

The sol-gel conversion induced by shear stress in amoeboid movement

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SUMMARY

Amoeboid movement is important not only in amoeba locomotion, but also in variety types of biological phenomena, such as embryonic development, wound healing and cancer metastasis. During amoeboid movement cytosolic gel and sol are interconverted in *Amoeba proteus*. To elucidate the mechanism of the interconversion, we have developed *in vitro* amoeba system. This system consisted of a cell cytoplasmic extract and an acto-myosin fraction prepared from amoeba cells. When the acto-myosin fraction was injected into the extract, the acto-myosin fraction moves just like amoeba. We tried to induce this movement in a sub-millimeter flow chamber, and observed the flow of acto-myosin fraction visualized with fluorescent latex beads. As a result, in the slow flow, functions of velocity and position followed quadratic like as Hagen-Poiseuille flow. On the other hand, in the fast flow, the functions of velocity and position have two stationary phases. This flow pattern was also observed in amoeba *in vivo*. Our results suggest that the act-myosin fraction have a property of shearthinning and sol-gel conversion of cytoplasm is probably induced by shear stress at the boundary surface between cytosolic sol and gel in amoeba.