

Internal Seminar

Exploring functions of polyphosphate (PolyP) in haemolymph clotting and innate immunity

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Polyphosphate (PolyP), polymer of inorganic phosphates connected by high energy phosphoanhydride bonds, is found in most living forms. While the biological functions of PolyP are well studied in prokaryotes, its molecular and biological function in multicellular eukaryotes are not well studied. Interestingly, in mammals PolyP is found to be enriched in platelets, and upon platelet activation it gets released, and promotes blood clotting, wound healing and inflammation. A recent work using human cell culture studies showed that PolyP can increase the release of inflammatory cytokines from macrophages indicating its possible role in innate immunity. One of the limitations in studying PolyP biology in multicellular eukaryotes is the lack of a suitable model organism which may allow spatial and temporal manipulation of PolyP in vivo. Here we made fly models to manipulate PolyP levels followed by detailed phenotypic studies. Second, we found that PolyP can promote haemolymph (the blood equivalent in insects) clotting in flies in ex vivo experiments. Our preliminary data also indicate depletion of PolyP can delay the clot formation after wounding the flies. Interestingly, we also found that PolyP depletion results in increased crystal cell numbers, which is an indicator of inhibition of one of the immune response pathways. Using a PolyP binding protein we also observed PolyP to be localised in haemocytes (blood cell equivalent in insects). We then found that PolyP depleted flies take a longer time to clear bacterial infection. Taken together, our data indicates that PolyP is crucial for haemolymph clotting and innate immune response. In this proposal, I plan to uncover the functions of PolyP in haemolymph clotting and innate immune response.

Wednesday, Jan 4th 2023

2:30 PM

Auditorium, TIFR-H