

# IMEG Seminar Series

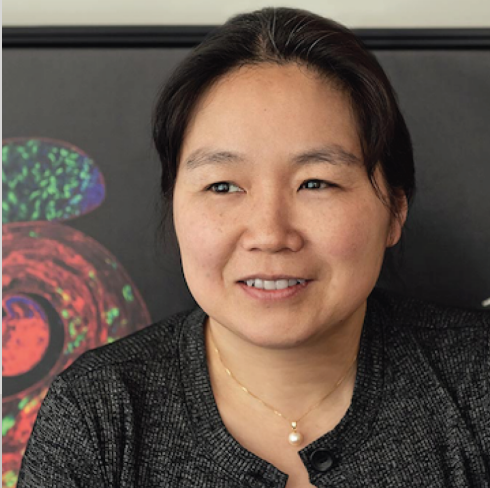
The road to global science

***Dr. Yukiko Yamashita***

Professor of Biology, MIT / Member, Whitehead Institute /  
Investigator, Howard Hughes Medical Institute

**January 24th, 2023, 10:00-11:00**

**Germline immortality**



This seminar series is open to all students and researchers in Kumamoto University.  
The Zoom ID and passcode were sent via email. Check your inbox!

Germline is the only lineage that is endorsed to transmit the genetic material to the next generation, supporting the continuation of multicellular life in the last 1.5 billion years. How the germline achieves this remarkable feat is poorly understood. Ribosomal DNA (rDNA) loci contain hundreds of tandemly repeated copies of ribosomal RNA genes needed to support cellular viability. This repetitiveness makes it highly susceptible to copy number (CN) loss, threatening multi-generational maintenance of rDNA. How this threat is counteracted to avoid extinction of the lineage has remained unclear. Recently, we have discovered two intertwined mechanisms that maintain rDNA copy number in the germline: 1) Unequal sister chromatid exchange that allows one sister chromatid to 'steal' rDNA copies from its sister, followed by programmed retention of the increased rDNA copy number by germline stem cells, and 2) induction of the unequal sister chromatid exchange by the rDNA-specific retrotransposon R2, revealing that active retrotransposons can provide a benefit to their hosts, contrary to their reputation as genomic parasites, which may contribute to their widespread success throughout taxa. Our study revealed unexpected mechanisms that contribute to germline immortality underlying the continuation of multicellular organisms.