Puroindoline-a and ?1-purothionin form ion channels in giant liposomes but exert different toxic actions on murine cells

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Puroindoline-a (PIN-a) and ?1-purothionin (?1-PTH), isolated from wheat endosperm of Triticum aestivum sp., have been suggested to play a role in plant defence mechanisms against phytopathogenic organisms. We investigated their ability to form pores when incorporated into giant liposomes using the patch-clamp technique. PIN-a formed cationic channels (? 15 pS) with the following selectivity K+ > Na+ ? Cl -. Also, ?1-PTH formed channels of ? 46 pS and 125 pS at +100 mV, the selectivity of which was Ca2+ > Na+ ? K+ ? Cl- and Cl- ? Na+, respectively. In isolated mouse neuromuscular preparations, ?1-PTH induced muscle membrane depolarization, leading to blockade of synaptic transmission and directly elicited muscle twitches. Also, ?1-PTH caused swelling of differentiated neuroblastoma NG108-15 cells, membrane bleb formation, and disorganization of F-actin. In contrast, similar concentrations of PIN-a had no detectable effects. The cytotoxic actions of ?1-PTH on mammalian cells may be expla