

KFSP Tumor Oxygenation

Newsletter 3

April 15, 2014

Yearly Retreat 2013



At the Yearly Retreat 2013 we worked on the scientific, translational and interdisciplinary aspects of the project at the beautiful hotel restaurant Uto Kulm in Zurich.



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KFSP Tumor Oxygenation

Mission

One of our population's main health threats is cancer (25.7% of deaths in Switzerland in 2012). Four out of ten people in Switzerland will contract cancer during their lifetime, with increasing incidence, leading to personal distress and a substantial and rapidly increasing proportion of the healthcare spending. And we still have no sufficient cures. Today, we know that for cancer diagnosis and treatment, oxygen is one of the most important prognostic biomarkers (i.e. low oxygenation is strongly associated with unfavorable outcomes) and therapeutic targets (i.e. oxygenation highly affects the effectiveness of therapies and therefore the target is to increase tumor oxygenation). So far, the accurate measurement of tumor oxygenation in a non-invasive, non-toxic, yet repetitive manner has not been possible.

The aim of the KFSP Tumor Oxygenation is to provide novel methods of bio photonics, such as 3D near-infrared imaging technologies and fluorescence molecular tomography, BOLD magnetic resonance imaging (MRI) and positron emission

tomography (PET) to image and measure tumor oxygenation and oxygen metabolism in vivo at the animal and human level. Our research focuses on head and neck cancers and might be extended to other important tumor entities at a later stage. The oxygenation of these cancers will be studied before and during surgery, radiotherapy and chemotherapy as well as photodynamic therapy and, ultimately, the therapy will be optimized by being able to predict treatment response before and during therapy. By striving for multidisciplinary medical research, we aim for a personalized approach of cancer treatment that limits harmful side-effects and at the same time provides more effective treatment. Specifically, the KFSP Tumor Oxygenation will provide the tools to better understand, possibly prevent and more effectively treat cancer, thereby reducing social cost and personal distress and increasing the quality of life of cancer patients.

Spotlight



On November 28, 2013 the KFSP Tumor Oxygenation Yearly Retreat 2013 took place at the beautiful hotel restaurant Uto Kulm on Zurich's Uetliberg. The aim of the retreat was to present the current findings, scientific achievements, project progresses and deliverables of the KFSP Tumor Oxygenation. A major part of this work was to define the next steps and research milestones towards the overall research goal with a particular focus on the collaborative subprojects. Prof. Dr. Urs Lütolf, former Director of the Clinic of Radiation Oncology and Medical Director of the University Hospital Zurich (USZ), acted as a scientific advisor and reviewed the projects' progress.

Several overarching and integrating projects were defined and all members of the KFSP were asked to propose additional projects by the end of the year.

The retreat ended at 5.30pm with a joint outdoor campfire aperitif.

Additional Projects

Based on the project proposals received by the



Steering Committee and the aims defined at the retreat, additional projects were included.

The methods section will additionally develop a near-infrared imager for animals (collaboration Rudin, Wolf).

The preclinical section has defined an overarching project, where hypoxia will be assessed by the different methods available in the same animals, who receive CO to induce hypoxia (collaboration Borsig, Rudin, Wenger, Wolf, Pruschy).

For the clinical section, the radiation oncology will conduct four additional projects and complement existing projects to form overarching projects, in particular in several studies in patients, additional measurements will be carried out (serum markers, MRI, PET, deep sequencing) (collaboration Boss, Buck, Ikenberg, Pruschy, Wolf,

Riesterer). The so far missing oncology part of the KFSP project will be activated by conducting a phase I study in collaboration with the Department of Clinical Oncology (collaboration Buck, Boss, Rordorf, Wolf, Bredell).

Seminar

Forschungskolloquium KFSP Tumor Oxygenation

On October 17, 2013 Prof. Dr. Dmitri B. Papkovsky from the University College Cork in Ireland gave a speech on "New family of phosphorescent probes for imaging tissue oxygen".

On November 21, 2013 Prof. Dr. Peter Vaupel from the University Medical Center Mainz gave a speech on



“Tumor hypoxia: Coping with different pathophysiologies, spatio-temporal heterogeneities and fatal consequences”.

On December 19, 2013 Prof. Dr. Daniel Zips from the University Hospital Tübingen gave a speech on “Tumour hypoxia and biologically individualized radiotherapy”.

On February 20, 2014 Prof. Dr. Lars French from the University Hospital Zurich gave a speech on “The inflammasome and autoinflammatory disease”.

