The S&T Office
of the Embassy of Switzerland in Seoul
is launching the second
Swiss-Korean Science Club

Q. Who are we?

The Science and Technology Office Seoul is the knowledge hub of the Embassy of Switzerland linking Swiss and Korean research ecosystems. We identify strategic cooperation topics and connect the dots by the establishment of platforms for scientists' networking and visibility, and internationalization of startups.

Q. What is *the Science Club*?

The Science Club is a platform of a bimonthly opportunity for scientists based or travelling to Seoul to informally meet in a small circle.

The main goal is to highlight cooperation in S&T between Switzerland and Korea by inviting researchers developing joint projects, experiencing research exchange between the two countries or to share their latest developments.

Every two months scientists interested in the proposed topic or simply intending to extend their network, and get more insights about CH-ROK cooperation and opportunities are welcome to join us!

Q. Interested?

- **Date: 25.09.2019**
- **Time: 16:30 pm – 18:30 pm**
- **Location: Embassy of Switzerland, 77 Songwol-gil, Jongno-gu, Seoul**
- **Participants : limited to 15-20 by registration order**
- **Free of charge but registration compulsory**
- **Registration and info**: seo.science@eda.admin.ch

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This month speaker

Rajib Schubert, Ph.D.

Director of Innovation, Cellfebiotech, San Carlos, USA
Principle investigator and visiting scientist, Kyunghee University, Seoul, Korea

Rajib received his BSc and MSc from Columbia University in Biomedical Engineering and a PhD from ETH Zurich (Switzerland) Biophysics. He then went on for his postdoctoral studies at Caltech where he focused on developing targeted therapies using cell specific viruses. He held project positions at Roche Molecular systems (2005-2006) and Novartis Institute of Biomedical research, Basel, Switzerland (2011-2016) before taking up his current positions as a principle investigator at Kyunghee University, and at Cellbiotech, USA, as director of innovation. His research combines materials science and biochemical techniques to develop new tools and methods in targeted delivery of therapeutic molecules in cell therapy with a focus in the area of neuroscience and oncology.

Biodistribution and efficacy analyses of a targeted adenoviral therapy via CLARITY and deep imaging of intact tumors

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Introduction: Cancer continues to be a major global health problem. This problem is in big part due to the administration of therapeutic agents that are highly effective, but toxic due to continuous high local concentrations for efficacy. To address this, we have engineered a novel gene therapy platform in which nonreplicative adenoviruses harboring the genes for secreted payload combinations are engineered to transduce tumor cells specifically and convert them into therapeutic-secreting biofactories. Using state-of-the-art whole tumor clearing and imaging we validate the biodistribution of this novel gene therapy vector and the payload it encodes.

Materials and Methods: HER2- retargeted, shielded adenovirus variants were engineered to encode a secreted therapeutic antibody against human HER2 (Ad-TZB) [1-3]. Human BT474 breast carcinoma xenografts (HER2+) were engrafted in the mammary fat pad of female SCID-beige mice (Figure 1A). Tumors were harvested 11-days and 61-days post the onset of treatment via perfusion-fixation for CLARITY[4-5] and confocal microscopy (Figure 1B).

Results and Discussion: We first validate the cell specific infection of our viruses in vivo using CLARITY based tissue clearing for high resolution and large volumetric imaging. We next validate several parameters of our gene delivery approach by assessing several therapeutic parameters such as vasculature, cell counts and biodistribution of our therapeutics using our CLARITY imaging assay. Our results confirm continuous intratumoral activity with an improved therapeutic index(Figure 1C).

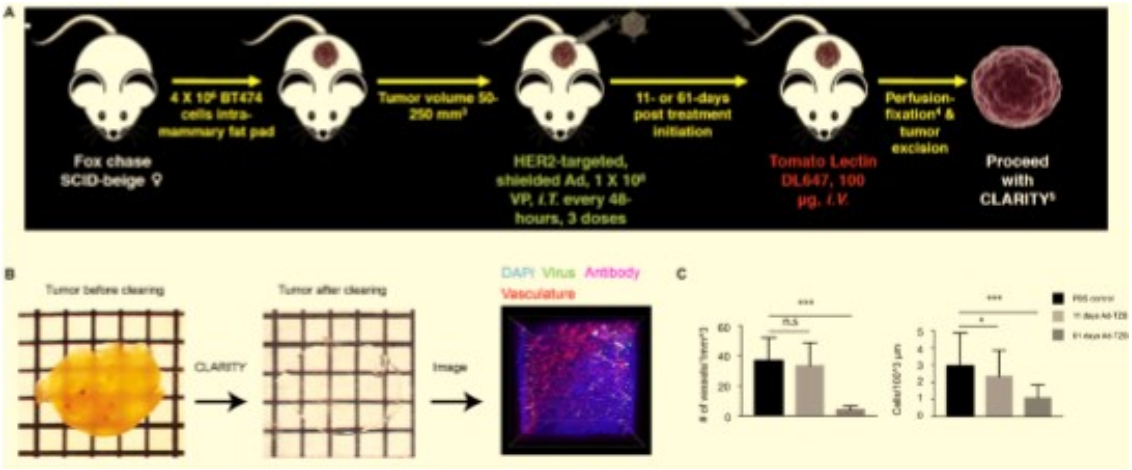

Figure 1. CLARITY based imaging for assessing efficacy of adenovirus gene delivery platform. (A-B) Schematic showing our gene delivery work flow and assessment of tumors. (C) Quantification of vasculature (left) and cell density (right) change upon treatment, tumors from n=3 mice. Statistical significance was assessed by two-sided unpaired Welch's t-test. NS, not significant; *P < 0.05, **P < 0.01, ***P < 0.001.

Conclusions: Our gene delivery approach and imaging assessment shows that we can individualize therapy by delivering complex combinations of biologics, using targeted viruses. Our results point to promising future studies to individualize therapy and limit systemic toxicity of drugs.

References:
①Dreier, et al. (2013). Proc Natl Acad Sci USA 110, e8X69.
②Dreier, et al. (2011). J Mol Biol 405, 410.
③Schmid, et al. (2018). Nat Comm 9, 450.
④Yang, et al. (2014). Cell, 10, 1860.
⑤Chung, et al. (2013), Nature, 497, 332.