

PRESS RELEASE

12th SWISS BRIDGE AWARD: 500,000 francs for outstanding cancer research

Zurich, October 25th, 2011 – Rare tumours and childhood cancer are the topics of this year's SWISS BRIDGE AWARD. The following three scientists will be granted the award sum totalling 500,000 francs for their excellent work in the area of basic cancer research: Professor Jürg Schwaller of the University of Basel, Professor Shai Izraeli of the Sheba Medical Center in Israel and Professor Monika Hegi of the University Hospital Lausanne. The award ceremony is being held today in Zurich.

Since 2000, the SWISS BRIDGE foundation has been awarding 500,000 francs annually with their research award. Three scientists are recognized for their outstanding research work in the fight against cancer. The president of the Scientific Committee, Professor Gordon McVie of the European Institute of Oncology in Milan, will present the SWISS BRIDGE AWARD in Zurich today already for the twelfth time.

Three award winners from Switzerland and Israel

The money allows the award winners to realize their innovative research projects and is split up as follows:

- Professor Jürg Schwaller, MD, Department of Biomedicine of the University Hospital Basel: 175,000 francs;
- Professor Shai Izraeli, MD, Department of Pediatric Hemato-Oncology and Cancer Research Center, Sheba Medical Center in Israel: 150,000 francs;
- Professor Monika Hegi, PhD, Director of the Laboratory of Brain Tumor Biology and Genetics, Department of Clinical Neurosciences, University Hospital Lausanne (CHUV): 175,000 francs.

Research on rare tumours and childhood cancer

In total, 30 letters of intent were submitted by research scientists working at academic institutions and cancer research institutes in Europe. This year, researchers with projects focusing on rare tumours or childhood cancers were eligible for application. Rare tumours are defined as those which affect less than 6 of 100,000 persons per year.

The Scientific Committee, comprised of international experts, evaluated the letters of intent submitted and selected six applicants to be invited to submit a detailed project description. Out of these six selected projects, the three aforementioned were finally nominated for the award. The Scientific Office of the Swiss Cancer League was again responsible for the operational management including the call for proposals and the coordination of the evaluation process.

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SWISS BRIDGE was founded on the initiative of the former managing director Thomas Hoepfli, who is now a member of the Board of Foundation. The purpose of the organisation, founded in 1997 with assistance of the Swiss Cancer League, is to financially support high-quality Swiss and international research projects, which are expected to deliver new findings in the fight against cancer, through contributions from private donors and foundations. To date, a total of 6.85 million Swiss francs has been conferred by the SWISS BRIDGE AWARD for cancer research projects of scientists based in Belgium, England, France, Israel, Italy, Norway, Sweden, Spain and Switzerland.

Summaries of the three supported research projects

Professor Jürg Schwaller, MD, Department of Biomedicine, University Hospital Basel, receives 175,000 Swiss francs for the project entitled:

Modeling for targeting of mixed-lineage acute leukemia

Infant acute leukemia is a rare but severe disease that affects about 5 of 100,000 newborns per year. In almost 80 % of the cases, the leukemic cells harbor chromosomal translocations affecting the mixed lineage leukemia (MLL) gene. Such alterations are also found in pediatric and adult acute leukemia and are often associated with a poor prognosis. These chromosomal translocations lead to the expression of chimeric proteins fusing the amino-terminal portion of MLL to the carboxy-terminus of the partner. Two third of the cases are covered by translocations t(9;11), t(11;19) or t(4;11) leading to MLL-AF9, MLL-ENL and MLL-AF4. Experimental studies have shown that MLL fusions act as potent oncogenes. Gene expression profiling revealed deregulation of closely overlapping downstream targets in human and murine MLL leukemia defining the mouse as an ideal model to study the biology of the disease and to search for novel therapeutic strategies.

Professor Shai Izraeli, MD, Department of Pediatric Hemato-Oncology and Cancer Research Center, Sheba Medical Center, Ramat Gan, Israel, receives 150,000 Swiss francs for the project entitled:

From inflammation and allergy to high risk childhood leukemia – The TSLP-JAK-STAT leukemogenic pathway

Acute lymphoblastic leukemia (ALL) is the most common cancer in children. The major challenge in management of childhood acute ALL is to increase cure rate with lesser toxicity through the identification of biomarkers amenable to targeted therapies. This proposal is based on our discovery of the aberrant expression of the receptor to thymic stromal lymphopoietin (TSLP) in childhood ALL with particularly poor prognosis. Importantly this abnormality is

amenable to targeted therapy with JAK and mTOR inhibitors and clinical trials have already started, barely three years from our first report. We further discovered that the aberrant activation of this receptor is caused by a complex array of cooperating mutational events including genomic translocations, unique activating mutations in its key component CRLF2 and IL7 receptor (IL7R) and mutations in downstream enzymes (JAK1 and JAK2). Yet it is presently unclear how these successive mutations affect the initiation and progression to leukemia, what is their relative importance for leukemia evolution and what are their specific oncogenic roles, separately from the effects of other leukemia oncogenes.

