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## **Regulation of cholesterol transport processes in the liver by dietary citrus flavonoids**

Katherine Zalasky & Lene Holland

Over the past few years, the importance of diet management and moderation has become a focal point of everyday life. Obesity, high blood pressure, diabetes, and high blood cholesterol can all result from poor nutrition decisions. High plasma levels of low-density lipoprotein (LDL), the particle which contains cholesterol, are of particular interest as this condition has been classified as one of the most prevalent risk factors for heart disease. Individuals affected by high levels of LDL are commonly encouraged to maintain a healthy diet and exercise routine while also receiving medication to expedite the cholesterol reduction. Although several treatment options for high cholesterol have come into common use in recent years, there are always continuing efforts to develop more effective therapies. Recent research on natural food constituents has suggested that citrus flavonoids, found in oranges, tangerines, and grapefruits, may reduce the amount of LDL in the blood. The process of cholesterol metabolism takes place primarily in the liver and, thereby, it is appropriate to analyze the effect of flavonoid treatment on hepatocytes. The low-density lipoprotein receptor (LDLR) and the microsomal triglyceride transfer protein (MTTP) control the amount of LDL circulating in the blood. The genes coding for these two proteins are believed to be regulated by the transcriptional regulatory protein, sterol regulatory element binding protein. Citrus flavonoids induce the expression of LDLR mRNA and suppress that for MTTP. This action will increase the amount of LDLR protein and decrease the amount of MTTP protein in liver cells, thus resulting in lower plasma levels of LDL. To determine the roles of LDLR and MTTP mRNA expression in the mechanism of flavonoid activity in the liver, we have used quantitative real-time polymerase chain reactions in dose response studies to determine the most effective concentration of citrus flavonoid treatment.