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Coffee Consumption-A Genetic Approach

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Introduction

Coffee is among the most widely consumed beverages in the world. The consumption of coffee has been receiving a lot of attention in regards its potential health benefits and risks as well. Caffeine and phenolic compounds such as chlorogenic acids are some of the most investigated constituents from coffee. It has been attributed various properties to those compounds such as central nervous system stimulant and antioxidants respectively. Coffee is in fact a very complex mixture that varies according with the origin of the beans and roasting process.

A new approach to look into possible effects of drugs is through genetic and genomic studies. Recently it was created The Coffee and Caffeine Genetics Consortium with the purpose to identify DNA loci associated with habitual coffee consumption. The technique utilized is called genome-wide meta-analysis (GWMA)[1]. Caffeine has been the center of attention in those studies [2,3], but the data that is being collected started showing a complex network of gene transcription regulation that will probably lead us to a broader picture of the profile of the regular coffee consumer.

It is a common belief that people avoid drinking coffee because of its effects.Caffeine content in coffee is responsible for the effects experienced, since the common complaints are hand shaking, increase in the heart rate and anxiety [4-6]. CYP1A2 accounts for approximately 95% of caffeine's metabolism and shows genetic polymorphism that reflects the variability in enzyme activity between individuals [7]. It displays a polymorphic genetic binomial distribution within the population. The homozygous wild type confers a fast metabolizer phenotype and the homozygous variant allele confers a slow metabolism of caffeine. The latter being the least predominant in the normal population[8]. In a pilot study, we evaluated whether the individuals that have the polymorphic variant genotype (1A2 *1F) for caffeine metabolism (CYP 1A2) would show higher levels of caffeine in plasma after consumption of one cup of coffee. Secondly, we used a questionnaire to examine if the caffeine metabolism phenotype status of an individual influences their habitual coffee consumption[6]. The results did indicate an inverse relationship between caffeine metabolism (CYP 1A2) and plasma caffeine levels but the sample population was too small to correlate with coffee consumption habits.

New studies are showing the involvement of many other loci within the genome, either located at the same fragment of CYP 1A2 gene, chromosome 15, but also at other fragments not necessarily at the same chromosome and in non-coding regions with regulatory effect on CYP 1A2 expression and other genes as well [5,9-16].

It is our goal to continue genetic studies of coffee consumption, which is considered as a genetic trait (NCBI database) such as DNA fragments rs16868941 (Chr.8); rs12148488, rs6495122, rs762551, rs2470893 (Chr.15) as well as caffeine trait (rs1051730; rs1378942 at Chr.15) [16,9,10]. It is our understanding that we are very close to start unveiling this intricate network of regulatory effects of specific genomic regions that are inherited from our parents and the environmental influence within coffee consumers and non-consumers.

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Competing Interests

The authors declare that they have no competing interests.

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