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2017 JAN 17 PM 4:06

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FILED

11 **IN THE SUPERIOR COURT OF THE STATE OF ARIZONA**
12 **IN AND FOR THE COUNTY OF COCONINO**

13 STATE OF ARIZONA,

No. CR2015-00862

14 Plaintiff,

**NOTICE OF SUPPLEMENTAL
DISCLOSURE BY STATE**

15 vs.

(The Honorable Dan R. Slayton -
Division 2)

16 STEVEN EDWARD JONES,

17 Defendant.

18 COMES NOW the State of Arizona, by and through Ammon Barker, Deputy County
19 Attorney, pursuant to Arizona Rules of Criminal Procedure, Rule 15.1, and discloses the
20 following matters in the above-entitled case:

21 **EXHIBITS:**

[REDACTED]	
Relationship of Alcohol and Aggression Report Prepared By Pamela E. Potter, Ph.D. dated December 29, 2016	001706-001714

22 **WITNESSES:**

23
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The above material and information has been provided to counsel for the defense,
Burges McCowan.

RESPECTFULLY SUBMITTED this 17 day of January, 2017.

DAVID W. ROZEMA
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By 
Ammon Barker
Deputy County Attorney

COPY of the foregoing
mailed/delivered this
17th day of January, 2017,
to:

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Re: State of Arizona vs Steven Jones

I have been retained by the Office of the Coconino County Attorney to give an opinion on the effects of alcohol on aggressive behavior with regard to an incident that occurred on Nov 9, 2015.

I am a Professor and Chair of Pharmacology at the Arizona College of Osteopathic Medicine, Midwestern University, in Glendale AZ. I received my Ph.D. in Pharmacology in 1981, completed two postdoctoral fellowships, and have held faculty positions at medical schools since 1986, in Departments of Pharmacology, Neurosurgery, and Anesthesiology. My area of research has focused on neurochemistry of the central nervous system, in particular neurotransmitter release and drug-receptor interactions. I have been teaching Pharmacology to medical students since 1997. My primary area of expertise is the effects of drugs in the central nervous system.

In preparing this opinion I have reviewed the following documents relevant to the case:

Toxicology Report: AIT Laboratories, Case # 3012157, Colin Brough
Laboratory Report and Medical Records, Northern Arizona Healthcare, Flagstaff Medical Center, ID 45565247, Nicholas Prato
Laboratory Report and Medical Records, Northern Arizona Healthcare, Flagstaff Medical Center, ID 45874073, Kyle Zeintek
Laboratory Report and Medical Records, Northern Arizona Healthcare, Flagstaff Medical Center, ID 45754912, Nicholas Piring

Other references from the published scientific literature are included in REFERENCES at the end of this document.

Aggression has been defined as “any form of behavior directed toward the goal of harming or injuring another living being who is motivated to avoid such treatment”¹. Aggressive behavior may include fighting, pushing, shoving, kicking, slapping², and perhaps even yelling at another person. It may escalate to rape, assault, domestic violence, and homicide³.

Use of alcohol has been associated with aggressive behavior in numerous studies. This is thought to result in part from disinhibition and loss of impulse control due to intoxication. However, the majority of people do not become aggressive when they consume alcohol; in fact it has been stated that “only a small number of individuals become aggressive after acute alcohol intake”⁴. Furthermore, aggressive behavior does not always involve alcohol⁵. This leads to difficulty in establishing a causal relationship between alcohol intake and aggressive behavior^{6,7}. While alcohol increases aggression in some individuals, it reduces it in others⁷⁻¹¹. Predicting which individuals will become aggressive when intoxicated in the real world is very difficult. There are many factors that determine the likelihood of aggression and violence when people become intoxicated. These include a predisposition to aggressive behavior, gender (males are more likely to be aggressive than females), motives and expectations for drinking (e.g. to get drunk, or start a fight), and beliefs about whether aggressive behavior is acceptable⁴.

Many scientific studies have been conducted to attempt to determine the contribution of various factors to alcohol related behavior, often with somewhat conflicting results. These studies are difficult to perform in humans, due to ethical concerns. Real-world alcohol-induced aggression cannot be provoked or observed in a study, nor can levels of alcohol be given to produce more than minimal intoxication, for safety reasons. In order to get around some of these obstacles, animal models or experiments in humans that attempt to model possible aggressive behavior have been used.

