

# Comparison of Neurocognition and Behavioral in Alcohol with Placebo group

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**Abstract**— *Alcohol is a psychoactive substance that their consumption can cause some damage to the body, mainly in the central nervous system, also it is possible observed changes in the social behavior of the individual when ingested in large amounts.*

*In addition, a placebo effect is based on the total of similar beneficial effects to health regarding physiological - psychological active substance. With regard to this issue, have been conducted to observe the behavior of volunteers where it is used a psychoactive substance such as coffe, marijuana or drugs in some volunteer groups compared to a group that ingested a placebo (inert substance).*

*In this study, it was observed the behavior of two groups of young volunteers aged college to which were given drinks alcoholics beverages and drinks with placebo (group A and B, respectively), where alcoholics beverages and placebo were smell similar and taste.*

*Previously it determined that these volunteers had no alcohol dependence. Also before giving the drinks, their levels of anxiety and depression were assessed by means of psychological testing; volunteers also underwent neurocognitive testing, neuromotor before and it then give them drinks with alcohol or placebo.*

*We observed in this study that the placebo effect was can be as strong as if it had ingested the psychoactive substance, In like manner, we perceived that mood at the studie moment have a significantly influence, because the psychoactive substance effect or stimulating feeling are improved even when they to believe has been drinking alcohol*

**Key words:** *Alcohol, Anxiety, Neurocognition, Placebo*

## I. INTRODUCTION

Alcohol is a psychoactive substance that excessive consumption may end up causing damage to the body especially the nervous system and liver. In addition this would include cases in which it were a causal agent indirect, of the social harm or family. Although alcohol in moderate amounts accelerates the rhythm of the heartbeat, dilates blood vessels, lowers blood pressure, excites the appetite, increases the production of gastric juices and stimulates urination, the overall effect of alcohol on the human body is of a depressant, specifically on the central nervous system. In its general effect on the body, as depressive factor,<sup>1</sup> alcohol decreases the activities of the central nervous system in proportion to the concentration in the blood,<sup>1</sup> which is measured by the level of blood alcohol; mainly it affects the brain, which not only affects the emotions, reasoning, concentration and even memory but also to monitor the functioning of the internal organs,<sup>2</sup> like the cerebellum is the case where an imbalance and lack of muscular control occurs.

On the other hand, when we talk about a placebo effect can be powerful on the total positive health effects produced with intent of therapeutic potential;<sup>3</sup> There are several reports on the placebo use, these effect have been seen in different active substances in the central nervous system, such as marijuana,<sup>4-6</sup> alcohol,<sup>7</sup> caffeine or drugs in volunteer groups,<sup>8,9</sup> where the power of the mind is analyzed to influence the body in a more conspicuous manner and the presence of anxiety by social coexistence and alcohol use disorders often go together,<sup>10</sup> such experiments are based on an experimental design in which half the population is given the psychoactive substance and the other is given a placebo, odor could be similar to the stimulant or depressive substance appearance as appropriate, That with the objective to observed whether the placebo group have similar behavior to group that ingested.<sup>11,12</sup>

## II. METHODOLOGY

A group of 22 young people aged 18 to 24 years in undergraduate school age, region of Valles in Jalisco, were divided into two groups A and B (without knowledge of which group volunteers ), both groups were subjected to the following psychological tests: 1) Questionnaire MALT-S, 2) Test Anxiety Beck, 3) Neurocognitive test, 4) Neuromotor test; also their cognitive abilities. We evaluated and interviewed to volunteers for know whether at this time they go through for a any psychological alteration, such as, period of depression for family, economic, educational, health or emotional issues. After performing the tests and interviews, the group A, with a total of 11 volunteers were given to make the alcoholic beverage (70 ml of vodka with 100 ml of orange juice), and group B, with a total of 11 volunteers were given a placebo drink (70 ml tonic water with 100 ml of orange juice), they drank up to three times per group (drank alcohol and Placebo) with intervals of 10 minutes each one. All volunteers lived in a closed room with chips to free choice, and unlimited on the number of times one may visit the toilets. Upon test completion, were allowed to proceed 30 minutes and the cognitive tests were repeated again to the volunteers.

The MALT-S test consists of 26 questions, is used to determine if the person is dependent on alcohol, the value of each affirmative answer is worth 1 point. If there are more than 5 affirmative answers diagnosed as alcoholic.

