

LABORATORY FOR APPLIED RADIOBIOLOGY

Prof. Dr. Martin Pruschy

Laboratory for Applied Radiobiology
Dept. Radiation Oncology
University Hospital Zurich
Raemistr. 100, 8091 Zurich

martin.pruschy@usz.ch
[Website](#)



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SUMMARY & MISSION STATEMENT

Our research projects include different aspects of translational research in the field of radiobiology investigating the cellular and tumoral response on the molecular, cellular and *in vivo* level to ionizing radiation alone and in combination with classical chemotherapeutic and novel pharmacological agents

OVERVIEW

Our research program focuses on the identification of processes on the molecular, cellular and tumor pathophysiological level that regulate the response to radiotherapy and thereby co-determine treatment outcome. Novel anti-cancer agents targeting these molecular and cellular entities are identified and probed as part of combined treatment modalities with ionizing radiation, towards the translation of such novel treatment approaches into clinical concepts. This research is performed in the Laboratory for Applied Radiobiology and is linked to the Dept. of Radiation Oncology at the University Hospital Zurich. This research program can be grouped into three major research projects with the overarching goals.

- i) to identify novel targets for radiosensitization and to develop novel combined treatment modalities (ionizing radiation with chemotherapy/antisingaling agents)
- ii) to understand differential treatment responses to different qualities of ionizing radiation
- iii) to implement preclinical tumor models and radiotherapy approaches close to the clinical situation.

This research program thereby bridges the gap between basic and clinical-oriented research in the field of radiotherapy.

SELECTED CANCER RELATED PUBLICATIONS

The novel microtubule targeting agent BAL101553 in combination with radiotherapy in treatment-refractory tumor models. Sharma A, Broggin-Tenzer A, Vuong V, Messikommer A, Nytko KJ, Guckenberger M, Bachmann F, Lane HA, Pruschy M. **Radiother Oncol.** 2017 Sep;124(3):433-438

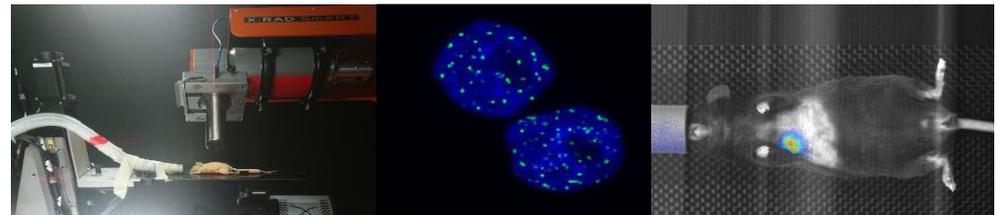
Secretome Signature Identifies ADAM17 as Novel Target for Radiosensitization of Non-Small Cell Lung Cancer. Sharma A, Bender S, Zimmermann M, Riesterer O, Broggin-Tenzer A, Pruschy MN. **Clin Cancer Res.** 2016 Sep 1;22(17):4428-39

Combined treatment strategies for microtubule stabilizing agent-resistant tumors. Broggin-Tenzer A, Sharma A, Nytko KJ, Bender S, Vuong V, Orłowski K, Hug D, O'Reilly T, Pruschy M. **J Natl Cancer Inst.** 2015 Feb 17;107(4). pii: dju504

Ionizing radiation antagonizes tumor hypoxia induced by antiangiogenic treatment.

Riesterer O, Honer M, Jochum W, Oehler C, Ametamey S, Pruschy M. **Clin Cancer Res.** 2006 Jun 1;12(11 Pt 1):3518-24

Differential DNA repair pathway choice in cancer cells after proton- and photon-irradiation. Fontana AO, Augsburg MA, Grosse N, Guckenberger M, Lomax AJ, Sartori AA, Pruschy MN. **Radiother Oncol.** 2015 Sep;116(3):374-80.



We are interested to integrate *in vitro* and *in vivo* approaches to understand the tumor response of ionizing radiation alone and in combination with molecular targeting agents. We recently acquired a small animal image-guided radiotherapy platform (left), which allows us to irradiate orthotopic tumors in small animals with high conformity and to probe the response e.g. with functional bioluminescent reporter systems (right). Molecular, biochemical and cell biological assays (middle) are used to identify and to mechanistically investigate treatment resistances.