**Beata Hat-Plewinska, Bogdan Kazmierczak and Tomasz Lipniacki**
Institute of Fundamental Technological Research, Warsaw, Poland
e-mail: bhat@ippt.gov.pl
e-mail: bkazmier@ippt.gov.pl
e-mail: tlipnia@ippt.gov.pl

# B cell activation triggered by the formation of the small receptor cluster: a computational study

B cells are activated in response to the binding of polyvalent ligands, which induces the aggregation of B cell receptors. The formation of even small clusters containing less than 1% of all the receptors is sufficient for activation. This observation led us to the model in which the receptor cluster serves only as a switch that turns on the activation process, involving also the remaining receptors. We have proposed that the system is bistable, and thus its local activation may start the propagation of a traveling wave, which spreads activation over the entire mebrane. We found that the minimal size of the activatory cluster decreases with the thickness of the cytoplasm and kinase diffusion coefficient. It is particularly small when kinases are restricted to the membrane. These findings are consistent with the properties of B cells, which have extremely thin cytoplasmic layer and in which the receptor interacting Src family kinases are tethered to the membrane.