How to write a scientific paper

https://www.elsevier.com/connect/11-steps-to-structuring-a-science-paper-editors-will-take-seriously

https://www.researchgate.net/publication/310912880_How_to_Write_a_Scientific_Research_Paper_International_Journal_of_Research_IJR_e-ISSN_2348-6848_p-_ISSN_2348-795X_Volume_2_Issue_05_May_2015

Steps to organizing your manuscript

Prepare the figures and tables.
Write the Methods.
Write up the Results.
Write the Discussion. Finalize the Results and Discussion before writing the introduction. ...
Write a clear Conclusion.
Write a compelling introduction.
Write the Abstract.
Compose a concise and descriptive Title.

UPPSALA
UNIVERSITET

STUDY DESIGN: NON-TRIVIAL CHALLENGES IN COMMON ISSUES

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Basic steps in conducting research

Hypothesis

Study design / resources

Data acquisition

Data processing:
Bioinformatics/Statistics

Discussion / Conclusions

Publication process:

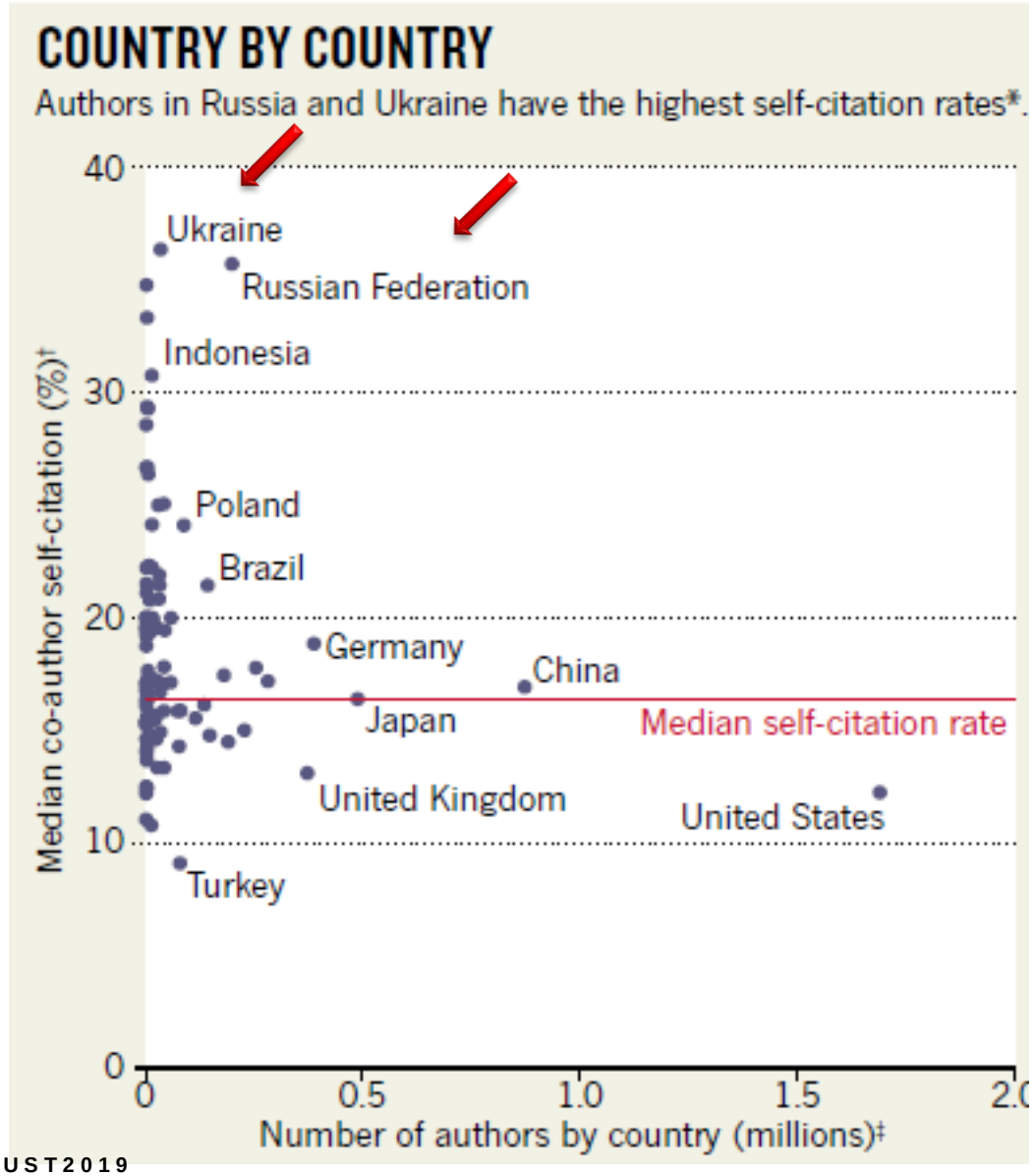
Manuscript design

Writing

Figures

References

Self-citation rates



- The Committee on Publication Ethics (London): extreme self-citation is one of the main forms of citation manipulation

Basic steps in conducting research

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Necessary / basic elements in Cellular and Molecular Neuroscience:

- **analyses of gene products**

Proteins / peptides	Western blot, RIA, ELISA, mass spectrometry/ proteomics
mRNA	qRT-PCR, dd-PCR, RNA-seq

- Could we get wrong with molecular methods when analyze brain?
- How to design such analysis?
  (Normalization, N of observations, statistics)
- How to interpret the data?