- The Beck Anxiety test provides a score range from 0 to 63. The way to score is 0 “at all” 1 “slightly”, 2 to “moderately” and scores 3 to "severely".  
Cut points suggested to interpret the results obtained are as follows:  
00-21 - Very Low Anxiety  
22-35 - Moderate Anxiety  
Over 36 - Severe anxiety
- Neuromotor test consists of a series of repetitive exercises that evaluate the flexibility, balance, and postural dynamometry assessment.
- Neurocognitive test consisted of 20 questions, with a time of 2 minutes per question.

Ethical Approval: Permission to conduct the study was sought and obtained from school officials and informed consent was obtained from voluntaries.

Data thus collected on a semi structured, pre designed schedule were entered in Microsoft excel sheet to prepare master chart, tabulated and analysed to get inferences. Significance of difference in proportions

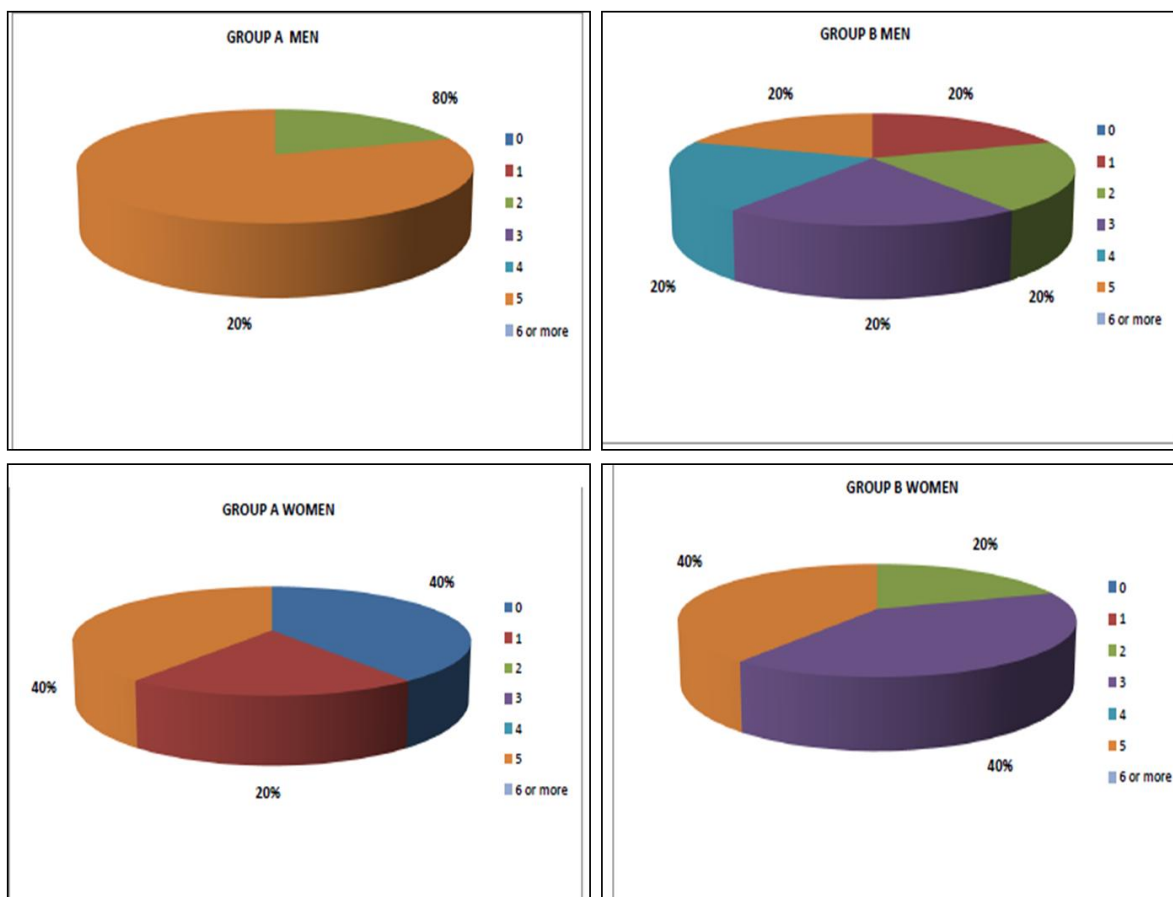
was inferred by Chi-square test and significance of difference in means was inferred by unpaired 't' tests. For significance 'p value' equal or less than 0.05 was considered significant.

