Inhibition of lipid accumulation in hepatocytes by unique Ashwagandha extracts

Dongyang Li[1], Huayue Zhang[1], Jia Wang[1], Ashish Kaul[1], Sunil Kaul[1] and Renu Wadhwa[1*]

[1]AIST-INDIA DAILAB, DBT-AIST International Center for Translational and Environmental Research (DAICENTER), National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba 305-8565; li.dongyang@aist.go.jp (D.L.); zhang-huayue@aist.go.jp (H.Z.); wang-jia0819@aist.go.jp (J.W.); ashish-kaul@aist.go.jp (A.K.); s-kaul@aist.go.jp (S.K.); renu-wadhwa@aist.go.jp (R.W.).

*Corresponding author: (renu-wadhwa@aist.go.jp)

INTRODUCTION. Ashwaganda (*Withania Somnifera*) is a popular ayurvedic herb, trusted for a variety of health benefits in Indian traditional home medicine system. Steroidal lactones, Withaferin A (Wi-A) and Withanone (Wi-N), have been characterized as its major bioactives with a variety of bioactivities. We investigated the effect of Ashwagandha extracts on steatosis, abnormal retention of fat within a cell or organ that often affects liver as non-alcoholic fatty liver disease (NAFLD).

METHODS. We prepared extracts from Ashwagandha that varied in their Wi-A and Wi-N content. Cytotoxicity of these extracts on human hepatocytes (Huh-7 and Suit-2) was evaluated by cell viability assays. Nontoxic doses were used to treat the cells subjected to activated lipid accumulation by palmitic acid (PA). The lipolygenesis was evaluated by Oil Red O and triglyceride (TG) assays, and the expression of molecules involved in this preocess.

RESULTS AND DISCUSSION. The four kinds of extracts with different amounts of total withanolides and Wi-A:Wi-N ratio were generated. Cells were treated with PA to induce lipid accumulation. We found that in cells pre-treated with specific Ashwahandha extracts, TG accumulation was decreased. Of note, Sterol regulatory element-binding protein-1c (SREBP-1c), and its downstream effector-Fas, the key regulators of lipogenesis showed downregulation in specific extract-treated cells. Furthermore, the expression of PPARγ, a key factor involved in hepatic lipogenesis, showed decrease in cells treated with some of these extracts.

CONCLUSION. Ashwagandha extracts may provide a useful natural resource with anti-steatosis activity, maintaining liver health and NAFLD prevention.