The rapid detection of botanical natural toxins using probe ESI unit combined with quadrupole time-of-flight mass spectrometer

Many animals and plants are known to have poisonous components (natural toxins) in their bodies. Food poisoning caused by animals and plants containing these natural toxins occurs every year, although the number of cases and patients are not so high compared to bacterial food poisoning. It is extremely important from the viewpoint of food sanitation because some poisons have a high fatality rate. Therefore, rapid and effective screening methods are required. In this study, we report a method for rapid detection of natural plant toxins in Narcissus tazetta and Colchicum autumnale by utilizing the quadrupole time-of-flight (Q-TOF) mass spectrometer with probe electrospray ionization (PESI) unit , one of ultra-high speed analysis screening. The leaves and bulbs of Narcissus tazetta and the bulbs of Colchicum autumnale were cut and analyzed by using the PESI technique. These resemble vegetables such as chinese chives and onions, and it has been reported that accidental ingestion can cause food poisoning. From sample processing to completion of MS analysis, it took about 5 minutes or less. In the positive mode mass spectrum of the Narcissus tazetta bulb, characteristic natural toxins tazettine, lycorine, and galanthamine were detected with high accuracy within 1 mDa compared to theoretical mass values. In addition to these toxins, other components such as choline, arginine and saccharide were also detected. Similarly, these toxins were detected in the positive mode mass spectrum from leaves. In the case of the Colchicum autumnale bulb, representative natural toxins colchicine and demecolcine were detected in the positive mode mass spectrum. Some toxins could also be confirmed at the MS/MS level using standards. LC and LC/MS are commonly used to measure several toxins simultaneously, but they require a lot of separation time using a column to remove contaminants. This problem can be solved by PESI technique.