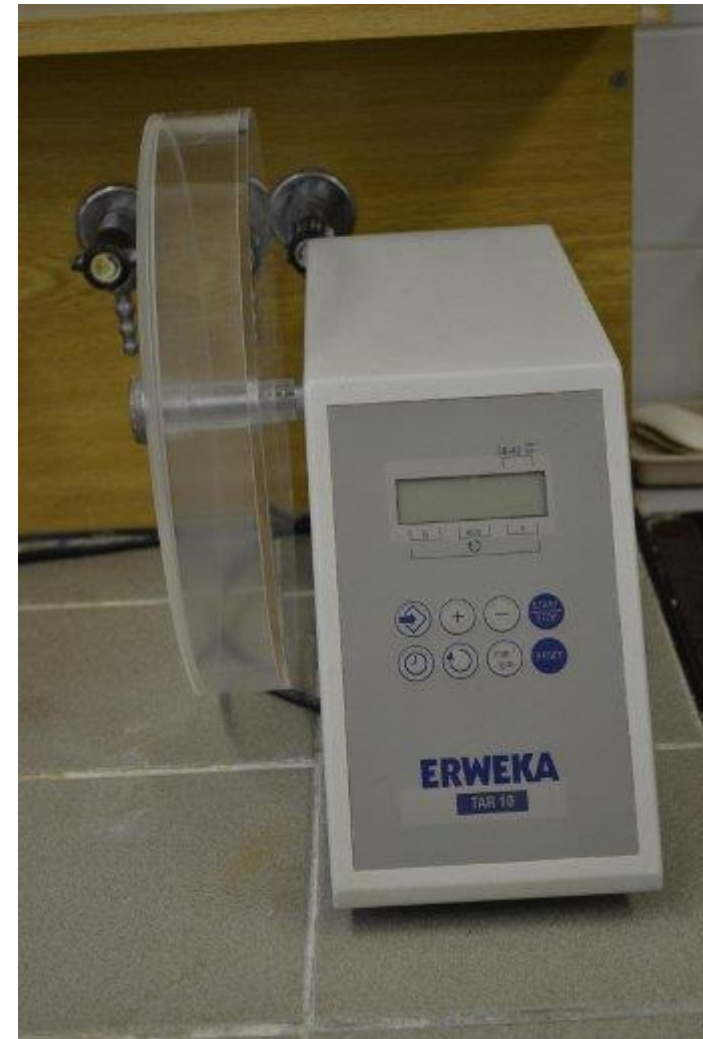


Image Analysis NIS a LECO with Optical microscope and Stereo microscope Nikon

# *Technological equipment located in Department of Pharmaceutical Technology*



Laser Diffraction Horiba



Friabilator Erweka



# *Technological equipment located in Department of Pharmaceutical Technology*



Hardness Tester Engineering Systems



Tester for weight, high, diameter and hardness of tablets Pharmatest



# ***Technological equipment located in Department of Pharmaceutical Technology***



Helium Pycnometer Porotec



Texture Analyzer and Rotary Viscometer  
Brookfield

# *Technological equipment located in Department of Pharmaceutical Technology*



Dissolution Tester (on/off line ) Sotax and Spectrophotometer Perkin Elmer



Franz Cells system

# *Technological equipment located in Department of Pharmaceutical Technology*



HPLC YL9100 Diode Array Detector and a Refractor Detector



DSC Perkin Elmer

# *Technological equipment located in Department of Pharmaceutical Technology*



Golem



Electron microscope Tescan



# *Technological equipment located in Department of Pharmaceutical Technology*



Laboratory Extruder – Spheronizer



High Speed Mixer

# ***Technological equipment located in Department of Pharmaceutical Technology***



Stability Boxes

# Extrusion and spheronization



1\_Extruze a sferonizace.mp4

# Coating



2\_Fluidní zařízení - Wurster.mp4