



### **G142 Body Packages in Spectral Imaging CT- Experimental Study to Distinguish Between Different Illicit Drugs *In Vitro* and in a Porcine Model**

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After attending this presentation, attendees will understand the impact of modern imaging methods on research and clinical handling of suspected body packers as well as the need for cooperation between forensic and clinical disciplines.

This presentation will impact the forensic science community by demonstrating how new imaging methods like dual energy spectral imaging CT scan alter existing algorithms and change clinical handling of suspects and patients, provided that specialists from the disciplines involved cooperate closely.

Bodypacking—meaning the transport of packed illicit drugs inside the human body—is a prevalent and increasing concern for modern societies with a major impact on the medicolegal and clinical field. The most feared complication of body packing is the rupture of one of the carried packs with potentially lethal drug intoxication (body packer syndrome). When suffering from symptoms of intoxication due to pack rupture, existing algorithms for the treatment of body packers suggest immediate abdominal surgery to remove the packs. Yet, in cases of heroin intoxication, a laparotomy with its high rate of complications could be avoided by administration of the antidote Naloxone and intensive care supervision of the patient. Thus, the distinction of carried illicit drugs, especially between heroin and cocaine, can be crucial in clinical handling of body packers and influence medicolegal investigations. Our objective was to evaluate the differentiability between several substances in packages containing illicit drugs via Spectral Imaging CT (SICT) *in vitro* and in a porcine model.

Ten samples of illicit drugs (heroin, cocaine and hashish in different concentrations/compressions) packed in standardized ovoid plastic containers were examined *in vitro* and after placement in the rectum of a 121.5kg pig cadaver. Images were obtained using a 64-row CT unit (GE CT750 HD) in spectral imaging mode. The mean CT number in Hounsfield-Units (HU) representing radiation density was recorded for each sample. Spectral curves displaying radiation density of each sample in HU in relation to photon energy at keV-levels between 40 and 140 were obtained. Mean HU and standard deviation as well as the average slope (S) of the curve were evaluated for each sample. Statistical analysis was performed using Wilcoxon's test.

Mean HU of a substance was greatly affected by its concentration and the degree of compression and did not significantly differ between the investigated drug types. *In vitro*, the average slope of a substance's spectral curve did not significantly differ with varying density and concentration, but was characteristic for the investigated type of drug (i.e., heroin, cocaine, and hashish, respectively; all  $p < 0.001$ ). In the porcine model, differences were less pronounced than *in vitro* but still significant ( $p < 0.01$ ). Mean effective radiation dose for the scans was 9.4 mSv in the porcine model.

This presentation will demonstrate that interdisciplinary cooperation is important to evaluate potential applications and use the advantages of new imaging methods to their full extent. It will highlight the ability of new imaging methods to differentiate between various substances in general and different illicit drugs in particular. In contrast to hypotheses in the existing literature, the examinations *in vitro* and in a porcine model suggest that different illicit drugs cannot be identified by measuring their radiation density in HU at any given keV level. However, at a reasonable radiation dose, SICT may aid in the identification of incorporated substances in a body packer using the slope of the spectral HU curve. If confirmed in clinical studies, this information could alter the clinical handling of symptomatic body packers suffering from body packer syndrome due to pack rupture. Body packers carrying heroin could be treated conservatively instead of undergoing complicated abdominal surgery.

**Body Packer, Illicit Drugs, Spectral Imaging CT**