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Annals of Medicine

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/iann20

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To cite this article: Ana Luzio, Joana Couceiro, Carla Ferreira & Alexandre Quintas (2021) Assessing the content of a package of SGT-151 sold online, Annals of Medicine, 53:sup1, S75-S77, DOI: 10.1080/07853890.2021.1897425

To link to this article: https://doi.org/10.1080/07853890.2021.1897425

Published online: 28 Sep 2021.

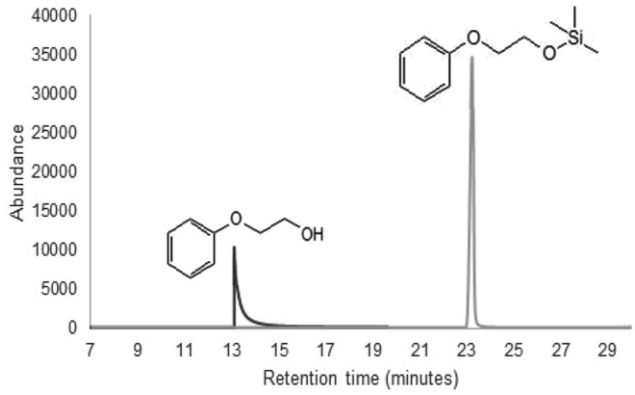

Figure 1. GC-MS chromatogram of PE (tr = 13.2) and PE-TMS (tr = 23.2) carried out in SIM mode using a GC MEGA-5 MS; 0.25µm, 0.32mm, 30 m capillary column.

Acknowledgements

This study was funded by Cooperativa de Ensino Superior Egas Moniz.

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DOI: 10.1080/07853890.2021.1897424

Assessing the content of a package of SGT-151 sold online

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ABSTRACT

Introduction: Synthetic cannabinoids (SCs) are novel psychoactive substances that mimic the effects of cannabis [1–3]. These products were sold *via* online shops and consisted of herbal mixtures sprayed with SCs [3]. Since then, a deluge of chemical variations of SCs has been occurring worldwide due to their synthesis in clandestine laboratories, often based on pharmaceutical research and patents, posing a growing challenge for authorities regarding regulation of these substances [1,3]. More recently, several highly potent compounds have emerged on the drug market, synthesised as stated in the patent application of Bowden and Williamson ("SGT-compounds"). These drugs are characterised by a cumyl substituent, which is attached to an indole, indazole or azaindole structure. One of the first cumyl-derivatives, CUMYL-PEGACLONE, was found in 2016 on the German drug market, being sold under the street name SGT-151 [1,2]. The present study aims to understand what is inside of a SGT-151 package sold in the internet as a 'research chemical'.

Materials and methods: The cannabinoid identification was based on its mass spectra using the Cayman database (Chemical C. Cayman Spectral Library, vol. v08302018). GC/MS was the technique used to analyse the compound using a MEGA–5 MS capillary column (0.25 µm, 0.32 mm, 30m). Chromatographic analysis was carried out under the following conditions: injection volume 1 µL and splitless injection at 280 °c. The initial oven temperature was 100 °C for 3 min, ramped to 310 °C at a rate of 30 °C/min and held at 310 °C for 10 min. The MS conditions were as follows: ionisation energy was set at 70 eV; acquisition was carried out in a scan mode range of *m/z* 30–450. Helium was used as the carrier gas. For purification, a HPLC/DAD, operated by Clarity software, was used with a reversed-phase column. The mobile phase was a solvent gradient system consisting of (A) 5% 10 mM ammonia format and (B) 95% acetonitrile, optimised to achieve the best resolution. The results were recorded at $\lambda = 252$ nm.

Results: Figure 1(A) shows the GC/MS chromatogram of SGT-151. It is clear the presence of a peak corresponding to SGT-151 and several other peaks from other compounds. It was not possible to identify the remaining peaks. Figure 1(B) shows a GC/MS chromatogram after purification of the package content.