In humans, the most commonly used models of alcohol-induced aggression simulate a situation in which the subject sits at a computer and is able to give shocks of varying intensity to a hypothetical opponent. The intensity and frequency of shocking the opponent models aggression¹². In some studies, the subject is provoked to anger, and in others the responses available include either the “positive” option of shocking the opponent or the second option of providing a neutral response. Results sometimes differ in studies where a neutral response is available compared to those where the only option is to shock the opponent. Other studies use a model in which subjects can earn money by engaging in certain computerized behaviors, in order to “win” more than their opponent, but they can also act to remove money from their opponent, considered to be another model of aggression. Groups tested may include a control group who know they have not been given alcohol, a placebo group who believe they are given alcohol but have not, and a group that has been given alcohol. Sometimes the same subjects will be tested sober, then again after consuming alcohol. Most of the studies provide enough alcohol to be close to the legal limit of impairment, 0.08% blood alcohol concentration (BAC).

The results of these studies vary based on the model that is used, on the belief of the subjects of how intoxicated they actually are, on their expectations regarding the situation, on whether there is a placebo group or a neutral option, and on the degree of provocation used. One of the flaws in these studies is that they report results in the aggregate, but do not report the percentage of

individuals in the study who become more “aggressive”. The results vary. In most studies, the behavior modelling aggression increases with alcohol, especially if there is no neutral option^{13,14}. It appears to increase more when participants feel threatened or increasingly frustrated^{13,15-18}. However, it may also increase to some degree in participants who were not given alcohol but believed that they had received it (placebo group). Overall, the majority of studies indicate an increased tendency for aggressive behavior with alcohol consumption^{12,19}.

In rodents^{8,20}, the effect of alcohol on aggression is dose dependent, increasing at low dosages, but decreasing at higher dosages. In these studies there were wide differences between individuals in the effects of alcohol on aggression. A given dose of alcohol increased aggression in some animals, decreased it in others, and had no effect in some. The effect of alcohol on aggression was found to be a stable, trait-linked response, in that the effect was consistent for a given individual. Thus, an individual animal who was more aggressive without alcohol was likely to be more aggressive when consuming alcohol.

This trait association is borne out in humans, as well. One of the most consistent findings in the scientific literature is that people with poor impulse control, and who respond aggressively to situations when sober, are more likely to be aggressive when intoxicated²¹.

There is also evidence for a dose related effect of alcohol on aggression in males^{13,14}, in addition to the effect of aggressive personality. However, in this study, the highest breath alcohol concentration was 0.139%. In fact, the majority of the experimental studies showing aggression were conducted with alcohol intake that produced blood levels around 0.10% BAC, and ranged from about 0.06-0.14%¹³. Experiments in animals have indicated that over a certain level of intoxication, aggressive behavior begins to decrease, as the animals often become sedated. Experimental studies at higher BAC levels are not feasible in humans, but anecdotal evidence has suggested that many people begin to exhibit sedation as BAC increases over 0.2%. One study in bars suggested that severity of aggressive behavior decreased as the level of intoxication increased²². The authors hypothesize that as intoxication increases, people are less capable of severe aggression because they are sedated by the alcohol, similar to the effects seen in animals²².

One analysis of the effects of BAC, intoxication, personality traits and provocation¹³ tested sixty people, 30 males and 30 females. The mean age for the males was 21.7 years. Average blood alcohol readings were 0.102%, but ranged from 0.06-0.14%. Aggression was assessed by measuring shock intensity in a computerized situation with high- and low- amounts of provocation. Aggressive personality traits were measured with the Assault scale of the Buss-Durkee Hostility Inventory (BCHI), a tool used in many of these studies. The results of the study indicated that the likelihood of measured “aggressive” behavior in males could be predicted by the interaction of these variables with the following contributions from each factor: aggressive tendencies measured by BDHI, 29%; perception of intoxication, 15%; and actual BAC, 6% in the situation with high provocation. In the low provocation setting, the only two predictors were aggressive tendencies, 23%, and BAC, 9%. The conclusion was that alcohol consumption is most likely to result in aggressive behavior in males with higher BAC levels, high levels of subjective intoxication, strong provocation, and aggressive personalities, with the pre-existing

personality trait of aggression being the strongest predictor. The influence of personality as a strong predictor of aggressive behavior is reinforced by many different studies²³.

On the other hand, similar studies have suggested that aggression was increased primarily under threatening conditions¹⁸, especially personal threat¹⁷. Frustration is also a very important factor in whether a person becomes aggressive^{15,16}. Also, the type of beverage is important- with beer and wine consumption being much less likely to produce aggression than consumption of distilled spirits, both in real-world and laboratory studies^{24,25}. The reason for this is not known, but may be related to expectations regarding the effects of different types of alcoholic beverages. The tendency towards aggressive behavior may also depend on the time at which alcohol ingestion ceased. It is higher on the ascending limb of the blood alcohol curve - as the concentration is increasing- than in sober participants, but as the blood alcohol begins to decrease, the degree of aggressive behavior is the same as in a sober subject²⁶.

