

# **Multi-directional Optimization of Hair Drug Testing Platform: Rehabilitation Services Support for Local communities**

## **Executive Summary**

### **Background & Objectives**

Drug abuse has been the social, mental and physical health problems during the past decades. In October 2007, a high level inter-departmental task force (the Task Force) led by the Secretary for Justice was formed and is responsible for making recommendations on how to tackle the youth drug abuse problem. According to the Task Force, drug testing may serve the objectives of monitoring and deterrence, early identification, preventing drug abuse and crime investigation and prevention. Among all the specimens, hair provides a longer detection window up. This enables retrospective investigation of the past drug consumption. Hair drug testing has irreplaceable role in rehabilitation programs. Hair drug test provides a continuous record of drug consumption across the rehabilitation programs which not only provides important information for program evaluation, but also encourage drug abusers and their families that the rehabilitation program is working well for them.

Our laboratory, Laboratory for Molecular Testing of HKUST, have developed HPLC-MS/MS technology in the detection of drug residues in the hair. This method is more sensitive than the existing hair drug detection methods. The method satisfies the requirement of ISO17025 accreditation. Our laboratory has been cooperating with various NGOs in the project, providing them with free drug testing services on hair samples. With this experience, we now understand the utmost needs of NGOs and rehabilitation units, and are able to optimize the drug testing platform to best suit the society. Hence, we believe our reliable platform can well fit into the drug control and rehabilitation schemes in place in Hong Kong.

#### **Objectives:**

1. To optimize the existing drug testing platform;
2. To include the most updated drug residues in the testing platform;
3. To provide free tests to schools and NGOs;
4. To provide tailor-made support to schools and NGOs;
5. To evaluate the cut-off value of ketamine in hair drug tests.

#### **Methods**

To optimize the existing drug testing platform, the amount of hair specimen has been reduced to 5mg (about 20 strands of hair). Our laboratory has been accredited by the Hong Kong Laboratory Accreditation Scheme (HOKLAS) under the scope of abuse drugs in human hair, covering 16 analytes of 10 commonly abused drugs and their metabolites (cocaine, norcocaine, benzoylecgonine, cocaethylene, morphine, 6-Acetylmorphine, codeine, methadone, amphetamine, methamphetamine, MDMA, MDEA, MDA, phencyclidine, ketamine and norketamine). With the accredited hair-drug testing service, we have been serving for 14 NGOs and rehabilitation units and issued HOKLAS-endorsed test reports during the project. We have collected the information including gender, age, types of drug addicted, frequency and dosage of consumption by providing questionnaires to the subjects in order to understand their drug use behavior. The first 3-cm from hair root of hair samples (approximately corresponding to 3-month history) was analyzed. Hair test reports were issued to the coordinator of the NGO or rehabilitation units for their record.

In order to cover the most updated drug residues in our platform, the detection methods for another 16 abused therapeutic and new designer drugs have been investigated. Three of them are under the process of accreditation in the scope extension. About the tailor-made support to our users, we have provided urgent hair test, consultation service and tailor-made service (segmental analysis for past drug consumption).

## **Results**

Our hair drug test service platform provided sensitive, accurate, reliable accredited services for rehabilitation units. The operation workflow of our test has been optimized and standardized for routine service. About 5mg of hair (approximately 20 strands) was sufficient for revealing the drug use history. Over 1700 hair samples have been analysis from Jan 2012 to Mar 2016. Among the 16 analytes of 10 commonly abused drugs and their metabolites, ketamine, cocaine and methamphetamine were the most frequent detected drugs.

In May 2014, our laboratory (Laboratory for Molecular Testing, The Hong Kong University of Science and Technology) has obtained HOKLAS accreditation of ISO17025 on testing drug of abuse in human hair. A total of 12198 free tests have been performed and 651 HOKLAS-endorsed test reports have been issued. Apart from the accredited test service, the cut-off value for hair ketamine has been proposed and published in peer-review journal. A cut-off level at 400 pg/mg is proposed for positive identification of ketamine users.

**Conclusion**

With the support of Beat Drug Fund Association, we have optimized our hair drug test service platform and provided free accredited hair drug test services for the rehabilitation units. We have built the communication and logistics in the drug test service to our clients with satisfactory results. Our proposed cut-off hair ketamine value could act as a useful reference value with international acceptability.