### III. RESULTS

In this present study, followings were the salient observations:-

**3.1 Alcohol dependence:** In these graphs it can be seen that volunteers both group A and B of both genders subjected to this experiment did not express alcohol dependence, according to Test MAL-S which considers a person dependent on alcohol to that with more than 5 affirmative answers. (Figure 1)

**Figure 1.- Alcohol Dependence**



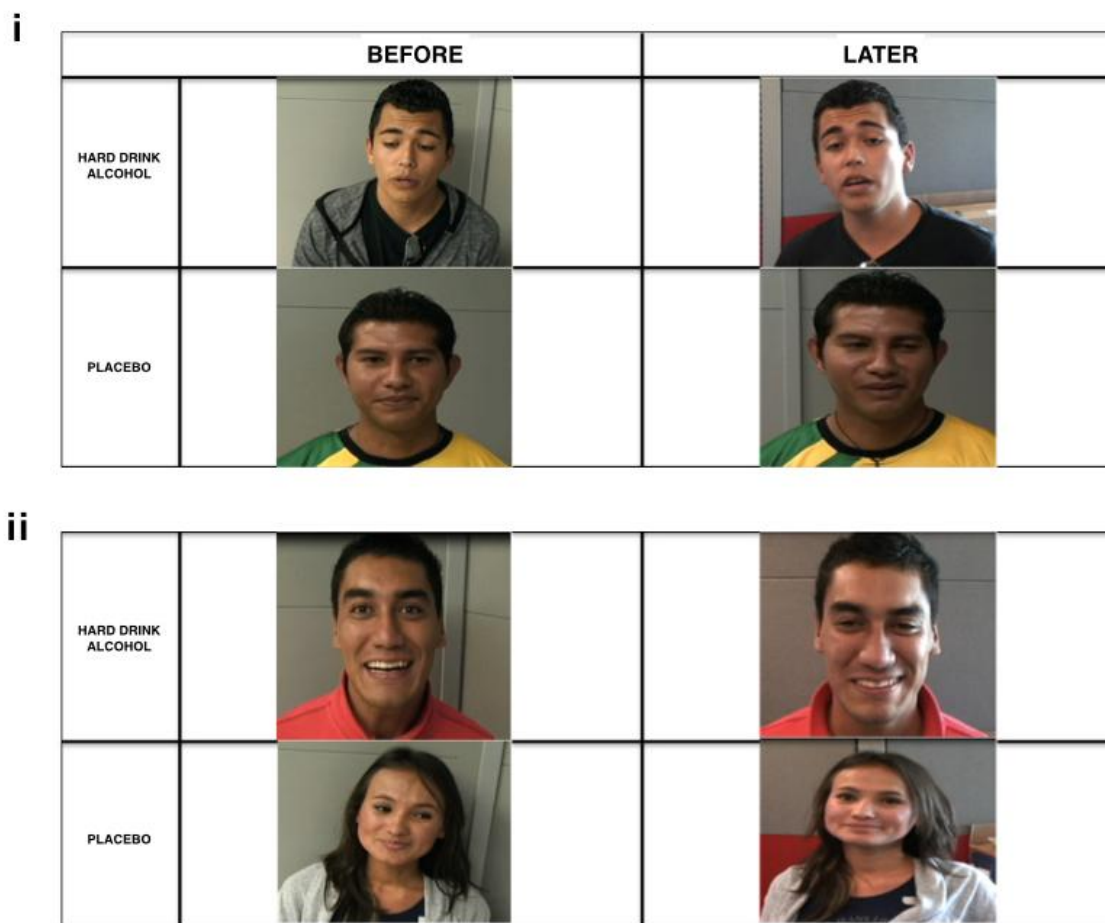
### 3.2 Anxiety

Some representative volunteers drank alcohol group and the placebo group, In both we can see a change of post-consumer facial expressions. In panel i) we can see two volunteers, both the volunteer who drink alcohol as the placebo, both showing pre-trait anxiety intake, these being features increased post-intake

In box ii), the volunteers have features of happiness before and after the intake. The volunteer group alcohol intake continues to show the same traits of happiness. In the case of volunteer who ingested placebo expression of happiness decreases, which indicates that drinking alcohol and placebo interferes with the behavior and facial expression, demonstrating that anxiety is increased when the individual is under the influence of alcohol or who they believe to be. Being drinking alcohol or social idea of a person to believe has been drinking alcohol, having the effect as inhibitor of positive emotions.

