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### **B153 Comparison of Cosmetic Foundations by Analysis of Preservative Content Using Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)**

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After attending this presentation, attendees will have a better understanding of how the analysis of preservatives can be used to compare cosmetic foundation samples submitted as trace evidence exemplars to forensic science laboratories.

This presentation will impact the forensic science community by providing a simple and sensitive LC/MS/MS method to compare cosmetic foundations by the analysis of a specific set of preservatives found in most cosmetic samples.

Preservatives are natural or synthetic ingredients that are commonly added to products in order to prevent spoilage, including but not limited to microbial growth or undesirable chemical changes, ultimately extending the product's shelf life. Without the addition of preservatives, the foundation has the ability to easily become contaminated, leading to product degradation and increasing the risk of irritation or infection. In the United States, the Food and Drug Administration regulates the use of preservatives under the cosmetic provisions of the law and requires manufacturers to determine at what levels the preservatives are considered "safe" for consumer use. The most widely used preservatives in cosmetic products are parabens.

This study developed an LC/MS/MS method for differentiating different brands of cosmetic foundations by observing the absence and or presence of specific preservatives, including six different parabens. The analyte preservatives used in this study were methylparaben, ethylparaben, n-propylparaben, isopropylparaben, butylparaben, benzylparaben, tocopheryl acetate, and 3,5-di-tert-butyl-4-hydroxytoluene (BHT). The method is capable of separating and identifying all eight preservatives in less than seven minutes including the separation of n-propylparaben and isopropylparaben, which has not been accomplished and reported prior to this method. LC/MS/MS data was acquired using an ABI® SCIEX™ 3200 QTRAP® triple quadrupole mass spectrometer interfaced with a Shimadzu® LC system. The instrument utilized Electrospray Ionization (ESI) and all samples were run in positive-ion mode monitoring. Chromatography was performed on a 5.0cm x 3.0mm x 2.7µm Ultra® biphenyl column. The strong mobile phase used was 0.1% formic acid in 2-propanol and the weak mobile phase used was 0.1% formic acid in High-Performance Liquid Chromatography (HPLC)-grade methanol. A Shimadzu® SIL-20AC Prominence auto sampler injected 2.0µL of sample and the column oven temperature was set isothermally at 25°C throughout the run with a flow rate of 0.300µL/min. A retention time optimization study provided preeminent separation conditions.

Foundation samples were prepared by adding 100mg of each foundation to 5mL of methanol:acetonitrile (1:1) and sonicating for ten minutes. After sonication, the solution was placed into centrifuge tubes and centrifuged for five minutes at 800G. After centrifugation, the supernatant was carefully removed using disposable pipettes and filtered using 0.2µm Millipore® filters. Then 1mL of the supernatant was added to a vial along with 60µL of the internal standard (BHA). Lastly, 2.0µL of sample was injected onto the LC column.

Separating and identifying the six parabens as well as the other preservatives proved to be simple and quick. The method is capable of identifying which preservatives are present in a cosmetic sample with a limit of detection of 0.5µg/mL. Twenty-six different brands of cosmetic foundations were tested and easily differentiated by analysis of the preservatives in the samples using the LC/MS/MS method.

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#### **Preservatives, Cosmetics, LC/MS/MS**