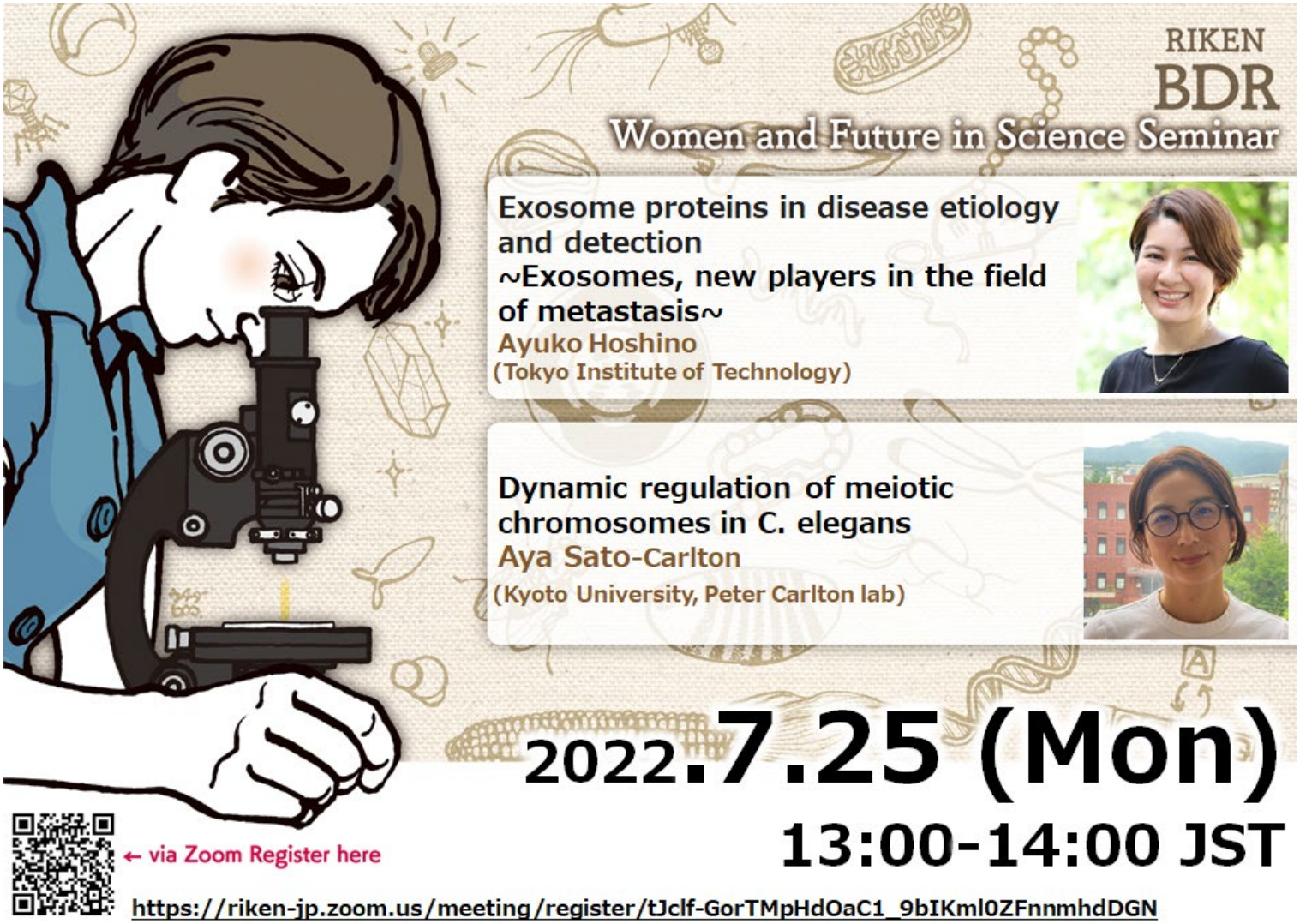

Exosome proteins in disease etiology and detection ~Exosomes, new players in the field of metastasis~

For over 130 years, metastatic organotropism remained as one of the greatest mysteries in cancer biology. We have reported that tumor-derived exosomes, released by lung-, liver- and brain-tropic tumor cells fuse with cells at their future metastatic sites preparing the pre-metastatic niche. Proteomic profiling of exosomes revealed integrin patterns associated with lung and liver metastasis, whereas CEMIP in brain tropic exosomes enhanced metastasis in the brain. To gain a more comprehensive understanding of the exosomal protein cargo, we investigated the proteomic profile of exosomes in 426 human samples from tissue explants, plasma and other bodily fluids. Machine learning classification of plasma-derived exosome proteomes revealed high accuracy in identifying cancer-associated exosomes. Protein signatures that determine cancer types were derived from a variety of sources, including tumor tissue, distant organs, as well as the immune system, emphasizing the importance of non-cancer cell-derived exosomal signatures to define tumor-associated biomarkers. Finally, we defined a panel of tumor-type specific exosomal proteins in plasma, to classify types. In the last part of the talk, I will introduce our new findings on heterogeneity of exosomes and potential role in other pathophysiological conditions as well as biomarker potential.

Dynamic regulation of meiotic chromosomes in C. elegans

Meiosis is a specialized cell division to generate haploid cells such as sperm and oocytes, and this is achieved by separating chromosomes in two steps after one round of replication. In order to separate chromosomes in two consecutive steps, two distinct chromosome domains need to be established during meiotic prophase. The model organism C. elegans, carrying holocentric chromosomes, creates these two separation domains by measuring the length of chromosome arm segments on either side of the single crossover site. Once a single crossover is formed on an arbitrary position on the chromosome, the difference in lengths between the crossover and each chromosome end is somehow detected. Of the two segments, the shorter one becomes the meiosis I division site, while the longer one becomes the meiosis II division site. In this seminar, first I would like to talk about how cells could measure chromosome arm length to determine chromosome separation sites, and in the second half of my talk, I will introduce our recent findings on the molecular circuit generating DNA double strand breaks, necessary for crossover formation.

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