To elucidate these questions we will create a model of gradual transformation of human cord blood hematopoietic progenitors by expressing one or more of the mutated proteins. Utilizing B cell cultures we will examine B cell differentiation, proliferation, survival and self renewal as well as downstream targets *in vitro* and generation of pre-leukemia and leukemia *in vivo* by transplantation of transduced CB progenitors into NOD/LtSz-scid IL2R γ null (NSG) mice. We will also unfold the potential differential activity of “lymphoid” vs “myeloid” JAK2 mutations. Utilizing a primary human model system we hope to answer two key questions in leukemia research: (a) What is the role of an aberrant activation of inflammatory TSLP pathway in evolution of ALL? This may be particularly important to the general theme of environment and health as childhood ALL has been proposed to evolve by an abnormal immune response to early childhood pathogens. TSLP may be the “missing link”; and (b) what are the downstream components of the TSLP pathway in leukemia that may be receptive to targeted therapy.

Professor Monika Hegi, PhD, Laboratory of Tumor Biology and Genetics, Department of Neurosurgery, University Hospital Lausanne (CHUV), receives 175,000 Swiss francs for the project entitled:

Epigenetic aberrations in low grade glioma, identification of novel therapeutic targets and biomarkers for response to treatment

Epigenetic alterations denote important mechanisms in neoplastic transformation and malignant progression of cancer. Aberrant CpG methylation, an epigenetic modification, has been identified as underlying cause for deregulated expression of genes, but also other regulatory elements including microRNAs. This affects diverse cancer relevant pathways leading to activation of oncogenic pathways such as the Wnt pathway, mediated by silencing of Wnt antagonists, or by inactivation of tumor suppressing pathways, including DNA repair. Most interestingly, some of these epigenetic alterations can be converted into the “Achilles heel” of the affected tumors upon treatment with certain classes of anti-cancer agents as we have shown previously for GBM with a methylated MGMT gene that particularly benefit from treatment with the alkylating agent temozolomide.

At present little is known about specific epigenetic alterations and their clinical relevance in low grade glioma (LGG). However, recent reports suggest that most LGG may exhibit a methylator phenotype that displays a high proportion of aberrantly methylated genes of a particular pattern. Curiously, this methylator phenotype is associated with mutation of the IDH1 or IDH2 genes encoding metabolic enzymes. These observations suggest that epigenetic alterations are key events in the development of LGG. Hence, in order to understand underlying molecular mechanisms for successful treatment of LGG, they need to be characterized for genome-wide aberrant DNA methylation and respective associations with clinical parameters including response to therapy. The ultimate goal is to identify novel therapeutic opportunities by rendering epigenetically silenced pathways exploitable for individualized therapy as they sensitize to specific drugs.

Here we propose to determine the DNA methylome as part of an integrated project of multi-dimensional molecular and clinical characterization of LGG of patients treated within a phase III randomized clinical trial (EORTC 22033-26033). The overall hypothesis is that genome wide

high resolution CpG methylation profiles in association with high quality clinical data will uncover novel targets for therapy, and biomarkers for prediction of treatment resistance. In order to establish an “unbiased” genome-wide DNA methylome we use MBD2-sequencing (MBD2-seq) for global mapping of methylation in a set of 90 frozen LGG samples from the trial.

The analyses will be extended to FFPE samples that are available for most patients. High resolution CpG methylation mapping of formalin fixed paraffin embedded (FFPE) GBM will be established using the Infinium 450K methylation chip with a novel, FFPE adapted protocol. The 450K Infinium Methylation-BeadChip offers coverage of over 450,000 methylation sites. The combination of two distinct technologies will improve the identification of “true” DNA methylation. Subsequent analyses will comprise unsupervised analyses to identify overall methylation patterns and discovery of new molecular features. In a second strategy we will map aberrantly methylated genes to pathways using gene ontology to identify epigenetically deregulated pathways. Third we will interrogate candidate genes that are key in cancer relevant pathways such as DNA repair, and apoptosis. Fourth, these efforts will be greatly enhanced by correlating the methylome with gene expression and copy number variation data becoming available for the same samples through associated projects. Functional assays of candidate genes or pathways will be performed using glioma cell lines and sphere lines (tumor stem cell features) *in vitro* and *in vivo* to evaluate the potential for druggability.

Coordinated sample preparation and distribution, and testing of molecular biomarkers relevant for overall translational research in this study will be organized and supported through this project.