



Review of doctoral thesis
“Alteration of the redox signaling in liver cancer cells by non-thermal plasma and laser radiation.” submitted by Mgr. Barbora Smolková

The dissertation thesis submitted by Mgr. Barbora Solková focuses on systematic study of the mechanisms of action of air non-thermal plasma (NTP) and low-power laser light therapy (LLLT) irradiation on HepG2, Huh7 and Alexander hepatic cancer cell lines.

The dissertation mainly focusses on the challenges, downfalls, fragmental knowledge and utilization of NTP and LLLT irradiation utilized for the treatment of hepatic cancer cells. In particular the thesis aims to reveal the molecular foundations and responses of the treated cells so various challenges will be overcome, potentially leading to better controlled, safer and more robust biomedical applications and potential treatments.

The thesis consists of introduction, aims, experimental part summarizing the utilized methods, part summarizing the main results, conclusions and referenced bibliography. The submitted thesis has 69 pages and includes 4 appendixes/main publications from which it mainly sources. The work is well conceived and organized with a clear presentation and vision. The candidate addresses and explains all obtained results independently. I highly value the fact that the candidate also directly states her contribution on every sourced publication. I highly value the fact that every utilized/overtaken figure is reprinted by respecting copyrights and clear publisher's permission.

Despite the fact that the work is rather precisely written, I have to point out few discrepancies, typos and inconsistencies:

- i) author does not use cursive/italics for the physical quantities/properties (example page 9, 43 (mitochondrial membrane potential));
- ii) some abbreviations (example NTP) not referenced at first point, although full abbreviation list is given in the dissertation;
- iii) often the magnitude of various physical quantities is written as united with the units (example page 15, 22);
- iv) in the discussion and conclusion part, I expected higher criticism to the literature results, going beyond the published works of the applicant.

Although the dissertation builds on 4 authored/co-authored publications, I have to note that at the submission point the candidate has 17 publications with a high scientific visibility. At this point she has Hirsh index of 8 with a reasonable number of citations. Despite the small typographic inconsistencies, I **recommend Mgr. Smolková's dissertation for defense at the Board of Biophysics, Chemical and Macromolecular Physics, Faculty of Mathematics and Physics, Charles University**. In my opinion the applicant has shown a high level of independence, diligence and creativity, undoubtedly thus demonstrating to be fully capable of performing independent research.

Specific questions:

- 1) As shown on Page 38, Figure 11 and Figure 13, The plasma torch exhibits lateral inhomogeneity. How does this influence the irradiation of individual cells over the surface? Can you comment on the spatial uniformity of exposure?
- 2) Can you briefly summarize the main discrepancies that you have found with respect to published literature, propelling your research, aims and focus?
- 3) Can the author give a critical view on future implementation of NTP and LLLT irradiation in biomedical applications and potential treatments?

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