Garlic (Allium sativum)-Derived Exosomes Suppress HCT116 Colon Cancer Cell Growth and Trigger Caspase-Mediated Apoptosis

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As a critical element of intercellular communication, exosomes released from diverse sources influence the physiological states of target cells. While it's been proposed that edible plant-derived nanoparticles can contribute to cross-kingdom communication with mammalian cells, the impact of these particles on cancer cell progression warrants deeper investigation. In this study, we isolated and characterized exosomes derived from garlic using Nanoparticle tracking analysis (NTA), electron microscopy, and exosomal surface antibodies. The HCT116 human colon carcinoma cell line was chosen to investigate the anti-cancer properties of garlic exosomes. As a control, normal Human umbilical vein endothelial cells (HUVEC) cell lines were also used. Annexin V/pI staining, along with the analysis of apoptotic mRNA & protein expression levels, indicated that garlic exosomes triggered apoptosis through the activation of the intrinsic pathway in the HCT116 cells. Moreover, the angiogenic VEGF protein expression levels saw a marked decrease in the cancer cells upon treatment with the exosomes. In our in vivo studies with a colon cancer rat model, there was a notable reduction in tumor size following treatment with garlic-derived exosomes. The findings from our research suggest that garlic-derived exosomes can induce apoptotic cell death in colon cancer cells while leaving normal cells unharmed. This is the first study demonstrating that plant exosomes hold anti-cancer properties by initiating caspase-mediated apoptosis, presenting a novel alternative for cancer therapy.

Biography

She has been an expert in the field of Genetics, Bioengineering and Gene therapy with a particular focus on the use of plant- derived exosomes in the treatment of cancer and osteoarthritis. She is graduated from Biotechnology Program of Yeditepe University. In partnership with MD Anderson Cancer Center, she has conducted clinical studies on cancer treatments and awarded a patent for a cancer drug. Her published work includes the effects of plant derived exosomes applications for the regeneration of bone, cartilage, muscle and hearth muscle. Recently, she was developed a new treatment for osteoarthritis which is currently undergoing clinical trials. In 2020, she was elected Scientific Chairman of Cancer free Life Association, a non- profit to assist patient and family undergoing cancer treatment. As co-founder of Cellestetix, she sherheads the R&D initiatives to develop a wide range of break through discoveries and novel molecular applications for disease treatments, cellular regeneration and longevity support.

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