We have studied the role of cyclic guanosine monophosphate (cGMP) in regulation of meiotic resumption and cumulus expansion in the pig. Recently, a crucial role of cGMP in maintenance of oocyte meiotic arrest has been described on the mouse model of follicular culture. Cyclic GMP is produced by granulosa and cumulus cells by a quanylyl cyclase NPR2 upon stimulation with type C natriuretic peptide (NPPC) and passes through gap junction into the oocyte, where it prevents hydrolysis of cAMP by inhibition of phosphodiesterase 3A. This inhibition maintains a high concentration of intra-oocyte cAMP and blocks meiotic progression. LH reverses the inhibitory signal by lowering production of cGMP in somatic follicular cells and by closing gap junctions between the cells, thereby causing a decrease in oocyte cAMP, leading to resumption of meiosis. The aim of our study was to verify hypothesis that resumption of oocyte meiosis and expansion of cumulus cells in isolated pig cumulus-oocyte complexes (COCs) can be blocked by high levels of cGMP and that this effect is mediated by cGMP-dependent inhibition of mitogen-activated protein kinase 3/1 (MAPK3/1) as proposed in other laboratory. We found that both NPR2 and NPPC are expressed in pig COCs. NPPC and cGMP analogues significantly increased concentration of cGMP in COCs and inhibited spontaneous maturation of cumulus enclosed and denuded oocytes but they did not affect expansion of cumulus cells. Neither expression of the expansion-related genes nor activation of MAPK3/1 was affected by cGMP analogues in FSH-stimulated COCs. In conclusion, these data indicate that high cGMP concentration blocks maturation of pig oocytes in vitro but not through inhibition of MAPK3/1 signaling in cumulus cells.