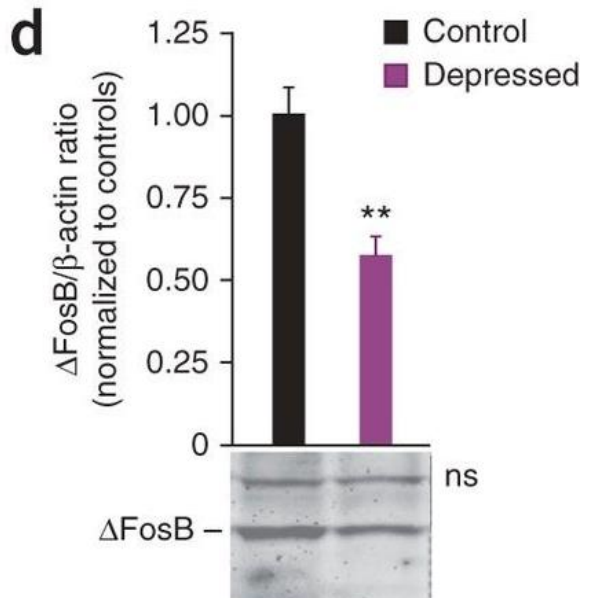
- Could we get wrong with Western blot when analyze brain?

nature neuroscience

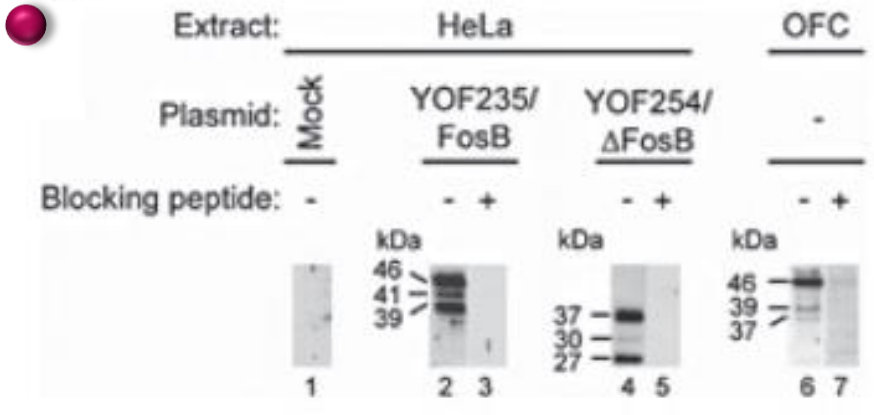
ΔFosB in brain reward circuits mediates resilience to stress and antidepressant responses

Vincent Vialou[1], Alfred J Robison[1,7], Quincey C LaPlant[1,7], Herbert E Covington III[1], David M Dietz[1], Yoshinori N Ohnishi[1], Ezekiell Mouzon[1], Augustus J Rush III[2], Emily L Watts[1], Deanna L Wallace[2,6], Sergio D Iñiguez[3], Yoko H Ohnishi[1], Michel A Steiner[4], Brandon L Warren[3], Vaishnav Krishnan[2], Carlos A Bolaños[3], Rachael L Neve[5], Subroto Ghose[2], Olivier Berton[2,6], Carol A Tamminga[2] & Eric J Nestler[1]

(d) Postmortem human NAc show smaller amounts of ΔFosB in depressed individuals as compared with matched controls
ns, nonspecific band unrelated to ΔFosB



- Best negative control: animals deficient in a gene product



Could we get wrong with Western blot when analyze brain?

