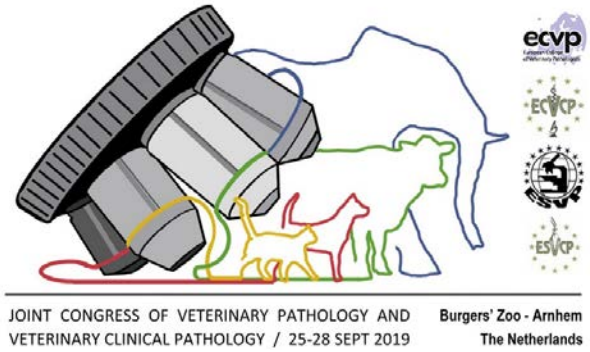

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Resident´s / CE Workshop:

How to Set Up a Research Project

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Dear participants,

This handout is a compilation of topics we might want to discuss in Arnhem on 25 Sept. 2019.
Please bring your own questions and ideas which I will be happy to include.

In case you have further topics you would like to discuss, please drop me an e-mail during the days before the congress:

achim.gruber@fu-berlin.de

Thanks, I look forward to see you all! Achim

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Motive: What is your research project good for?

a) Strategic aim-driven

- Just need a publication for your residency / application to sit your board exam?
- Plan a PhD?
- Plan your life time academic career?
- Make your department / institution / faculty more competitive?
- Want to place a product? Advertise for your company?

b) Motivation-driven

- Your own curiosity for a specific subject?
- Made an interesting observation you long o pursue?
- Invited for your particular expertise to join a research network?

fitfeelsgood.com

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nahbnow.com

***Research* =**

planning
+ (successful) work
+ communication (=publication)
+ become rich and famous

Think backwards!

1. *Goals / hypotheses reasonable?*
2. *Materials and Methods sound?*
3. *Conclusions justified by the data shown?*

Imagine you were the reviewer of your own manuscript to be submitted in 2 yrs

If you think RESEARCH, think in PUBLICATIONS these days…

When will research be acceptable for publication?

Results need to be

New: *Unknown / not published before*

Substantial: *Tell a story which is complete and flanked by supporting data. Are your conclusions unequivocally justified by your data shown?*

Relevant: *Does the readership have an interest in your story? Will it make a change in your field? Will it prompt subsequent work?*

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May your work be patentable?

See *epo.org*

An idea / **application** cannot be patented any more once it is published! (EU)

Application needs to be

New: *Unknown / not published before!*

Substantial: *Describe an application which is complete and flanked by supporting data. Are your conclusions unequivocally justified by your data shown?*

Relevant: *Commercial interest on the horizon?*

1. *First file a patent application, then publish in a journal*
2. *See your institutional patent lawyer EARLY*

Conceptual Design:

Hypothesis driven	vs.	descriptive / landscaping project
Product-oriented	vs.	dynamic project management

In any case: **Make it a *win-win-project design*!**

Epistemology (!!): *The Path of Truth* *

"just a thought" (educated guess)

↓

Idea

↓

Opinion

↓

(Working) Hypothesis

↓

Justified belief

↓

Theory

↓

Generally accepted knowledge

* Under heavy construction, probably not shared by everybody: depending on the field

The Outcome of Testing a Hypothesis

?

Our data ***proved*** our hypothesis

Our data ***confirmed*** our hypothesis

Our data ***falsified*** our hypothesis

Our data ***reject*** our hypothesis

Our data ***support*** our hypothesis

Our data ***fail to support*** our hypothesis

Our data ***corrected*** our hypothesis

Based on our data, ***we refined*** our hypothesis

The Outcome of Testing a Hypothesis

Suggested reading:

- ***Wikipedia:*** ***"Hypothesis"***
  "Epistemology"

- ***Merz et al., (2019) Vet. Pathol. 56(5) pp. 715-724***

Collaborations

barnraisersllc.com

Which lab should I join to optimally meet my goals? The best!

Networking

- With whom should we collaborate?

  Unique expertise?
  Training purposes?
  Unique material / samples?
  Halo effect?

- Who is the competition and what are they up to? Collaborate?

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Finances

- Solid calculation w/ all conceivable expenses considered
- Potential funding sources: National and EU funding agencies (competitive!)
  National research endeavors
  University starting funds
  Industrial partner
- Successful writing of grant applications
- Talk to your institutional Vice Dean of Research or equivalent

Chances of external funding increase with
- Your history of successful research
- Originality, quality and impact of your plans
- Fitting w/ policy of funding agency

hr.nmsu.edu/coi/

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Ethics: Keep an eye on it, right from the start!

- Animal experiments: Permission by legal authorities?
  University ethics committee?
- Clinical case material: (Permission by legal authorities)
  University ethics committee?
  Written patient owner consent!
- Good Scientific Practice (See your Vice Dean of Research)

Learn about journal requirements on ethics before you start!

Further Points to Consider in the Planning of your Research:

- **Time frame:** Be realistic, anticipate delays and detours
- **What-If-Scenarios: Think of "Plan B",** where reasonable. Backups for samples, experimental procedures, reagents, personnel?
- Make **Resilience** part of your planning!
- **Statistics:** How much statistical power can you afford? Number of samples? Expected variations? Consult a statistician before you start.
- **Data handling:** storage, backup, confidentiality, publicizing

- Which role do (economical) **conflicts of interest** play?

Suggested Further Readings:

1. Aldridge J (2012): The Research Funding Toolkit: How to Plan and Write Successful Grant Applications. SAGE, ISBN-10: 0857029681
2. Wingate LM (2014): Project Management for Research and Development. Auerbach, ISBN-10: 1466596295

Or contact achim.gruber@fu-berlin.de