

## PASSIVE EXPOSURE TO MARIJUANA

- Q:** My patient's Aegis report returned positive for marijuana, and they are citing passive exposure to marijuana as the cause. Is this possible?
- A:** It is unlikely but possible for passive exposure to marijuana to turn up as a carboxy-THC positive in urine or a THC positive in oral fluid. However, the period of detection for such positive results is much shorter than for an individual who was actively smoking, and the concentration should be low. Because exposure must be extreme in these cases, clinical judgment must be utilized to determine if the exposure is truly passive.

A common issue that confuses the interpretation for marijuana testing is “passive inhalation.” The argument presented is that exposure to marijuana smoke by a non-user will result in a positive urine cannabinoid test, and therefore, a person will be wrongfully accused of drug use. Historically, multiple studies were performed in the 1980s that demonstrated that passive exposure to marijuana in extreme conditions did sometimes result in positive carboxy-THC (metabolite of THC, the primary psychoactive constituent of marijuana) in urine.<sup>1-5</sup>

In the study by Cone *et al.* which reported concentrations obtained by chromatography/mass spectrometry methods, positive results were found under repeated exposure or exposure conditions so extreme that the study subjects were asked to wear goggles to prevent eye and mucous membrane irritation, and the test area was visibly saturated with marijuana smoke. Anecdotal evidence of study subjects who had taken off their goggles concluded that prolonged exposure would be unlikely to be tolerable to most subjects.<sup>4</sup> Most of the studies were conducted in unventilated areas (closed cars or specifically built rooms of small size). Furthermore, Cone *et al.* conducted a test of room air THC exposure levels in the same test room as their studies with ventilation, which resulted in THC levels <10% that of the room unventilated.<sup>4</sup>

One criticism of studies conducted in prior decades is that marijuana is available at increased potency today, which could influence drug test results. More recent studies conducted to investigate urinary concentrations of carboxy-THC include Rohrich *et al.* where subjects were exposed to marijuana smoke for three hours in a Netherlands coffee shop. Urinary concentrations of carboxy-THC were typically either negative or no greater than 5 ng/mL.<sup>6</sup> A second study of passive exposure using high-potency marijuana (11.3%) being smoked by six smokers for one hour was performed by Cone *et al.* in unventilated and ventilated conditions.<sup>7</sup> The researchers demonstrated that with ventilation consistent with typical air conditioning, some study subjects did excrete detectable carboxy-THC above a 5 ng/mL threshold. Peak concentrations occurred at 15 ng/mL or less and remained detectable for 6 to 30 hours.<sup>7</sup>

Cone *et al.* also researched the likelihood of positive oral fluid results under similar conditions as above. Maximum oral fluid concentrations of THC were present in non-smokers up to 308 ng/mL in unventilated conditions and 75 ng/mL in ventilated conditions.<sup>8</sup> Maximum concentration levels occurred immediately post exposure and dropped rapidly within 1-3 hours, with unventilated subjects testing below 2 ng/mL after 12 hours and ventilated subjects after 2 hours. During the unventilated studies, smoke accumulation was rapid, and goggles were used to alleviate eye irritation, whereas ventilated sessions produced visible smoke at lower levels. Niedbala *et al.* measured THC in oral fluid following passive exposure to marijuana for 20 minutes in an unventilated van with four smokers and found THC levels did not exceed 1.2 ng/mL following exposure, with all specimens below 2 ng/mL. Urine concentrations were also assessed and did not

exceed 15 ng/mL and were below 5 ng/mL in non-smoker subjects by 36 hours.<sup>9</sup> Moore *et al.* measured THC in oral fluid following less extreme exposure in a Dutch coffee shop. Oral fluid specimens collected outside the coffee shop during exposure reached a maximum concentration of THC at 17 ng/mL; specimens were not collected following exposure until 12-22 hours later, for which a max concentration of 1.1 ng/mL was observed.<sup>10</sup>

Overall, the likelihood of positive marijuana results from passive inhalation will depend on the amount and duration of exposure, as well as ventilation during exposure. In circumstances of true passive inhalation, levels of THC (oral fluid) or carboxy-THC (urine) would be expected to be low, and the exposure would have occurred very recent to the time of collection.

Please call our clinical scientists at 1-877-552-3232 if you require additional information.

**NOTICE:** The information above is intended as a resource for health care providers. Providers should use their independent medical judgment based on the clinical needs of the patient when making determinations of who to test, what medications to test, testing frequency, and the type of testing to conduct.

## REFERENCES:

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