Therefore, and anxiety activator. Figure below shows the change of facial expressions of volunteers from both pre and post-intake groups, showing features of anxiety (Box i), and features of happiness (Box ii) both pre-intake. (Figure 2)

**Figure 2.- Anxiety, represented by facial expression.**



Belck test was performed for analysis of anxiety levels before the intake, assuming that all volunteers had low or undetectable levels of anxiety in the clinical range. The range of 0-21 correspond to low or undetectable levels of anxiety, range of 22 to 35 moderate levels of anxiety and severe anxiety levels must be greater than 36. (Table 1)

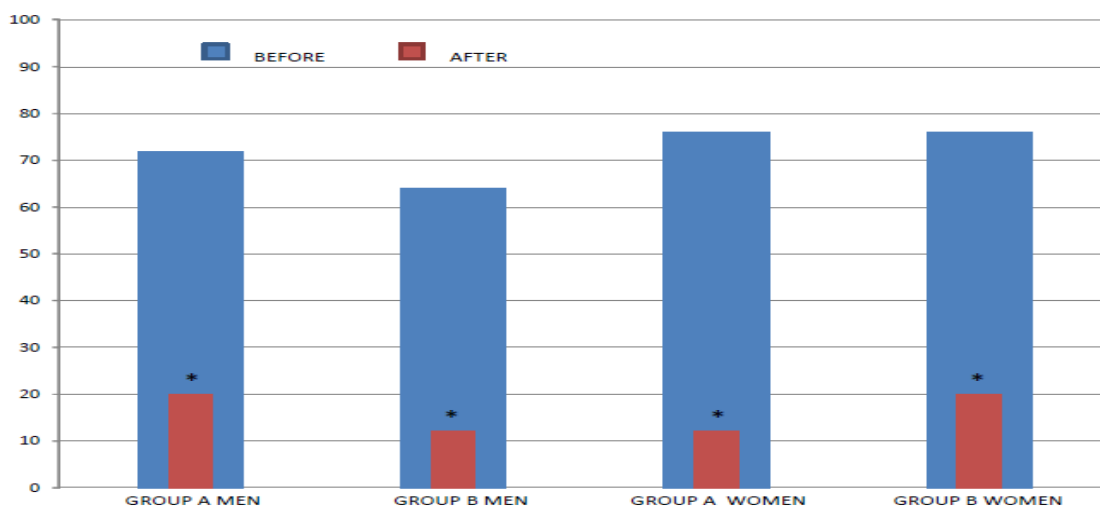
**Table 1  
Beck Anxiety test results**

Anxiety Level By Belck Test		
	Group A	Group B
Severe (+36)	0	0
Moderate (22-35)	0	0
Low (0-21)	11	11

### 3.3 Neurocognition

Both groups A and B in the first logical-mathematical test (before starting the experiment) showed a similar level, there was little difference in the results. After taking the first volunteers of the two groups began to feel uninhibited in the second group the volunteers began to get dizzy A and one from group B, indicated that it could no longer continue with another takes over and I felt much sickness and sorrow. In the third it takes longer identified "Two drunk" (male and female) from group B and "Three drunken" group A. After carrying out the activity (the indicated doses) the second logical-mathematical tests that were present gave a huge low in both groups, compared to the results given in the first logical-mathematical test. Taking three volunteers to not end the test because they were under the influence of psychoactive substance, but one of them had ingested placebo. It also found it difficult to follow the directions on cognitive tests at three voluntary group A, above them was not possible to continue with the tests because they were engaged in a very emotional state. A significant difference ( $p$  value  $<0.05$ ) in comparison to each of the groups between before and after intake was observed. However there is significant when making a comparative gender difference, which we can ensure that groups A and B are homogeneous and because gender statistics in this analysis is not a significant variable. So the following analyzes were performed considering only two groups (A to alcohol intake and intake B with placebo considering the two genders in the group).

