

## Opponent review of doctoral dissertation

**Work title:** Use of Nanomaterials in Fortification of Anastomoses on the Gastrointestinal Tract

**Author:** MUDr. Jáchym Rosendorf

**Supervisor:** Prof. MUDr. Václav Liška, Ph.D.

**Opponent:** Prof. Dr. Inge K. Herrmann, ETH Zurich

Millions of patients undergo intestinal surgery procedures where diseased tissue is resected and healthy ends are reconnected in a procedure known as anastomosis. Leaking of the sutured site is a most feared post-operative complication where non-sterile, digestive fluids enter the peritoneal cavity and put the patient at risk for sepsis. Despite significant progress in the recent years, currently available materials solutions only insufficiently address the issue due to weak adhesion and sealing under these most demanding conditions. There is a clear scientific and clinical need to develop new materials in order to prevent and treat anastomotic leaking. The objectives of the thesis are clearly stated and address a pressing need.

The thesis is well-structured and provides a good overview on the anatomy and physiology of the gastrointestinal tract, as well as current surgical techniques to manage and minimize (postoperative) complications. It presents a review of available animal models of peritoneal adhesions and anastomotic leaking/wound healing. Relevant literature is cited. Additionally, the field of nanofibrous materials is briefly introduced. While a discussion of available alternative materials solutions would have been of interest, it might be considered to be beyond the scope of the thesis. In the subsequent chapters, three original studies are presented with clear aims, hypotheses, methodology, results and discussion. The methodologies are well selected and are at the forefront of the field. After all, currently available animal models for intestinal complications suffer from poor reproducibility and the appropriate selection of animal model and endpoints is controversially discussed in the field. The work by MUDr. Rosendorf provides important insights and additions to the state-of-the-art and offers a new scoring system to (semi)quantitatively assess adhesions and intestinal wall integrity. In addition, it contains novelty also on the materials development side, even though the material design still needs to be refined in order to bring actual clinical benefit. The thesis is concluded by a final chapter outlining the main achievements and future steps.

MUDr. Rosendorf has been a highly productive physician-researcher and has published at least 22 articles in his still young career, amongst them five as first-author. He has successfully obtained research grants for his work. Additionally, he has delivered multiple talks and lectures (including an invited talk) at national and international conferences. For his work, he has been awarded multiple awards, including the Niederle's prize, a best presentation award at the HPB Surgery Congress in Plisen, and the Albert Schweitzer 3<sup>rd</sup> Prize by the French Institute in Prague. These achievements, together with the submitted dissertation attest to his ability to carry out meaningful and recognized scientific work.

Taken together, the doctoral thesis submitted by MUDr. Rosendorf fulfils the standards of a doctoral dissertation and I therefore recommend acceptance of the thesis without reservation. Based on all the above considerations, I recommend the thesis to be defended according to the law of the Czech Republic, Act No. 111/1998 Coll., section 47.

Sincerely yours,

Inge K. Herrmann

Zurich, April 14, 2021