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References

[1] Mogler L, Halter S, Wilde M, et al. Human phase I metabolism of the novel synthetic cannabinoid 5F-CUMYL-PEGACLONE. Forensic Toxicol. 2019;37(1):154–163.
[2] Mogler L, Wilde M, Huppertz LM, et al. Phase I metabolism of the recently emerged synthetic cannabinoid CUMYL-PEGACLONE and detection in human urine samples. Drug Test Anal. 2018;10(5):886–891.
[3] Angerer V, Mogler L, Steitz J-P, et al. Structural characterization and pharmacological evaluation of the new synthetic cannabinoid CUMYL-PEGACLONE. Drug Test Anal. 2018;10(3):597–603.

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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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References

[1] Anderson CA, Bushman BJ. Human aggression. Annu Rev Psychol. 2002;53:27–51.
[2] Qadeer MI, Amar A, Mann JJ, et al. Polymorphisms in dopaminergic system genes; association with criminal behavior and self-reported aggression in violent prison inmates from Pakistan. PLOS One. 2017;12(6):e0173571.
[3] Toshchakova VA, Bakhtiari Y, Kulikov AV, et al. Association of polymorphisms of serotonin transporter (5HTTLPR) and 5-HT2C receptor genes with criminal behavior in russian criminal offenders. Neuropsychobiology. 2017;75(4):200–210.
[4] Hemmings SMJ, Xulu K, Sommer J, et al. Appetitive and reactive aggression are differentially associated with the STin2 genetic variant in the serotonin transporter gene. Sci Rep. 2018;8(1):6714.

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Improving methodology to determine vitamin D_3 in food supplements

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ABSTRACT

Introduction: Nowadays, there is a trend to enrich food and food supplements (FS) with Vitamin D_3. Economic operators who places FS on the market does not have to perform running safety trials, but only to comply with the food safety regulations applicable in the European Union [1]. This scenario may present public health and legal issues. To overcome these challenges, it is mandatory to know accurately the amount of vitamin D_3 in FS and if it corresponds to the label value. HPLC methods are a preferential approach to determine accurately the content of vitamin D_3 in pharmaceuticals and supplements. Actually, HPLC/MS has become the technique of choice for vitamin D_3 determination in complex matrixes. Notwithstanding, this analysis must be preceded by time-consuming sample preparation. In fact, the success to measure accurately vitamin D_3 depends heavily in a reliable sample preparation. Moreover, it becomes even more critic when dealing with different formulations of vitamin D_3, such has gel pills, solid pills, liquid or cutaneous applications. There are literature validating methodology to determinate vitamin D_3 in various matrixes according to the International Conference on Harmonisation (ICH) guidelines by HPLC-UV [2]. However, this published study does not use an internal standard (IS). The internal standard is useful to improve the precision of quantitative analysis, removing the error of losing sample during sample preparation. Our aim is to test o-cresol as an internal standard to future validation the methodology.

Materials and methods: Vit D_3 present in FS was analysed by HPLC/DAD. Sample was spiked with internal standard (*o*-cresol) and liquid extraction coupled to an ultrasound bath was used has an extraction procedure. After a centrifuged step the supernatant was filtered. The separation was performed using a C18 column with a solvent gradient consisted in (A) 0.1% formic acid and (B) acetonitrile. The acquisition was performed on DAD-detector at 265 nm.

Results: Figure 1 shows a chromatogram of a FS containing Vit D_3. Two major peaks are present, corresponding to *o*-cresol (RT 5.45 min) and Vit D_3 (RT 11.20 min).

Discussion and conclusions: The results show the capacity of the chromatographic method to separate and resolve the two chromatographic peaks. These preliminary results show that o-cresol can be used as an internal standard to determine Vit D3 in FS, normalising the loss of Vit D3 during preparation step. Since in Europe and USA, the association of vitD toxicity with the use of FS has been described, this methodology will be useful to confirm the VitD composition stated on the label.

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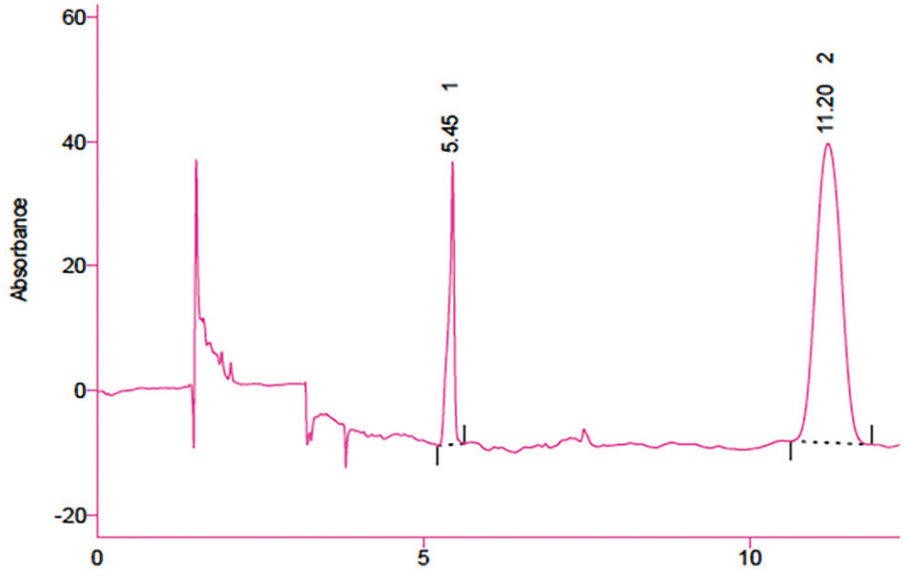

Figure 1. HPLC/DAD chromatogram of FD with IS (RT = 5.45 min) and Vit D_3 (tr = 11.20 min).