**Figure 3.- Neurocognition**



### 3.4 Behavioral

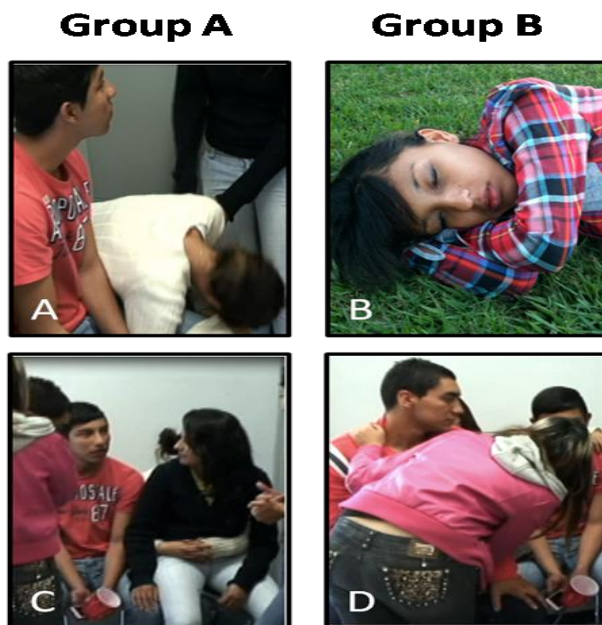
Pictures below are of behavior change post-ingestion. In the images A and B representative of each group analyzed alcohol and placebo group, where a lethargic behavior is observed .in both volunteers. In the images C and D volunteers of both groups are shown with disinhibition of sexual behavior. (Figure 4)

### 3.5 Movement Tests

The results obtained with the implementation of motor tests indicate that both volunteers who ingested alcohol as the placebo group are affected motor development after ingestion. Thus it shows that alcohol intake or of a person who believe has been drinking alcohol, alters the behavior motor, therefore, alcohol must be an inhibitor of coordinated body movements. In the group picture, motor ability of the

group before alcohol intake is compromised after of drank alcohol and placebo. In the upper panoramic images of the motor tests are observed in total volunteers. The images where one individual appears represent the effects before and after intake. (Figure 5)

**Figure 4.- Pictures of behavior change post-ingestion**



**. Figure 5.- In the group picture, motor ability of the group before alcohol intake is compromised after of drank alcohol and placebo**

	BEFORE	LATER
ANALYSIS GROUP		
VOLUNTARY GROUP A (HARD DRINK ALCOHOL)		
VOLUNTARY GROUP B (PLACEBO)		



#### IV. DISCUSSION

It was observed that volunteers both group A and B of both genders subjected to this experiment did not express alcohol dependence, according to Test MAL-S which considers a person dependent on alcohol to that with more than 5 affirmative answers.

It was also observed that change of facial expressions of volunteers from both pre and post-intake groups, showing features of anxiety and features of happiness both pre-intake. And by Beck Anxiety test the range of 0-21 correspond to low or undetectable levels of anxiety, range of 22 to 35 moderate levels of anxiety and severe anxiety levels must be greater than 36.

A significant difference ( $p$  value  $<0.05$ ) in comparison to each of the groups between before and after intake was observed. However there is significant when making a comparative gender difference, which we can ensure that groups A and B are homogeneous and because gender statistics in this analysis is not a significant variable. So the following analyzes were performed considering only two groups (A to alcohol intake and intake B with placebo considering the two genders in the group).

A lethargic behavior is observed in both volunteers i.e. representative of each group analyzed alcohol and placebo group. These volunteers of both groups are shown with dis-inhibition of sexual behavior.

Rebecca G et al<sup>14</sup> reported that belief of having received a moderate dose of alcohol has an effect on reaction time similar to that of its pharmacological effect in older moderate drinkers. Although placebo effects are not novel, these findings suggest that cognitive processes are differentially affected. The study of moderate doses and more complex real-world tasks is an important next step.

In contrast to present study Johnej G et al<sup>15</sup> stated that alcohol significantly impaired critical tracking, divided attention, and stop-signal performance. THC generally did not affect task performance. However, combined effects of THC and alcohol on divided attention were bigger than those by alcohol alone.

#### V. CONCLUSION

In this study it was observed that the placebo effect can be so strong as to ingest the psychoactive substance, and is of great importance that the mood in the individual is to feel a potentiating effect, also how biased this to you affecting or not ingest. It is very important the state of the person and the level of IQ were affected severely by volunteers who ingested placebo, low level similar to that if ingested psychoactive substance level. State anxiety is important as it can lead a person to feel worse than how it is, that is what was observed in the volunteers who took the placebo causing negative effects.<sup>13</sup> It is most vulnerable to be affected by those around you a greater degree of anxiety.

