Trans-Golgi mediated secretion of xylogalacturonan is critical for border-like cell release from the root cap

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Root border cells constitute the surface of the root cap and secret massive amounts of mucilage that contains polysaccharides and proteoglycans. Golgi stacks in the border cells have hypertrophied margins, reflecting elevated biosynthetic activity to produce the polysaccharide components of the mucilage. We have recently shown that XGA is sorted into a new type of large vesicles derived from the *trans*-Golgi, termed XGA-LVs. Interestingly, XGA-LVs accumulate in border cell precursors, but they do not fuse with the plasma membrane until the precursor cells mature into border cells. The *Arabidopsis* root cap does not produce genuine border cells, but it sheds sheets of surface cells termed border-like cells (BLCs) that remain attached after releasing. To better understand the XGA synthesis and secretion in BLCs of the model plant *Arabidopsis*, we investigated the Golgi stacks in BLCs of *Arabidopsis* using laser-scanning confocal and electron microscopy coupled to high-pressure freezing/freezing substitution. Our results demonstrated that Golgi stacks in BLCs of 14-day-old seedling root caps exhibited ultrastructural features resembles to what we observed in border cell Golgi stacks. Darkly stained hypertrophied peripheries were seen in *trans*-Golgi cisternae in the 14-day-old but not 5-day-old root cap cells. Furthermore, the Golgi stacks of 14-day-old cells are labelled by LM8, but those of the 5-day-old *Arabidopsis* seedlings are not. These suggest that *Arabidopsis* BLCs secret XGA in a developmental stage-dependent manner. Besides, our CLEM data clearly show that the LM8 puncta in immuno fluorescence images corresponded to Golgi stacks in TEM. And the production of XGA in hypertrophied *trans*-Golgi cisternae is not affected by secretory vesicles formation of TGN in pi4kβ1/β2 null mutant. We also identify some *Arabidopsis* mutant lines (*brn1brn2, rcpg* and *syp42syp43*) in which border-like cells release is defective, and we demonstrated that the production of XGA is affected in some of the mutants. However, it is not understood what cargoes of XGA-LVs are, how they are selected, and how the trafficking is controlled. Our recently data indicate that XGA-LVs carry a polysaccharide-degrading enzyme. We will determine amino acid sequences in the protein required for its sorting. To identify more XGA-LV cargo proteins, we will isolate vesicle fractions associated with XGA epitopes from the root cap samples and carry out proteomic analyses.