Most experimental studies have focused on the aggregate of aggressive behavior in groups of participants, rather than examining the proportion of people who respond one way or another. Estimates of the relationship between alcohol and aggression often focus on people who have committed crimes, but do not take into account the number of people engaging in alcohol consumption who do not engage in criminal behavior. Thus, there are few estimates of the actual proportion of people who become aggressive or who engage in violent activity as a result of drinking alcohol.

The most direct measurement of the proportion of drinkers who became aggressive was conducted in a study in Brazil, where men and women drinking in bars were sampled as they entered the bar, as they left, and again the day after the drinking episode. The BAC in each subject was measured at the time they left the bar. In the men that were sampled, 3.8% engaged in some form of aggressive or violent behavior²⁷. This gives the most direct measurement of the proportion of people engaging in aggression during a single drinking episode.

Perhaps the most relevant study to this case was one that followed more than 2500 college students over four years²⁸. Many factors were measured, including subjective intoxication at varying blood alcohol levels, and average blood alcohol levels on drinking days. Overall, during the 4 years, the students who were drinkers reported the following:

	# of drinking days	average BAC	percent with aggressive incident
Year One	4.81	0.088	25.5
Year Two	5.59	0.089	19
Year Three	6.85	0.084	17
Year Four	7.28	0.073	12.5

Thus, the likelihood of aggression per drinking experience was 5.3% in Year 1, 3.4% in Year 2, 2.5% in Year 3, and 1.7% in Year 4. On the aggregate, this is close to the study from Brazil^{27,29}. It also corresponds to studies that suggest that the prevalence of alcohol-induced aggression decreases with age.

Another study suggested that binge drinking increased the likelihood of violent behavior in 18-24 year old males, with 15% of binge drinkers being involved in a fight in a public place once over the course of the previous year, versus 3% of other regular drinkers and 2% of non-drinkers³⁰.

Another way to estimate the incidence of aggressive behavior associated with alcohol is to look at national statistics (<https://www.niaaa.nih.gov/alcohol-health/overview-alcohol-consumption/alcohol-facts-and-statistics>). Of approximately 8,762,000 college students in 2014, 59.9% reported alcohol use in the past month (5,240,000). It has been estimated that 696,000 students per year are assaulted each year by another student who has been drinking. That would indicate an incidence of about 13%.

Globally, alcohol ingestion is thought to contribute to about 22% percent of cases of intentional harm³¹. Another study estimated the risk of intentional harm to others to be around 10%³². The likelihood of injuring others or being involved an altercation is higher in males who consumed more than 5 drinks^{31,32}. The likelihood of exhibiting aggressive behavior is also higher in males who abuse alcohol chronically and those with antisocial personalities²¹.

Overall, the scientific literature available suggests that the likelihood of being involved in an aggressive situation following excessive alcohol consumption probably ranges somewhere in the range of 20-25% over the course of a year. In a sample of 18-30 year olds in the US, 25% of men had engaged in or experienced violent behavior in or around a licensed bar during the previous year^{2,33}. In a study of male adolescents in Italy, 86% reported drinking at least once a month, and 18% reported being involved in an aggressive incident during the previous year²⁹.

It should be noted that these estimates studied the likelihood of being involved in an aggressive or violent situation, but did not necessarily indicate whether the person was the aggressor or a victim. In fact, the likelihood of being victimized is increased in people who consume excessive amounts of alcohol³⁴. A recent study showed that 29% of male homicide victims in a US database search had a BAC greater than 0.08%³⁵. An international study showed that 47% of homicide victims tested positive for alcohol³⁶. It is thought that the increased vulnerability for being a victim of a violent act while intoxicated may result from people being less responsive to environmental cues that indicate danger, and reducing the ability to effectively respond to these situations, especially to sexual aggression³⁴⁻³⁶.

One study examined the frequency of aggression observed, experienced or initiated by people in various locations². Sports events and the area in and around bars had the highest degree of incidents. These are both areas where alcohol is being consumed. Violence was described as a) pushing or shoving; b) kicking, slapping, or punching; or c) use of a weapon. The most common behaviors reported were kicking, slapping or punching. Of the college aged males, 7.2% initiated an aggressive incident, whereas 14.9% experienced one. In a World Health Organization report from six countries, including the US, the percentage of victims presenting to emergency rooms who tested positive for alcohol ranged from 24-43% (http://www.who.int/violence_injury_prevention/violence/world_report/factsheets/pb_violencealcohol.pdf).

