Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Alexandra Mitina

PhD Program: Life Sciences

Title of Thesis: Role of breast milk lipid composition
in postnatal brain development

Supervisor: Associate Professor Philipp Khaitovich

Name of the Reviewer:

I confirm the absence of any conflict of interest	Signature:
(Alternatively, Reviewer can formulate a possible conflict)	
	Date: 13-11-2020

The purpose of this report is to obtain an independent review from the members of PhD defense Jury before the thesis defense. The members of PhD defense Jury are asked to submit signed copy of the report at least 30 days prior the thesis defense. The Reviewers are asked to bring a copy of the completed report to the thesis defense and to discuss the contents of each report with each other before the thesis defense.

If the reviewers have any queries about the thesis which they wish to raise in advance, please contact the Chair of the Jury.

Reviewer's Report

Reviewers report should contain the following items:

- Brief evaluation of the thesis quality and overall structure of the dissertation.
- The relevance of the topic of dissertation work to its actual content
- The relevance of the methods used in the dissertation
- The scientific significance of the results obtained and their compliance with the international level and current state of the art
- The relevance of the obtained results to applications (if applicable)
- The quality of publications

The summary of issues to be addressed before/during the thesis defense

- Brief evaluation of the thesis quality and overall structure of the dissertation.

Thesis has canonical structure, well written reviewing recent developments in evolution of lactation, role of lipids in brain development and technical/bioinformatics protocols for mass-spectrometry lipid analysis . Thesis has traditional structure and comprises of 4 chapters 22 figures, 7 tables and 102 pages including supplement. The evaluation of experiments is logical and presented in a good style of scientific publication

- The relevance of the topic of dissertation work to its actual content
  Completely relevant
- The relevance of the methods used in the dissertation
  Mass-spectrometry and big data analysis methods are completely relevant.
- The scientific significance of the results obtained and their compliance with the international level and current state of the art
  The results are highly significant and were published in peer reviewd journals;
- The relevance of the obtained results to applications (if applicable)
  Not applicable
- The quality of publications

High standard publications in Interantional Journal : BMC Evol Biol 20, 70 (2020). https://doi.org/10.1186/s12862-020-01637-0 and Proc Natl Acad Sci U S A, 116(11), 4940–4945.
    https://doi.org/10.1073/pnas.1809105116v

The thesis presents for the first time TAG composition for seven mammalian species including primates, cattle and and pigs. Pig milk is different and fells out by containing unusually high amounts of long-chain polyunsaturated fatty acids, preceding human milk in long-chain polyunsaturated fatty acids abundance, followed by two macaque species, and then by the bovids. Authors explain it by adaptation to a shorter lactation period in pigs. In humans it might be a result of an enhanced demand of the growing brain.
Author also defines some human specific lipids, particularly containing very long chain unsaturated fatty acids. This investigation opens the field of milk lipidome evolution in conjunction with other developing tissues, especially the brain.

The thesis contains analysis of evolution of milk composition in humans, primates, bovids and pigs. The author probably should have taken in account the fact that cows and pigs were the subject of intensive human selection for thousands of years. Particularly cows were selected for milk productivity and contents including fat qualitative and quantitative parameters. I believe thet the work would benefit if the fact of human artificial selection would be taken into account.

Provisional Recommendation

X ☐ *I recommend that the candidate should defend the thesis by means of a formal thesis defense*

☐ *I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate's thesis according to the recommendations of the present report*

☐ *The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense*