The 4th Swiss-Korean Science Club

is hosted by the S&T Office of the Embassy of Switzerland in Seoul

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:** 4 February 2020
- **Time:** 04:00 pm – 06:00 pm
- **Location:** Embassy of Switzerland, 77 Songwol-gil, Jongno-gu, Seoul
- **Participants :** limited to 10 - 15 by registration order
- **Free of charge but registration compulsory**
- **Registration here**

77 Songwol-gil
Jongno-gu
Seoul 03165

Phone: 0082 2 739 95 11, Fax: 0082 2 737 93 92
seoul@eda.admin.ch, www.eda.admin.ch/seoul

This month speaker

Hongyoon Choi, M.D., Ph.D.

Assistant Professor, Seoul National University Hospital, Seoul, Korea

Hongyoon Choi received his MD degree (2010) and PhD degree (2014) from Seoul National University. He received the Korean Board of Nuclear Medicine accreditation in 2015. His research interests include the data-driven analysis of various types of biomedical data. The final goal of the analysis is the development of new diagnostics and therapeutics based on nuclear medicine and molecular imaging. He has integrated new cutting-edge technology into nuclear medicine and theranostic researches. In particular, he is one of the first to incorporate deep learning in nuclear medicine imaging. Additionally, recent researches focus on the integration of multi-omics and multimodal imaging data to link basic biology to clinical implication.

Artificial Intelligence for medical imaging beyond diagnosis: Biomarker development for neurodegenerative disorders

Summary

As recent advances in deep learning have impacted various scientific and industrial fields, medical fields have rapidly started to adopt this technique. Currently reported deep learning models have shown the diagnostic performance equivalent to or above the human expert level in specific tasks. These achievements are based on the advantages of deep learning which automatically extracts discriminative features from high-dimensional medical data. The major target of the application of deep learning is medical images, particularly, noninvasive diagnostic images such as PET as well as X-ray, CT, and MRI. Although recent deep learning models show remarkable performance on diagnostic image classification, there are many challenges that need to be addressed to contribute to the medical innovation in earnest. Due to unique properties of medical data, deep learning application to medical image is substantially different from natural images where deep learning has shown remarkable performance. Most of all, the ground-truth of deep learning is ambiguous in medical data. In most cases, ‘disease status’ is defined as a deviation from the normal population spectrum rather than a clear-cut discriminative status. By discovering distribution of features extracted by unsupervised learning, it may find new disease categories and redefine healthy and disease in the future. Additionally, as deep learning models can help us to use maximal information from image data, we may obtain new information from clinical routine images which has been overlooked. To sum up, the ultimate goal of medical application of deep learning will not be simply to improve diagnostic accuracy, but accurately map the current healthy state of a subject.

The proposed project will develop an integrated digital health tool for rapid multi-tracer PET imaging to support biomarker development of neurodegenerative disorders. It proposes a novel deep learning method to recover signals of individual tracer from overlapped imaging of several PET tracers within an integrated scan. Dose reduction strategies will be integrated in development of this deep learning method. Considering that most centres only have PET/CT, the proposed project will develop deep learning methods to synthesize high-quality structural MRI imaging from multi-tracer PET/CT imaging to simplify the imaging workflow. The second part of this project will develop unsupervised deep learning methods to discover biomarkers to facilitate individualized diagnosis and disease-modifying therapy for neurodegenerative disorders. The hidden interrelation between multi-tracer PET imaging and heterogeneous pathology will be explored, which may lead to the redefinition of neurodegenerative diseases based on identified effective biomarkers. The developed deep learning methods and identified biomarkers will be finally tested and validated on a multi-centre study of Korea and Switzerland.