The memory was affected, as some volunteers forgot their belongings. Also in the second test Logical-Mathematical volunteers from both groups A and B they were asked to repeat some of the possible answers to the test questions. Reflecting that those not taking the psychoactive substance had a negative effect of his memory.

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publish, or preparation of the manuscript.

## CONFLICT

None declared till date.

## REFERENCES

1. Zdrojewicz Z, Pypno D, Bugaj B, Cabala K. [Alcohol - when it's beneficial to your health?]. *Polski merkuriusz lekarski : organ Polskiego Towarzystwa Lekarskiego*. 2015;39(234):347-51
2. Han C, Ahn D, Hahm W, Nam J, Park Y, Lim S, et al. Serum Levels of Growth Factors in Alcohol-dependent Patients according to Comorbid Depressive Symptoms. *Clinical psychopharmacology and neuroscience : the official scientific journal of the Korean College of Neuropsychopharmacology*. 2016;14(1):43-8.
3. Berger L, Brondino M, Fisher M, Gwyther R, Garbutt JC. Alcohol Use Disorder Treatment: The Association of Pretreatment Use and the Role of Drinking Goal. *Journal of the American Board of Family Medicine : JABFM*. 2016;29(1):37-49
4. Peyret E, Delorme R. [Cannabis use among children and adolescents: impacts and consequences]. *Bulletin de l'Academie nationale de medecine*. 2015;198(3):579-88.
5. Epstein KA, Kumra S. Altered cortical maturation in adolescent cannabis users with and without schizophrenia. *Schizophrenia research*. 2015;162(1-3):143-52.
6. Batista EK, Klauss J, Fregni F, Nitsche MA, Nakamura-Palacios EM. A Randomized Placebo-Controlled Trial of Targeted Prefrontal Cortex Modulation with Bilateral tDCS in Patients with Crack-Cocaine Dependence. *The international journal of neuropsychopharmacology / official scientific journal of the Collegium Internationale Neuropsychopharmacologicum*. 2015;18(12).
7. Charney DA, Heath LM, Zikos E, Palacios-Boix J, Gill KJ. Poorer Drinking Outcomes with Citalopram Treatment for Alcohol Dependence: A Randomized, Double-Blind, Placebo-Controlled Trial. *Alcoholism, clinical and experimental research*. 2015;39(9):1756-65
8. Roy-Byrne P. Treatment-refractory anxiety; definition, risk factors, and treatment challenges. *Dialogues in clinical neuroscience*. 2015;17(2):191-206
9. Leduc C, Quoix E. Is there a role for e-cigarettes in smoking cessation? *Therapeutic advances in respiratory disease*. 2015.
10. Oakland A, McChargue D. Polysubstance use, social anxiety, and length of treatment for alcohol use disorders. *Journal of dual diagnosis*. 2014;10(1):3-8.
11. Kampman KM, Lynch KG, Pettinati HM, Spratt K, Wierzbicki MR, Dackis C, et al. A double blind, placebo controlled trial of modafinil for the treatment of cocaine dependence without co-morbid alcohol dependence. *Drug and alcohol dependence*. 2015;155:105-10
12. Giorgi I, Ottonello M, Vittadini G, Bertolotti G. Psychological changes in alcohol-dependent patients during a residential rehabilitation program. *Neuropsychiatric disease and treatment*. 2015;11:2989-96.
13. Danielsson AK, Lundin A, Agardh E, Allebeck P, Forsell Y. Cannabis use, depression and anxiety: A 3-year prospective population-based study. *Journal of affective disorders*. 2015;193:103-8
14. Rebecca Gilbertson, Robert Prather, and Sara Jo Nixon. Acute Alcohol administration and Placebo Effectiveness in older moderate drinkers: Influence on Cognitive Performance. *J Stud Alcohol Drugs*. 2010 May; 71(3): 345-350
15. Johannes G. Ramaekers, Eef L. Theunissen, Marjolein De Brouwer, Stefan W. Toennes, Manfred R. Moeller and Andgerhold Kauert. Tolerance and Cross-tolerance to neurocognitive effects of THC and Alcohol in heavy cannabis users. *Psychopharmacology (Berl)*. 2011 Mar; 214(2): 391-401