α-Tocopheryl phosphate – An active lipid mediator? J.-M. Zingg, M. Meydani, and A. Azzi, *Mol. Nutr. Food Res.*, **54**, 679–692 (2010). (Review)

The vitamin E (α-tocopherol, αT) derivative, α-tocopheryl phosphate (αTP), is detectable in small amounts in plasma, tissues, and cultured cells. Studies done in vitro and in vivo suggest that αT can become phosphorylated and αTP dephosphorylated, suggesting the existence of enzyme(s) with αT kinase or αTP phosphatase activity, respectively. As a supplement in animal studies, αTP can reach plasma concentrations similar to αT and only a part is dephosphorylated; thus, αTP may act both as pro-vitamin E, but also as phosphorylated form of vitamin E with possibly novel regulatory activities. Many effects of αTP have been described: in the test tube αTP modulates the activity of several enzymes; in cell culture αTP affects proliferation, apoptosis, signal transduction, and gene expression; in animal studies αTP prevents atherosclerosis, ischemia/reperfusion injury, and induces hippocampal longterm potentiation. At the molecular level, αTP may act as a cofactor for enzymes, as an active lipid mediator similar to other phosphorylated lipids, or indirectly by altering membrane characteristics such as lipid rafts, fluidity, and curvature. In this review, the molecular and cellular activities of αTP are examined and the possible functions of αTP as a natural compound, cofactor and active lipid mediator involved in signal transduction and gene expression discussed.