On March 20, 2014 we introduced progress reports by our young researchers as integral parts of the seminar. Dr. Katarzyna Nytko-Karouzakis from the University Hospital Zurich presented her progress report on “Tumor oxygenation and radiation resistance (preclinical)”.

After the speeches, we enjoyed stand-up pizza on site of the lecture hall and had the chance to discuss the speeches and the respective teams’ research progress.

Special lectures in the framework of the KFSP

We encouraged all researchers involved in the KFSP Tumor Oxygenation to

take part in the seminars of the Cancer Network Zurich, available at www.cnz.uzh.ch/Seminars.html.

Moreover, we invited all researchers to take part in specific selected seminar speeches chaired by our team heads. For example, Prof. Dr. Markus Rudin invited all researchers to a speech by Prof. Dr. Geoffrey Parker, one of his guest speakers, on “Quantitative MRI of oxygenation and perfusion using T1 contrast”.

Intermediate Report 2012/2013

In March 2014, we delivered the KFSP Tumor Oxygenation Intermediate Report 2012/2013 to the dean’s office. Thanks go to all teams for handing in their respective sub-reports to the KFSP Steering Committee on time. The aggregate report contained information regarding the research contents and progresses as well as financials. The chapter of the research contents and progresses can be downloaded from our wiki at: <https://www.uzh.ch/to2/ssl-dir/wiki/index.php?n=Main.DekanatBerichte>.

Publications

Papers

Papers that have been published in the framework of the KFSP Tumor Oxygenation so far:

Pavia J., Wolf M., Charbon E. (in press), *Single-photon Avalanche Diode Images Applied to Near-infrared Imaging*, IEEE Journal of Selected Topics in Quantum Electronics, in press.

Pavia J., Wolf M., Charbon E. (2014), *Measurement and Modeling of Microlenses Fabricated on Single-photon Avalanche Diode Arrays for Fill Factor Recovery*, Opt. Express, 2014, 22:4202-4213.

Helbig L., Koi L., Brüchner K., Gurtner K., Hess-Stumpff H., Unterschemmann K., Pruschy M., Baumann M., Yaromina A., Zips D. (2014), *Hypoxia-inducible Factor Pathway Inhibition Resolves Tumor Hypoxia and Improves Local Tumor Control after Single-dose Irradiation*, Int J Radiat Oncol Biol Phys., 2014, 88:159-66.

Orlowski K., Rohrer Bley C., Zimmermann M., Vuong V., Hug D., et al. (2012), *Dynamics of Tumor Hypoxia in Response to Patupilone and Ionizing Radiation*, PLoS ONE 7(12): e51476.

doi:10.1371/journal.pone.0051476.

Further publications by members of the KFSP Tumor Oxygenation have been submitted. Yet further publications are in the process of being issued and planned to be submitted for publication in 2014.

We would like to remind all researchers to mention the KFSP Tumor Oxygenation in the acknowledgement or affiliation of their papers, abstracts, newspaper articles, conference presentations and public speeches in the following form: "This work was supported by the KFSP Tumor Oxygenation of the University of Zurich". Please keep in mind to use the American spelling "tumor" (instead of "tumour").

People

Unfortunately, Dr. Matthias Rössle from the Institute of Clinical Pathology has left the UniversityHospital Zurich to accept a position as leading physician pathology at Kantospital Graubünden in Chur. We wish him all the best.

Due to his leaving, Irene Scholz has also quit her position as a research associate at the Institute of Clinical Pathology at the UniversityHospital Zurich. She has

accepted a new position at the pediatrics department at Kinderspital Basel. We wish her good luck.

New Team Members



In the place of Dr. Matthias Rössle, Dr. Kristian Ikenberg from the Institute of Clinical Pathology at the UniversityHospital Zurich has become a new member of the KFSP Tumor Oxygenation. Welcome to the team!

Outlook

On August 21, 2014 at 6 pm we will have an outdoor barbecue after the monthly seminar session in order to welcome everybody back after the alleged summer break and update each other on the status quo of one's research.

In November/December 2014 the KFSP Tumor Oxygenation will organize another Yearly Retreat. In addition to presenting progress reports that address what has been accomplished, what could not be accom-

plished and what the next research milestones are, the topics of the retreat will include the potential prolongation and evaluation of the KFSP, which will take place in March 2015.



Newsletter 4 will appear in October, 2014.

Publishing Information

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