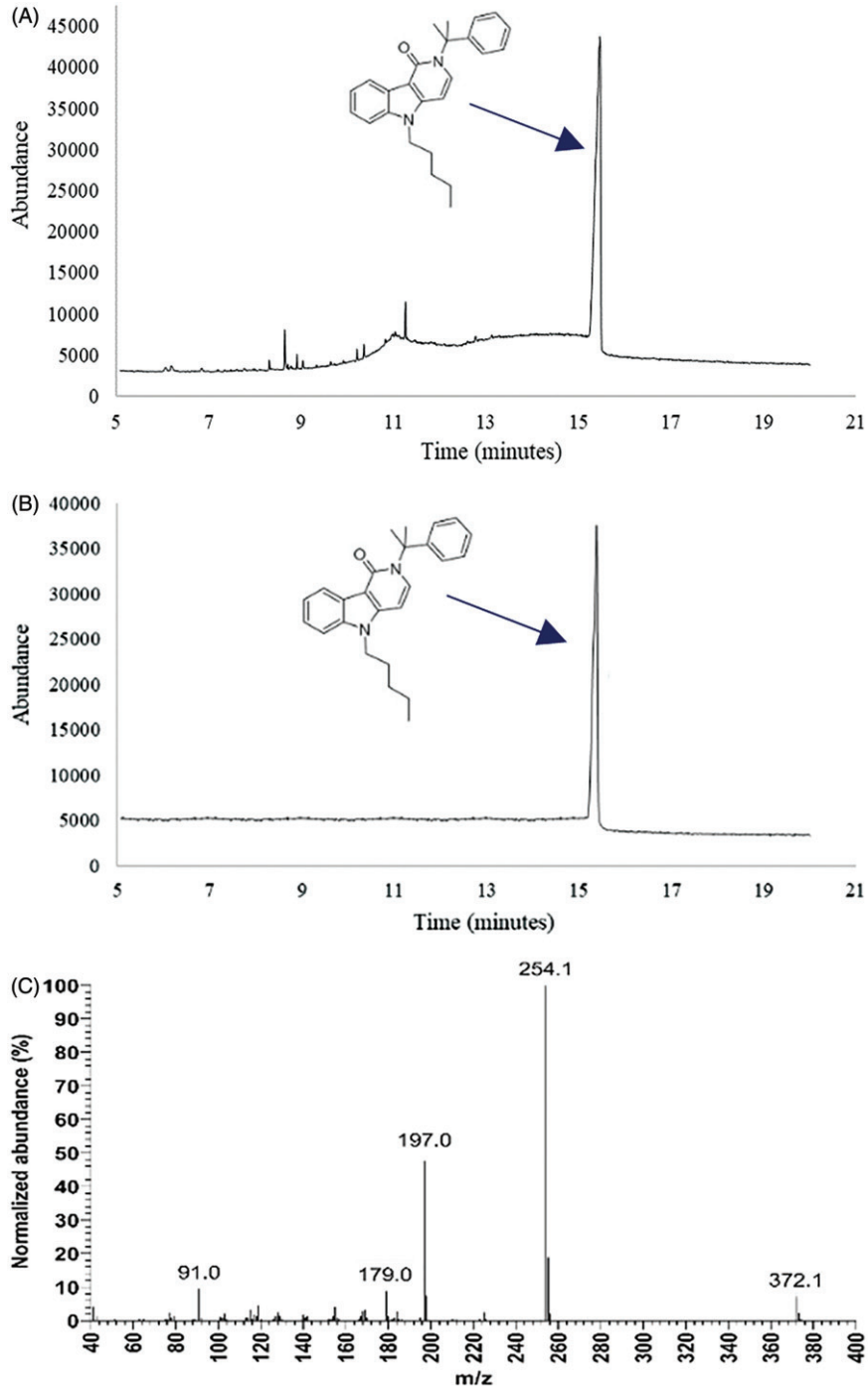

Figure 1. GC/MS analysis: chromatogram before (A) and after (B) purification by HPLC/DAD and mass spectrum (C).

Discussion and conclusions: The data gathered in this study shows that SGT-151 contains a significant amount of impurities. This working progress data is the initial step of a bigger project aiming to understand whether there are differences in the toxicity of pure and non-pure SGT-151 on human cell lines, once it is important to understand if the impurities may have any influence on the cytotoxicity, compared to substances in their pure form, since most of the times the substances that are sold on the streets are not 100% pure.

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DOI: 10.1080/07853890.2021.1897425

Genetic predisposition for aggressive behaviour related with dopamine and serotonin pathways – an overview

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ABSTRACT

Introduction: Aggression is a pervasive condition in human civilisation that sometimes emerge in human actions and consists in physical and verbal actions with the intention of causing harm to others. The term aggression can be divided in two types. Expressive aggression appears by provocation and it is usually driven by anger. Otherwise, instrumental aggression is performed as a premeditated mean to obtain something [1]. Aggressive behaviour is a complex process that involves the interaction between diverse factors, including genetic and environmental factors. The aim of this study is to give an overview of the several studies that have identified genetic alterations that may influence the behaviour of individuals. In terms of aggression, research is focussed on signalling pathways, especially involving dopamine and serotonin [2].

Materials and methods: Searches were made in the PubMed and B-on online databases. Search terms included "Genetic variants" combined with "Aggression" or "Aggressive behaviour". The search was limited to articles published on or after the 1st of January 2000 and in English-language peer-reviewed journal publications. Papers focussed on genetic variants that did not relate to the dopamine and serotonin pathways were excluded. Further literature sources were identified by following up internal citations and references. After articles analysis, 24 studies were considered in this literature review.

Results: The search for genes involved in impulsivity and aggression traits identified different candidate genes belonging to dopamine and serotonin pathways, of which *MAO-A*, *COMT*, *SLC6A4*, *SLC6A3*, *HTR1A*, *HTR1B*, *HTR2A*, *HTR2C*, *HTR6*, *DRD2*, *DRD4*, *TPH1* and *DBH* genes [3,4]. Results revealed the presence of 18 variants. The majority of these variants were SNPs, except 5 VNTR and 1 InDel.

Discussion and conclusions: Some studies found associations between several genetic variants and aggression. However, in many others such associations were unclear [2,3]. The fusion of genetics and psychology into these studies is essential. Notwithstanding, this literature review showed that all previous studies applied a limited psychological assessment of the subjects, leading to partial characterisation of the problem [4]. As such, it is critical to get a deeper insight into the association between aggressive behaviour and putative genetic factors by redefining the methodological strategies used for the psychological assessment.

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DOI: 10.1080/07853890.2021.1897426