P005 ESCRT III function is inhibited at low temperatures in yeast and plant cells

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Sudden drops in temperature affect agronomical yield and concomitantly food production. Identifying the molecular targets of cold stress will help to develop biotechnological tools to generate cold resistant crops. For this purpose we screened a *Beta vulgaris* (sugar beet) cDNA library for genes able to enhance growth at low temperature (10 ºC) upon expression in *S. cerevisae*. This allowed the identification of *CRIO1* and *CRIO2*. Two genes with homology to *SNF7*, a core member of the ESCRT III complex. This complex regulates endosomal trafficking of ubiquitylated proteins. Mutation of this gene is not lethal in yeast, but causes a typical class E vacuolar phenotype that can be monitored by the accumulation of prevacuolar compartments. Our results show that *CRIO1* and *CRIO2* can complement a yeast *snf7* mutant. CRIO1 and CRIO2 proteins interact physically with the known SNF7 partner BRO1. Interestingly wild type yeast cells grown at 10 ºC also display a class E vacuolar phenotype. We have constructed lines of the model plant Arabidopsis thaliana expressing CRIO2 under the control of a strong constitutive promoter (35S) or a stress inducible promoter (RAD29A). In these plants the expression of CRIO2 correlates with an alleviation of the delay of the development induced by temperature downshift. All together these results indicate that plant have functional SNF7 proteins and its function is impaired under cold temperatures. This is the first evidence that plants contain a functional SNF7 component of ESCRTIII and that this gene is a potential candidate for improvement the cold tolerance of crops.