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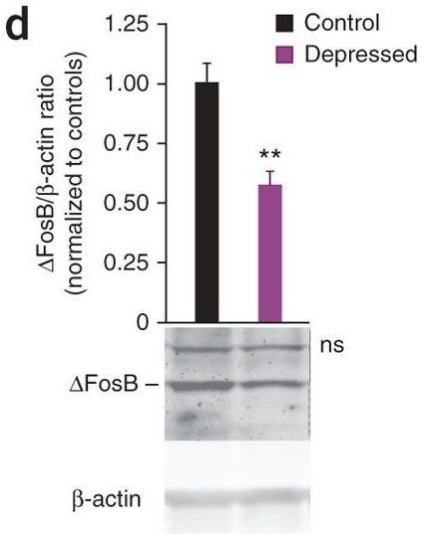
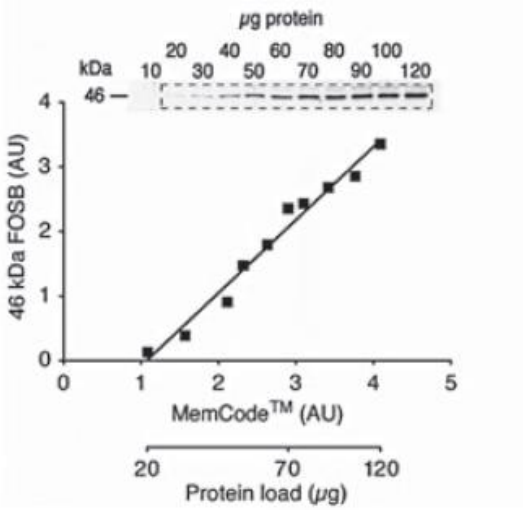
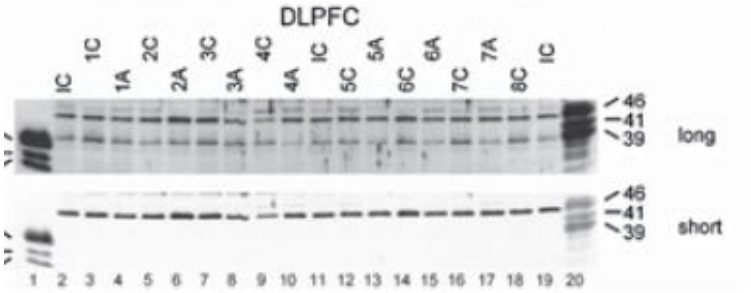
Student's t test; N = 8 human subjects / group





Statistics

- Covariates in stat models: gender, age, toxicology, agonal score, PMI, RIN,
- The number of subjects (effect size): 20 – 60 / group
- Replication study is essential



Could we get wrong with mRNA analysis in the brain?

qRT-PCR

- How many reference genes to be used for normalization?
- Should they be expressed in the same cells (neurons or glia) with genes of interest?
- Any corrections for the number of genes of interest?
  how to proceed if P > 0.05 after correction
- Interpretation:
  - changes in cell proportion
  - changes in RNA export / import

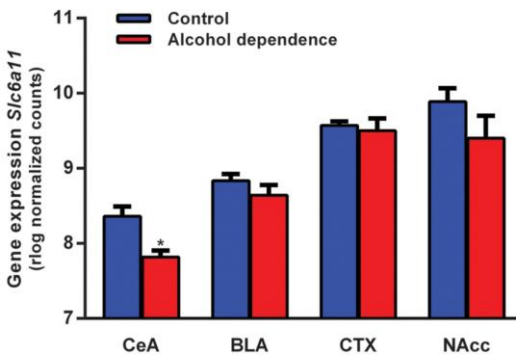
  - changes in gene expression
    initiation, elongation of transcription or RNA decay

Augier et al., **Science** 360, 1321–1326 (2018)

ALCOHOL DEPENDENCY

A molecular mechanism for choosing alcohol over an alternative reward

Eric Augier[1]*, Estelle Barbier[1], Russell S. Dulman[2], Valentina Licheri[3], Gaëlle Augier[1], Esi Domi[1], Riccardo Barchiesi[1], Sean Farris[4], Daniel Nätt[1], R. Dayne Mayfield[4], Louise Adermark[3], Markus Heilig[1]



Basics in design of analytical experiments:

- Get confidence in what you measure
- Use a quantitative variant
- When analyze human brain:
  - ➡ design **discovery** and **replication** cohorts with N > 20 – 30 / group
  - ➡ include covariates in stat models

NEVER WORKED!

Good Research Design

- Yields maximum information (avoids collecting unnecessary data)
- Maximizes reliability of results
- Provides firm foundation
- Helps organising one's ideas
- Give chances to foresee flaws & inadequacies
- Incorporates by learning from others critical comments & evaluation
- Researchers examine data critically
- Data valid and verifiable
- Researchers specify limits

- Fixed designs (quantitative) are normally theory driven; otherwise it is impossible to know in advance which variables need to be controlled and measured. Often, these variables are measured quantitatively.
- Flexible designs (qualitative) allow for more freedom during the data collection process. One reason for using a flexible research design can be that the variable of interest is not quantitatively measurable, such as culture. In other cases, theory might not be available before one starts the research.

Why Ukraine and Russia?

i) informational isolation due to limited access to the latest journal issues?

ii) the historical isolation pattern has not been yet overcome?

iii) scientific focus and methodologies are NOT modern – research groups are still investigating what they have been studied for 40-50 years:

limited resources?

limited engagement in international scientific activities