



Masahito Tachibana, MD, PhD

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Dr. Masahito Tachibana is a senior research associate in the laboratory of Dr. Shoukhrat Mitalipov, where he was first introduced to the XYClone laser system. Tachibana uses the XYClone laser system for oocyte and embryo manipulations, including nuclear transfer, chromosome transfer, ICM isolation, ICM/ESCs injections for making chimeras and blastomere/TE biopsies.

“Our research goals are to elucidate mechanisms responsible for oocyte based nuclear reprogramming and epigenetics, using nuclear transfer technology,” says Tachibana. “We are also trying to establish germline gene therapy, using nuclear transfer technology as well.”

Prior to the XYClone laser, Tachibana was performing the nuclear transfer procedure without a laser system, which he believes “required a higher level of skill and a higher learning curve.” Tachibana says, “The XYClone laser has helped us tremendously, especially for enucleation of the spindle-chromosome complex from mature MII oocytes. In primate oocytes, it is possible to remove spindles without laser assisted zona drilling. However, it would be very difficult to stay focused on both the spindle and pipette tip (without use of the laser), because you would need to exert more force with the pipette tip to pierce through the zona pellucida; thus, causing you to lose focus of where the spindle is. Since we have started using XYClone to drill a hole in the zona pellucida, I have been able to easily focus on both the spindle and pipette tip at the same time during the whole enucleation step.”

In fact, the XYClone system helped in the development of a new technique entitled “Chromosome transfer,” which was recently published in *Nature*, Tachibana et al. (2009). “Without laser assisted zona drilling, we might not be able to get high efficiency rates at reconstructing oocytes,” states Tachibana.



Masahito Tachibana displays his First Prize for Technical Achievement in Video, Chromosome Transfer in Mature Oocytes, at the 66th Annual Meeting of the American Society for Reproductive Medicine, 2010, in Denver, CO, with Michelle Sparman and Principal Investigator Shoukhrat Mitalipov.



Tachibana particularly likes the *RED-i* option “because it allows me to hit the exact position of interest” he says. “I often use the XYClone system with the CRI™ Oosight spindle imaging system. Both systems work beautifully for manipulation of the spindle-chromosomal complex. An added benefit is that it does not require that I check my procedures on the PC screen since it all can be done under direct vision through the eye pieces of the microscope. I like the video recording system too. It is very easy to operate and allows us to make movies as well. I also really enjoy the newly arrived *Staccato* system, which truly facilitates ICM isolation.”

When asked if he sees any additional applications of the XYClone, Tachibana replied, “I am not sure if this is feasible, but it would be useful (for spindle enucleation purposes) if the laser could allow us to destroy only the spindles within the cell, without actually having to remove the spindles and cytoplasm; thus, minimizing damage to the surrounding cytoplasm. This would be very helpful for simplifying the spindle enucleation procedure and saving precious time as well.”

Acknowledgements

Tachibana says, “I would like to acknowledge my boss Dr. Shoukhrat Mitalipov and all of my co-workers for their continued help. Our studies listed above were supported by start-up funds from the Oregon National Primate Research Center, Oregon Stem Cell Center and grants from the National Institutes of Health (HD057121, HD059946, HD063276, RR00163, HD018185, HD047675). I would also like to acknowledge their overall support of our research.”

Tachibana adds, “I am very grateful to Hamilton Thorne for providing useful tools and continued support. I hope that we can continue this working relationship and produce more exciting data in the future.”

Relevant Publications and Awards

- 1) Tachibana M, Sparman M, Mitalipov S. Chromosome transfer in mature oocytes. *Nat Protoc.* 2010;5(6):1138-47. Epub 2010 May 27. PubMed PMID: 20539289.
- 2) Tachibana M, Sparman M, Sritanaudomchai H, Ma H, Clepper L, Woodward J, Li Y, Ramsey C, Kolotushkina O, Mitalipov S. Mitochondrial gene replacement in primate offspring and embryonic stem cells. *Nature.* 2009 Sep 17;461(7262):367-72. Epub 2009 Aug 26. PubMed PMID: 19710649; PubMed Central PMCID: PMC2774772
- 3) Sparman M, Tachibana M, Mitalipov S. Cloning of nonhuman primates: the road “less traveled by.” *Developmental Biology* special issue. In press (2010).
- 4) Tachibana M, Sparman M and Mitalipov S. Chromosome transfer in mature oocytes. First Prize for Technical Achievement in Video 2010 in the 66th Annual Meeting of the American Society for Reproductive Medicine, ASRM 2010, in Denver, Colorado.