

# Metachronal wave travels not only in outer viscous fluid but also on elastic cell surface

Naoki NAREMATSU<sup>1</sup> and Yoshiaki IWADATE<sup>1, 2</sup>

(<sup>1</sup>Grad. Sch. Med., Yamaguchi Univ., <sup>2</sup>PRESTO, JST)

## SUMMARY

Ciliary movements in protozoa show metachronal coordination so as to maintain a constant phase difference between adjacent cilia. This coordination is called as “metachronal wave”. It is now generally thought that metachronal waves arise from hydrodynamic coupling between adjacent cilia at extracellular fluid. To confirm this, we planned to breakdown the hydrodynamic coupling of ciliary movements at a restricted portion of a *Paramecium* cell and observe whether metachronal coordination collapses or not. We applied UV irradiation to several cilia of a *Paramecium* cell, which was loaded caged calcium beforehand, to induce the reversal of beat-direction of the restricted cilia. Metachronal waves passed over the portion where the direction of ciliary movements was artificially reversed, suggesting that metachronal wave is mediated by something other than extracellular fluid. To clarify the other mediator, we sucked both ends of a *Paramecium* cell by two micropipettes and applied a vibration with a certain frequency to the one of the micropipettes. This induced cyclic stretching of cell body. The frequency of metachronal wave became equal to that of the cyclic stretching. These results suggest that not only extracellular fluid but also cell body can act as a coupling medium for propagation of metachronal waves.