

436j Overexpression of Geraniol 10-Hydroxylase and 1-Deoxy-D-Xylulose 5-Phosphate Synthase in *Catharanthus Roseus* Hairy Roots

Ryan Peacock, Christie A. Peebles, Susan I. Gibson, Jacqueline V. Shanks, and Ka-Yiu San

Catharanthus roseus produces a wide variety of terpenoid indole alkaloids (TIAs) including the chemotherapeutic drugs vincristine and vinblastine. The metabolic pathway producing these compounds begins with the indole and terpenoid branches, which produce tryptamine and secologanin respectively, and then join to synthesize the TIAs through a series of highly regulated reactions. Due to the regulation, economically relevant compounds are produced in low concentrations, making them expensive to produce. Our laboratory is interested in metabolic engineering of the TIA pathway to increase the yield of these compounds through the production of transgenic hairy roots.

Previously our lab has increased the flux through the indole branch in the pathway through overexpression of anthranilate synthase (AS) and tryptophan decarboxylase (TDC). This study addresses the challenge of increasing flux through the monoterpenoid pathway towards TIA pools through the overexpression of two key enzymes. While 1-deoxy-D-xylulose 5-phosphate synthase (DXS) overexpression increases the flux leading into terpenoid metabolism, geraniol 10-hydroxylase (G10H) overexpression ensures that the increase in flux occurs in the monoterpenoid branch and on into TIA pools instead of being diverted into other polyterpenoid pathways. Through the dual overexpression an increased level of TIAs should occur. Such multiple gene manipulation will be necessary for overall engineering of the TIA pathway.