MUNI

Annex No. 10 to the MU Directive on Habilitation Procedures and Professor Appointment Procedures

HABILITATION THESIS REVIEWER'S REPORT

Masaryk University	
Applicant	RNDr. Jan Balvan, Ph.D.
Habilitation thesis	Cell Death and Cellular Secretion: Key Factors in the Cancerogenesis
Reviewer	doc. RNDr. Michal Šimíček, PhD.
Reviewer's home unit, institution	Department of Hematooncology, Faculty of Medicine, University of Ostrava and University Hospital Ostrava

The habilitation thesis entitled "Cell Death and Cellular Secretion: Key Factors in Carcinogenesis" submitted by RNDr. Jan Balvan, Ph.D. focuses on the mechanisms of regulated cell death, autophagy, and extracellular vesicle-mediated intercellular communication, all of which play fundamental roles in cancer progression and therapeutic resistance. The topic is highly relevant and of considerable importance for both basic and translational biomedical research.

The thesis is based on a coherent collection of original scientific publications produced by the candidate over the last decade, demonstrating his systematic and long-term research activities. The presented studies are logically interconnected and provide a comprehensive overview of the candidate's scientific contribution to the field. The candidate successfully combined advanced experimental approaches, including quantitative phase imaging, AI-assisted image analysis, molecular and cell biology techniques, and extracellular vesicle characterization. The applied methodologies are appropriate, state-of-the-art, and scientifically rigorous.

Among the most significant contributions of the thesis are the development of innovative label-free methods for distinguishing different forms of cell death, the investigation of autophagy as a mechanism of tumor adaptation and therapeutic resistance, and the elucidation of the interplay between autophagy and extracellular vesicle secretion. The work not only advances the current understanding of tumor biology but also introduces novel methodological approaches with broad applicability in cancer research and experimental cell biology. The obtained results represent valuable contributions to the understanding of cellular stress responses and intercellular communication and provide a solid basis for further mechanistic and translational studies.

The scientific quality of the work is supported by an proven publication record comprising of 12 publications in respected international journals, including 2 first-author and 4 senior-author publications. The accompanying commentary clearly documents the candidate's substantial intellectual contribution to the individual studies.

From the formal perspective, the thesis is well organized, logically structured, and clearly written. The commentary appropriately integrates the individual publications into a readable

format, allowing to appreciate both the continuity and the progression of the candidate's research.

In conclusion, the submitted habilitation thesis represents an original, scientifically valuable, and methodologically sound collection of candidate´s work that fulfills standard requirements for a habilitation thesis. I therefore recommend its acceptance in the habilitation process.

Reviewer's questions for the habilitation thesis defence

1. What are the main obstacles preventing quantitative phase imaging from becoming a routine method in biomedical research and diagnostics?
2. Since autophagy can both promote survival and contribute to cell death, how should autophagy-modulating therapies be selected for different tumour types?
3. Among all the findings presented in your habilitation thesis, which do you consider the most important, and what would be your next major research objective building on these results?

Conclusion

The habilitation thesis entitled "Cell Death and Cellular Secretion: Key Factors in the Cancerogenesis" by RNDr. Jan Balvan, Ph.D., **fulfils** requirements expected of a habilitation thesis in the field of Pathological Physiology.

Date: 24.6.2026 Signature: