Use of Passive Sensors for Alcohol-Impaired Driving Enforcement

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Most alcohol-impaired driving arrests are made by officers on routine patrol who discern signs of impairment in a driver who has been stopped for an ordinary traffic violation. Some jurisdictions have specialized patrols, dedicated exclusively to alcohol-impaired driving enforcement, that look for signs of unsafe or erratic driving. Sobriety checkpoints are useful for screening large numbers for alcohol impairment. At checkpoints all drivers, not just those suspected of being impaired, are stopped. If stopping all drivers is not feasible, a predetermined plan for selecting drivers is used to eliminate the possibility of officer bias in determining which vehicles to stop.

Whether a driver is stopped by a patrol officer because of erratic driving or at a sobriety checkpoint, police officers rely on their senses in judging impairment. They look for cues, such as the smell of alcohol, slurred speech, and fumbling for a driver's license. But there are sizable individual differences in the signs of impairment at any given blood alcohol concentration (BAC). Because each vehicle is stopped only briefly at a checkpoint, officers have very little time to judge impairment. An objective indicator of alcohol use is needed to supplement the officer's observations and to provide an early indication of possible impairment. Passive alcohol sensors are designed to act as such an indicator. Because these devices sample the air around the subject's mouth that contains a mixture of air and expired breath, they do not provide an accurate measure of BAC. However, they can be effective as screening devices supplementing the officers' ability to detect whether a driver has been drinking.

Passive alcohol sensors indicate the presence of alcohol in a person's expired breath, using a digital display or a series of color bars to indicate approximate alcohol concentration. Most passive alcohol sensors have a small pump that draws a sample of air that includes exhaled breath across an alcohol-sensing device, which is typically a fuel cell. The officer holds the sensor about 5-6 inches from the driver's mouth and activates the pump when the driver is speaking to ensure that expired breath is sampled. The pump runs for about 5 seconds and the display reaches full value in about 10-20 seconds.

Passive sensors have been evaluated in the laboratory and in the field. Laboratory tests were conducted using the PBA 2000 and the NPAS passive alcohol sensor (manufactured by National Patent Analytical Systems). The PBA 2000, which is about the size and shape of a police radio, has a digital readout that can also be adapted to give a pass/fail readout. A passive alcohol sensor should strike a balance between detaining drivers with very low BACs (false positives) and failing to detect drivers with high BACs (false negatives). The laboratory tests indicated that, when held at a distance of 5 inches from the subject's mouth, the best balance occurs when the PBA 2000 indicates a reading of 0.04 or above. At this threshold, 20 percent of drivers with BACs of 0.10 percent would be missed (but only 1 percent at BACs of 0.15 percent); 12 percent of the drivers with 0.02 percent BAC would be detained for further testing.

The NPAS, which is housed in a standard, functional police flashlight, uses a 10-bar color-keyed light array to indicate approximate BAC. Here the best balance of false negatives and false positives was achieved using a threshold of one yellow bar. Any time one yellow bar or more was illuminated, the flashlight sensor missed 25 percent of drivers at a BAC of 0.10 percent (3 percent at a BAC of 0.15 percent); 19 percent of drivers at 0.02 percent BAC would be detained for further testing.

Field conditions can be very different from the highly controlled conditions of the lab, but when the sensors have been used at checkpoints the results are consistent with the laboratory findings. The Institute has assessed the performance of passive alcohol sensors at sobriety checkpoints in two studies. The first study was conducted in Charlottesville, Virginia in 1984, using an earlier prototype of the flashlight passive alcohol sensor. Twelve sobriety checkpoints were conducted and passive sensors were used by the officers on half of them. Without the sensors, officers were able to identify only 45 percent of drivers with BACs of 0.10 percent or higher; when using the passive sensors this rate increased to 68 percent. A similar study in Fairfax County, Virginia in 1993 used the Sniffer PAS II. Half of the officers at each of six checkpoints used the passive alcohol sensor, and half used only conventional methods. Results were very similar to those obtained in Charlottesville. Without the sensor, officers identified 55 percent of drivers with BACs of 0.10 percent or higher, compared with 71 percent when using the sensor.

In the Charlottesville study use of the sensor at checkpoints also reduced false positives. That is, it reduced the percentage of drivers with low BACs who were unnecessarily detained from 18 percent to 8 percent at BACs between 0.02 and 0.05 percent. Although there was a slight reduction in false positives in the Fairfax County study, this reduction was not significant.

Passive alcohol sensors have also been tested on special alcohol-impairment patrols and routine patrols. Police officers in Columbus, Ohio used the PBA 3000 (this version can be used in the active as well as the passive mode when fitted with a mouthpiece) on routine police traffic stops. On nights when the sensors were used, the percentage of drivers who came into contact with the police and were detected with BACs of 0.10 percent or higher and arrested increased from 69 to 77 percent. Another study looked at passive alcohol sensor effectiveness (using the prototype flashlight sensor) with officers who were specially trained in the detection of people driving under the influence of alcohol. The arrest of drivers with BACs of 0.10 percent or higher increased when the sensor was in use, but these differences were not large. This is probably because those stopped as a result of dedicated patrols had already exhibited behavior indicating alcohol impairment.

After the Fairfax County study, officers were surveyed concerning their experience with the sensor. Two-thirds of the officers reported that the passive alcohol sensor improved their ability to detect alcohol-impaired drivers. This opinion was strongly related to whether the officer had made an arrest at a checkpoint while using the sensor. Eighty-three percent of the officers who made an arrest while using the sensor thought it was a useful tool in identifying alcohol-impaired drivers. Eleven percent of officers who had not made an arrest did not find it so, but they may not have encountered drivers with BACs of 0.10 percent or higher. It is also possible that the low detection and arrest rate may be related to ineffective sensor use, such as holding the device too far away from the driver or activating the device when the driver was not talking. In fact, one of the most frequently listed complaints of the officers was that the sensor had to be held too close to the driver's face.

Police departments around the country are increasingly interested in trying the passive alcohol sensor. Many states have adopted lower BAC thresholds for alcohol-impaired driving, and 31 states have passed lower or zero tolerance laws for youth. Given that it will be more difficult to identify drivers with lower BACs, the passive alcohol sensor should be an effective tool in identifying this population. For example, in the Fairfax County study, at a BAC of 0.08 percent, 28 percent of drivers were detained without the sensor, and this increased to 44 percent when the sensor was used. If police officers use passive sensors routinely and the public is made aware that the police can detect alcohol use even in the absence of behavioral signs, these devices could provide a powerful deterrent against drinking and driving.