Convention ID: 1045
Submitting author: Mr Chun Keung WONG
Post title: Medical Technologist, Tuen Mun Hospital, NULL

An Innovative High Performance Liquid Chromatography Method for Determining the Caffeine Content in Tea Leaves
Wong CK(1)(2), Man HL(2)
(1)Department of Clinical Pathology, Tuen Mun Hospital, (2)Hong Kong Baptist University

Keywords:
Caffeine
Tea leaves
HPLC
Boiling water extraction

Introduction
Tea is a popular drink and beverage in the world. It strengthens our physical capacities, enables us to relax and acts as a good stimulant. Although caffeine in teas contributes to some favorable effects in humans, it is also controversially claimed to increase human blood pressure and cardiovascular risk as well as involved in the negative reproductive issue of miscarriages however inconclusive. A project was performed to design, optimize and validate a High Performance Liquid Chromatography (HPLC) method for determining the caffeine content in tea leaves.

Objectives
(1) To compare the effectiveness of the simple boiling water extraction method with other caffeine extraction methods. (2) To design an innovative method for determining the caffeine content in tea leaves by the HPLC method. (3) To determine the caffeine content in different types of teas.

Methodology
(1) Simple boiling water extraction method was compared to extraction by water at 60 degrees Celsius and 80 degrees Celsius, and the other traditional extraction methods such as microwave-assisted extraction, ultrasonic extraction and the Soxhlet extraction, etc for the extraction of caffeine from tea leaves. (2) Optimization and method validation were performed to design a HPLC method providing laboratory results with good precision and accuracy. (3) Employed the reversed-phase HPLC using the Agilent TC-C18 column with a wavelength setting of 280 nm. (4) Using the designed method, caffeine content in different types of teas was determined.

Result
Results: (1) Boiling water extraction method was found to be simple and effective in extraction of caffeine from tea leaves. (2) Total 34 tea samples including green, black, white, oolong, and pu-erh tea were successfully analyzed by the designed method with optimization and method validation. (3) Different levels of caffeine were detected

in the tea samples. (4) Average caffeine content of pu-erh was highest.
Conclusions: A simple, reliable and innovative method was designed to determine the caffeine content in tea leaves such as green, black, white, oolong, and pu-erh tea. It employed the reversed-phase HPLC method using the Agilent TC-C18 column and a wavelength setting of 280 nm, with simple boiling water extraction method for caffeine extraction. The laboratory results obtained are important in enhancing the quality of health care in both the research, public health and hospital settings.