



Přírodovědecká
fakulta
Faculty
of Science

Jihočeská univerzita
v Českých Budějovicích
University of South Bohemia
in České Budějovice

OPPONENT'S REVIEW ON BACHELOR THESIS

Name of the student: Mia Nußbaumer

Thesis title: Role of the serotonin receptor type 7 (5-HT₇) in autoimmune disease

Supervisor: Mgr. Alexey Bondar, PhD

Referee: doc. RNDr. Alena Panicucci Zíková, PhD

Referee's affiliation: Biology Centre, CAS

	Point scale ¹	Points
(1) FORMAL REQUIREMENTS		
Extent of the thesis (for bachelor theses min. 18 pages, for masters theses min. 25 pages), balanced length of the thesis parts (recommended length of the theoretical part is max. 1/3 of the total length), logical structure of the thesis	0-3	3
Quality of the theoretical part (review) (number and relevancy of the references, recency of the references)	0-3	3
Accuracy in citing of the references (presence of uncited sources, uniform style of the references, use of correct journal titles and abbreviations)	0-3	3
Graphic layout of the text and of the figures/tables	0-3	3
Quality of the annotation	0-3	3
Language and stylistics, complying with the valid terminology	0-3	3
Accuracy and completeness of figures/tables legends (clarity without reading the rest of the text, explanation of the symbols and labeling, indication of the units)	0-3	3
Formal requirements – points in total		
(2) PRACTICAL REQUIREMENTS		
Clarity and fulfillment of the aims	0-3	3
Ability to understand the results, their interpretation, and clarity of the results, discussion, and conclusions	0-3	3
Discussion quality – interpretation of the results and their discussion with the literature (absence of discussion with the literature is not acceptable)	0-3	2
Logic in the course of the experimental work	0-3	3
Completeness of the description of the used techniques	0-3	3
Experimental difficulty of the thesis, independence in experimental work	0-3	2

¹ Mark as: 0-unsatisfactory, 1-satisfactory, 2-average, 3-excellent.

Quality of experimental data presentation	0-3	3
The use of up-to-date techniques	0-3	3
Contribution of the thesis to the knowledge in the field and possibility to publish the results (after eventual supplementary experiments)	0-3	2
Practical requirements – points in total		
POINTS IN TOTAL (MAX/AWARDED)	48	(0-48) ²

Comments of the reviewer on the student and the thesis:

When I was asked to review the submitted thesis, I hesitated because the topic does not fall directly within my area of research and expertise. But after reading it, I have no regrets. I learned a lot of interesting things about GPCR that I should know anyway. The student did an excellent job explaining the role and different types of GPCRs and G protein heterotrimers, their structure, function and most importantly their role in different human diseases. I found the topic of this work very important and interesting. The objectives are well defined and the methodology used is clearly explained. The results are described logically and are well understood. The discussion is always the most difficult part of the study, and it usually takes the form of a repetition of the results, but in this case the student has tried to compare his results with the existing discussion, leading to conclusions and future directions. I have no reservations about the work and my questions below come mainly from my interest.

Suggestions and questions, to which the student has to answer during the defense.

Mistakes, which the students should avoid in the future:

1. I was a bit confused about the mechanism of G-protein signaling, since Figure 1 shows that the G-protein heterotrimer associates with the GPCR and, in response to a stimulus, GDP is exchanged for GTP on the G-protein subunit alpha, the complex dissociates, and the "G-protein heterotrimer is "recharged" by GTP hydrolysis on the subunit alpha after the "work" is done. On the contrary, the author wrote in the subsection "Inverse coupling" that according to the canonical model, the G protein couples only to active GPCR - to me this means that it binds upon the stimulus. I am sure this is because I am not familiar with this important signaling pathway, and although the student did an excellent job of explaining it, some of the principles were a bit confusing. I look forward to the presentation, which may clear up my confusion.
2. I would like to hear the student's opinion on the extent to which "reverse coupling" between GPCRs is common? Is it a rare event, or does it actually apply to the majority of GPCRs?
3. Is there any precedent in the literature that the binding of G proteins to GPCRs is affected by temperature? If so, what method has been used to show the differences in affinity of G proteins for GPCRs at different temperatures?

² Enter the number of points awarded.

4. The expression levels of the G protein subunits alpha(s) and alpha(12) were not determined. Is this something that should be considered? Or does it not matter how good the expression is and if the expression varies between the different cells examined.
5. Again, due to my lack of knowledge, it is not entirely clear to me how the labeling of the beta/gama dimer and its mobility is used as a proxy for determining the mobility of the G protein alpha subunits tested. I do not doubt that this is correct, I just want to understand it better.
6. Figure 8 - for the uninformed like me, I do not see much difference between the two images. Can the student say a bit more about the methodology and image analysis to that will help decide whether the image is useful for single molecule studies or not?
7. Just a suggestion - the title of the thesis does not reflect the work done. Although I like the title, the author could have come up with a more precise title that better describes the content of the work.

Conclusion:

In conclusion, I

r e c o m m e n d

the thesis for the defense and I suggest the grade 1³

In České Budějovice, 12.6.2023

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signature

³ You can suggest a grade, which can be modified during the defense based on the presentation. However, if the reviewer is not present at the defense, the grade will not be counted. Grades: excellent (1). Very good (2), Good (3), Unsatisfactory/failed (4).