

## **2019 Consensus for the use of alcohol markers in hair for supporting the assessment of abstinence and chronic alcohol consumption.**

The revision of this document was prepared by the following committee of experts and finally approved by the General Assembly of SoHT at Lille in May 2019.

Andraus, Maristela (Brazil),  
Appenzeller, Brice (Luxembourg),  
Baumgartner, Markus (Switzerland),  
Binz, Tina (Switzerland),  
Crunelle, Cleo (Belgium),  
Favretto, Donata (Italy),  
Kintz, Pascal (France),  
Kronstrand, Robert (Sweden),  
Lendoiro, Elena (Spain),  
Morini, Luca (Italy),  
Musshoff, Frank (Germany),  
Pragst, Fritz (Germany),  
Sporkert, Frank (Switzerland),  
Suesse, Silke (Germany),  
Tsanacis, Lolita (United Kingdom),  
Uhl, Michael (Germany),  
Vincenti, Marco (Italy),  
Yegles, Michel (Luxembourg);

### **1. Introduction**

1.1. The direct determination of ethanol itself in hair is not possible due to its volatility and its potential absorption from external sources. Instead, the minor ethanol metabolites ethyl glucuronide (EtG) and ethyl palmitate (EtPa) can be measured in hair as direct markers of alcohol consumption.

1.2. Abstinence from alcohol means no intake of any alcoholic beverages or other alcohol containing products over a pre-defined time period.

1.3 Measurement of markers to identify long-term alcohol consumption is generally used to corroborate claims of alcohol abstinence.

1.4. Occasional drinking events cannot always be excluded.

1.5. Chronic excessive alcohol drinking corresponds to an average consumption of 60 g or more of pure ethanol per day over several months (*According to the World Health Organization survey<sup>1</sup>*)

1.6. The results of hair testing for alcohol markers should be interpreted considering all relevant factors surrounding the case.

---

<sup>1</sup> International guide for monitoring alcohol consumption and related harm. World Health Organization, Dep.t of Mental Health and substance dependence, Geneva, 2000, pp 51-54

## **2. General Considerations**

2.1. The site of hair collection plays an important role in the concentration of markers detected. Hair taken from the posterior vertex region of the head is preferred and cut as close to the scalp as possible.

2.2. In instances where head hair is not available, body hair can be collected. The different physiology of non-head hair has to be considered during interpretation.

2.3. Powdering hair for the extraction of EtG is best practice. Washing with water prior to extraction, extraction in water, combination of time and temperature incubation conditions are recommended. The cut-off values presented in this document are defined according to the above specified conditions. If non-pulverized samples or different methodologies are used for extraction, the laboratory must demonstrate that comparable results are achieved through proficiency testing.

2.4. Pre-analytical washing (ideally 30 min with a non-polar solvent) prior to extraction of EtPa is recommended. The cut-off values presented in this document are defined according to the above specified conditions. If different methodologies are used, the laboratory must demonstrate that comparable results are achieved through proficiency testing.

2.5. The incorporation of EtG and EtPa into hair is not biased by natural hair colour.

2.6. Hair treatments

2.6.1. The concentration of EtG and EtPa in hair can be influenced by chemical and/or thermal hair treatments (e.g. bleaching, dyeing or perming, etc).

2.6.2. EtG concentrations appear not to be influenced by hairspray, gel, wax, oil, grease or ethanol-containing hair care products.

2.6.3. Use of ethanol-containing hair care products (e.g. hairspray or hair lotions) may increase the concentration of EtPa.

2.6.4. The type of hair treatments should be documented at the moment of sample collection and considered during interpretation.

## **3. Abstinence Assessment**

3.1. Abstinence assessment over a pre-defined time period is necessary in many clinical and forensic cases.

3.2. EtG in hair is the preferred marker for the assessment of abstinence. A negative result of EtG in pubic hair is the most sensitive test for abstinence because a single alcohol consumption may give a positive result.

3.3. The analysis of EtPa alone is not recommended.

3.4. Ethyl glucuronide (EtG)

3.4.1. A concentration lower than or equal to 5 pg/mg EtG in the proximal head hair segment with a length of 3 cm up to 6 cm does not contradict self-reported abstinence.

3.4.2. A concentration greater than 5 pg/mg EtG in the proximal head hair segment with a length of 3 cm up to 6 cm strongly suggests repeated alcohol consumption.

3.4.3. The same cut-off concentration can be used for head and non-head hair, excluding axillary hair.

### 3.5. Ethyl palmitate (EtPa)

3.5.1. An EtPa concentration lower than or equal to 120 pg/mg for a 0-3 cm proximal head hair segment, or lower than or equal to 150 pg/mg for a 0-6 cm proximal head hair segment, does not contradict self-reported abstinence.

3.5.2. An EtPa concentration greater than 120 pg/mg for a 0-3 cm proximal scalp hair segment, or 150 pg/mg for a 0-6 cm proximal head hair segment, strongly suggests repeated alcohol consumption.

## 4. Chronic Excessive Consumption

4.1. For clinical and forensic purposes, it is necessary to establish concentrations of alcohol markers in hair for the assessment of chronic excessive alcohol consumption.

4.2. EtG and EtPa in hair can be used alone or in combination for the assessment of chronic excessive consumption as defined above in point 1.5.

### 4.3. Ethyl glucuronide (EtG)

4.3.1. A concentration greater than or equal to 30 pg/mg EtG in the proximal head hair segment with a length of 3 cm up to 6 cm strongly suggests chronic excessive alcohol consumption. If sample lengths less than 3 cm or greater than 6 cm are used, the results should be interpreted with caution. Segmentation may provide additional information.

4.3.2. The same cut-off concentration can be used for hair sampled from other body sites except for axillary and pubic hair regions and with consideration of the different represented time periods.

### 4.4. Ethyl Palmitate (EtPa)

4.4.1. An EtPa concentration greater than or equal to 350 pg/mg in head hair strongly suggests chronic excessive alcohol consumption when measured in the 0-3 cm segment. An EtPa concentration greater than or equal to 450 pg/mg in head hair strongly suggests chronic excessive alcohol consumption when measured in the 0-6 cm segment. If sample lengths less than 3 cm or greater than 6 cm are used, the results should be interpreted with caution.

4.4.2. If hair from other body sites is used the results should be interpreted with caution.