Online Proceedings

POSTER SESSION 3

MGH 241, Easel 155

2:30 PM to 4:00 PM

Optimization of Extraction and Detection Methods for the Analysis of Imidacloprid in Honey and Water Using Gas Chromatography-Mass Spectrometry

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Mentor: Richard Glover, Science, Lane Community College
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Imidacloprid is the most widely used agricultural pesticide in the world. As a neonicotinoid, it is highly potent against insects while having low toxicity to mammals. One area of concern is its effect on honeybees, possibly playing a role in colony collapse disorder (CCD), a sudden disappearance of worker bees from an otherwise healthy population. Bees are known to be sensitive to imidacloprid at high concentrations, but what is unclear is whether chronic exposure to the low doses used to protect crops can also be harmful. The E.U. and Canada have taken steps to ban the use of imidacloprid as a precaution, and the U.S. EPA has warned users of its potential for leaching into groundwater. It may also persist for years in soil, pollen, and nectar. Due to its low volatility, high boiling point, and high solubility in polar solvents, imidacloprid can be difficult to reliably detect in environmental samples using current gas chromatography (GC) methods. To address this, we evaluated GC-MS detection of imidacloprid in methanol standards, spiked water, and spiked honey. Samples were evaluated after clean-up with both C18 solid-phase extraction (SPE) and dispersive solid-phase extraction (DSPE) methods, using two different GC columns (Restek Rxi-5MS and Rtx-1701). Samples were also subjected to a range of pH conditions, and ionized by both electron ionization (EI) and chemical ionization (CI). As GC is typically faster, cheaper, and easier than liquid chromatography, currently the method of choice for detection of neonicotinoids, our research could benefit the study of imidacloprid toxicity by reducing the attendant time, cost, and training requirements. Preliminary results have shown reliable detection of imidacloprid-urea, the main hydrolysis compound of imidacloprid, at pH 5-7.

POSTER SESSION 3

MGH 206, Easel 170

2:30 PM to 4:00 PM

Developing *S. cerevisiae* as a Disease Model for Studying the Role of Extracellular Vesicles in the Transmission of Alpha-Synuclein and Alzheimer's Disease Pathogenesis

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Alzheimer's disease (AD) is a progressive degenerative disorder that affects over 5.5 million Americans, resulting in memory loss and cognitive decline over time. AD is characterized by the accumulation of neurofibrillary tangles composed of pathogenic proteins, such as alpha-synuclein. Recent findings suggest that extracellular vesicles (EVs), which primarily function in intercellular communication, may play a critical role in the propagation of these pathogenic proteins in the brain. However, the cellular pathways that load AD-associated toxic proteins into EVs remain unknown. This research project aims to investigate the cellular pathways that influence the biogenesis, secretion, and uptake of EVs carrying AD-associated toxic proteinsusing the powerful genetic model system *Saccharomyces cerevisiae*. This simple brewer's yeast has already been proven to be a useful model for understanding AD-related toxicity. When alpha synuclein is overexpressed in *S. cerevisiae*, it localizes to cell membranes and results in cytoplasmic aggregation that is observed in humans. We purified EVs from yeast expressing human AD-associated toxic proteins (Tau, alpha-synuclein) to establish whether they contain the human transgenes using Western blot analysis. We developed an immunohistochemistry protocol to rapidly quantify the levels of proteins secreted into the extracellular enviroment. We cultured yeast, optimized Western blotting conditions, purified extracellular vesicles, and used imaging techniques in our project.