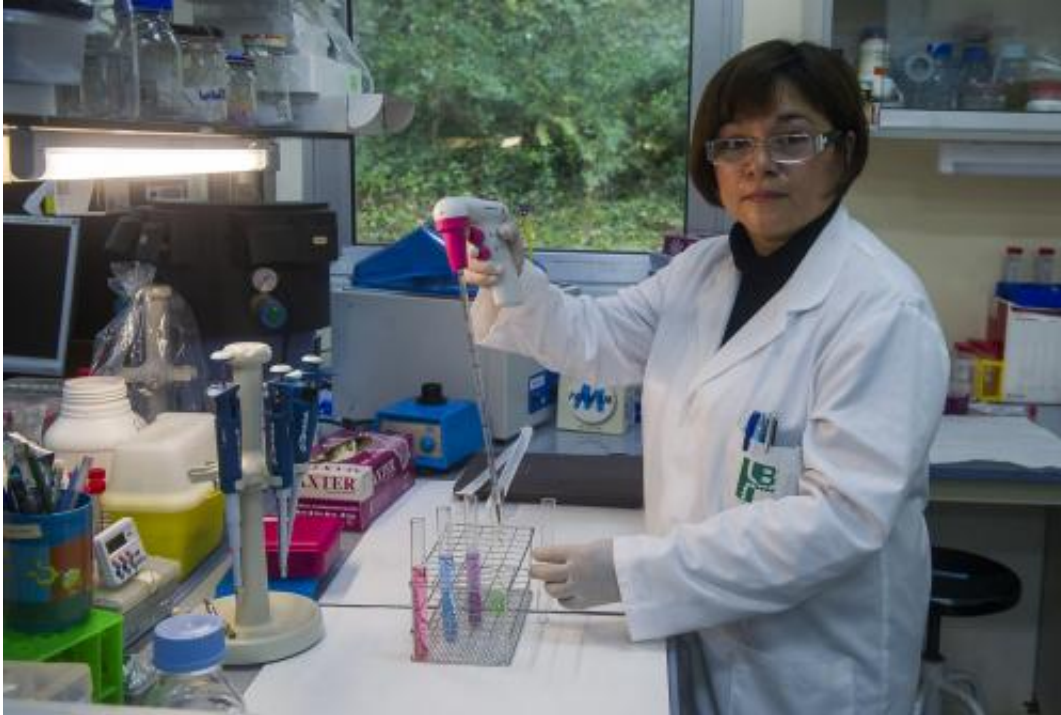


Alcohol leaves its mark on youngsters' DNA

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Weekend alcohol consumption may affect DNA. Credit: UPV/EHU

A study begun in Mexico with the collaboration of university students analysed the effect of weekend alcohol consumption on the lipids comprising cell membrane and its genetic material, i.e. DNA. Until now, the damage to the packaging of nuclear material in the early stages of alcohol abuse has never been documented, perhaps because most of the studies are done at later stages with people who have been consuming alcohol in an addictive way for many years. The results have been published in the journal *Alcohol*.

The harmful consumption of alcoholic beverages is a global problem and constitutes a significant health, social and economic problem. According to World Health Organisation data, alcohol is responsible for 2.5 million deaths a year worldwide and youngsters between the ages of 19 and 25 account for 320,000 of them; it causes harm that goes beyond the drinker's physical and mental health. The effects of alcohol abuse have been mostly studied in people who have been consuming alcohol for a long time and who therefore display symptoms ranging from liver damage to various types of cancer, depression and disorders of the nervous system. That is why this study is pioneering because it deals with the effect of alcohol on young, healthy people.

The idea of studying the oxidative effect of weekend [alcohol consumption](#) came about when the researcher Adela Rendón was lecturing in Clinical Biochemistry at the National Polytechnic Institute in Mexico. Many of the students turning up for class first thing on Monday morning displayed a lack of attention and general malaise due to having drunk alcohol over the weekend. The researcher suggested to them that they should study the effects on their bodies of the weekend consumption that the students regarded as harmless. The students got involved in the project in which Jesús Velázquez (Autonomous University of Nayarit, Mexico) also participated, and after completing the necessary administrative requirements and enlisting the help of various experts in surveys and analysis, the aim of the study was specified: oxidative damage caused by the consumption of alcohol beverages in young people.

The students were divided into two groups: the control group made up of the students who did not drink alcohol and the study group of those who drank at weekends. To make sure that they were healthy individuals without any other diseases or addiction that could alter the results of the study, they underwent blood tests. The age of the students ranged between 18 and 23 and the average consumption of alcohol was 118 g, a

litre and a half of beer, for example.

The activity of the alcohol enzyme dehydrogenase, responsible for metabolising ethanol into acetaldehyde, acetoacetate and acetone was measured. Oxidative damage is evaluated by a TBARS biochemical test (types that react to barbituric acid), and reflects the lipid peroxidation that affects the membrane due to the impact not only of the ethanol in the blood but also of the acetaldehyde produced by the action of the enzyme on the ethanol. Therefore, there are at least two means by which free radicals are formed and which can damage [cell membrane](#) integrity.

Although the researchers expected to find oxidative damage, they were surprised by the result, as Adela Rendón explained. "We saw that the ones who drank sustained twice as much oxidative damage compared with the group that did not consume alcohol," and they decided to continue with a test to assess whether the DNA was also affected: the comet test. They extracted the nucleus of the lymphocytic cells in the blood and subjected it to electrophoresis. "The interesting thing is that if the chromatin is not properly compacted, if the DNA has been damaged, it leaves a halo in the electrophoresis," which is called, "the comet tail". And in actual fact the chromatin of the exposed group left a small halo, greater than that of the control group. To be precise, the results revealed damage in 8% of the cells in the [control group](#) and 44% in the exposed group. Therefore, the exposed group had 5.3 times more damaged cells.

To be able to confirm the existence of considerable damage to the DNA, the comet tail must exceed 20 nm, and that was not the case.

"Fortunately," the researcher pointed out, "but the fact is, there should not have been any damage at all because they had not been consuming alcohol for very long, they had not been exposed in a chronic way." The means by which alcohol manages to alter DNA is not yet known. The next step would be as follows: to study the re-packaging of the chromatin and the behaviour of complex mechanisms like the histones in these

individuals.

"When we talk about youth [alcohol abuse](#), we are referring to youngsters who drink alcohol without having become addicted. Addiction involves a more complex issue socially and psychologically speaking. This is social [alcohol](#) abuse," said the researcher, "but which causes damage in the long term and you have to be aware of that."

More information: Rendón-Ramírez A., Cortés-Couto M., Martínez-Rizo A.B., Muñiz-Hernández S., Velázquez-Fernández J.B.: . Alcohol. 2013ko irailaren 27a. doi:pii: 934 13 00114 -6. www.ncbi.nlm.nih.gov/pubmed/24080163 Rendón Ramírez A., Gelover Reyes E., Couto M., Königsberg M., Castro P. Journal: Bioquimia ISSN 0185-5751. Bol.: 29; Zenbakia: Gehigarria; Hasierako orria: 84; Data: 2004 [www.medigraphic.com/pdfs/bioqu ... /bq-2004/bqs041d.pdf](http://www.medigraphic.com/pdfs/bioqu.../bq-2004/bqs041d.pdf)

Provided by Elhuyar Fundazioa

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