Predicted Effects of Varying Levels of Blood Alcohol Concentration

The likely effects of varying levels of blood alcohol have been described in multiple places. One example is shown in the figure here, taken from:

<https://www.rochester.edu/uhs/healthtopics/Alcohol/bac.html>.

There is considerable variation in the effects of alcohol from one individual to another, depending on the frequency with which they consume alcohol, and their degree of tolerance to the effects of alcohol. The assessment of likely effects that follows assumes occasional use of alcohol and an average male body weight of about 180 pounds.

Mr. Prato had a BAC of 0.92 mg/dL (equivalent to approximately 0.09%). This is in the BAC range of many of the experimental studies that examined alcohol induced aggression. At this level, as indicated in the chart to the right, there is usually a reduction in responses that would normally inhibit behavior, and deficits in reflexes, depth perception, peripheral vision and reasoning. This blood alcohol level is consistent with consumption of approximately 5 alcoholic drinks (70 mls of alcohol) over a 2 hour period.

Blood Alcohol Concentration	Changes in Feelings and Personality	Physical and Mental Impairments
0.01 - 0.06	Relaxation Sense of Well-being Loss of Inhibition Lowered Alertness Joyous	Thought Judgment Coordination Concentration
0.06 - 0.10	Blunted Feelings Disinhibition Extroversion Impaired Sexual Pleasure	Reflexes Impaired Reasoning Depth Perception Distance Acuity Peripheral Vision Glare Recovery
0.11 - 0.20	Over-Expression Emotional Swings Angry or Sad Boisterous	Reaction Time Gross Motor Control Staggering Slurred Speech
0.21 - 0.29	Stupor Lose Understanding Impaired Sensations	Severe Motor Impairment Loss of Consciousness Memory Blackout
0.30 - 0.39	Severe Depression Unconsciousness Death Possible	Bladder Function Breathing Heart Rate
0.40 and greater	Unconsciousness Death	Breathing Heart Rate

*Chart adapted from Virginia Tech, www.alcohol.vt.edu

Mr. Zeintek had a BAC of 0.181 mg/dL. This would correspond to consuming an average of 8-9 alcoholic drinks over the course of 2 hours. Behavior associated with this blood level often includes emotional swings, with the person boisterous, sad or angry, a decrease in reaction time, impairment of motor control that may produce staggering, and slurred speech.

Mr. Piring had a BAC of .208 mg/dL, consistent with consumption of about 10 drinks over a 2 hour period. He would be likely to exhibit many of the behaviors described for Mr. Zeintek.

Mr. Brough had a BAC of 0.285, consistent with consumption of more than 10 drinks in a 2 hour period. He also consumed cannabis at some time in the previous hours, as he had a THC level of 1.9 ng/ml, and had taken some alprazolam as well, to produce a blood level of 4.3 ng/ml. THC has been shown to decrease aggressive behavior³⁷, but the level measured in Mr. Brough's blood was low, suggesting that ingestion of a cannabis containing product had occurred some hours previously³⁸. While the blood level of alprazolam was low, below a therapeutic level, it would potentiate the effects of alcohol³⁹. There have been a report of an increase in aggressive behavior when alcohol was combined with alprazolam, but alcohol concentrations were low (0.07% BAC)⁴⁰, much lower than that in Mr. Brough. Also, benzodiazepines like alprazolam are commonly used to treat and reduce aggression⁴¹. The combination of alprazolam and alcohol would be most likely to cause sedation³⁹.

It is likely that Mr. Brough was severely impaired, with sedation, possible loss of consciousness, severe motor impairment, memory impairment, stupor and an inability to understand a situation.

Summary

Alcohol consumption has been correlated to an increase in aggressive behavior, especially in males. It is also correlated to an increase in the likelihood of being a victim of violence or assault. However, the majority of people who consume alcohol do not become violent or aggressive. Data from published studies suggest that the likelihood of a male college student behaving aggressively would range from about 5-25%, depending on factors including the location, amount and type of alcohol consumed, the level of perceived threat or provocation, and, most importantly, the personality of the person consuming alcohol.

For these reasons, it is not possible to accurately predict whether or not a person will become aggressive while under the influence of alcohol.

Submitted to Ammon Barker, December 29, 2016



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