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Patient: Sample, Sally (1/27/64) **Provider: Jane Doe, MD** **ApoE Genotyping Test**

Sample Collected	Sample Received	Sample Tested	Test Reported
01/01/2025	01/03/2025	01/04/2025	01/06/2025

Sample type: **Super Floss – Full Mouth**

Test performed by: L. Douglas
Test ID: 58893

Your results indicate an ApoE genotype of: ApoE 3/4

ApoE 2/2: Rarest ApoE genotype with the lowest risk for Alzheimer's disease. $ApoE_{2/2}$ is most efficient at removing metals, including mercury from the body; but may clear dietary fat more slowly and therefore may be at greater risk for vascular disease, diabetes, and high cholesterol.

ApoE 2/3: A heterozygous hybrid of two alleles of the same gene. In this case, the associated risk for ApoE 2/2and ApoE 3/3 are combined and averaged.

ApoE 2/4: A heterozygous hybrid of two alleles of the same gene. In this case, the associated risk for ApoE 2/2 and ApoE 4/4 are combined and averaged.

ApoE 3/3: Most common ApoE genotype found in the human population, suggesting "average risk" of diabetes, neurodegenerative and cardiovascular disorders, including Alzheimer's disease, high cholesterol and stroke.

ApoE 3/4: A heterozygous hybrid of two alleles of the same gene. In this case, the associated risk for ApoE 3/3 and ApoE 4/4 are combined and averaged.

ApoE 4/4: Genotype most often in individuals with neurological, cerebral, and cardiovascular disease; the least efficient at removing mercury and heavy metals like barium, aluminum, lead, cadmium, arsenic, copper, and uranium from the body.

General Information

Apolipoprotein E (ApoE) is a molecule composed of protein and fats. The ApoE gene creates the precursors to cholesterol molecules, known as chylomicrons, which are the microscopic particles of emulsified fat found in our blood and lymphatic tissues. Chylomicrons are formed during the digestion of fats and are essential for the normal formation and digestion of the fatty proteins that are often referred to as "HDL" and "LDL" (high-density lipoproteins and low-density lipoproteins). ApoE helps carry and metabolize cholesterol and fat; both major components of all cells in the human body; particularly within the nervous system.

The human ApoE gene contains 299 amino acids residues which are joined together by flexible "hinges". There are three common forms of the ApoE gene: $ApoE_2$, $ApoE_3$, and $ApoE_4$; each with differences at amino acid 112/299 and 158/299: ($ApoE_2$ Cysteine112, Cysteine158); ($ApoE_3$ Cysteine112, Arginine158); and ($ApoE_4$ Arginine112, Arginine158). These differences alter the gene's protein and lipid structure. The amino acid Cysteine removes toxins and heavy metals from the central nervous system (CNS) more efficiently than the amino acid Arginine does.

Every person inherits two copies of the gene; creating one of six possible ApoE genotypes. These are $ApoE_{2/2}$, $ApoE_{2/3}$, $ApoE_{2/4}$, $ApoE_{3/3}$, $ApoE_{3/4}$, and $ApoE_{4/4}$. Defects in these variants have been linked to the body's ability to break down and remove cholesterol, triglycerides, mercury, and other heavy metals like barium, aluminum, lead, cadmium, arsenic, copper, and uranium.

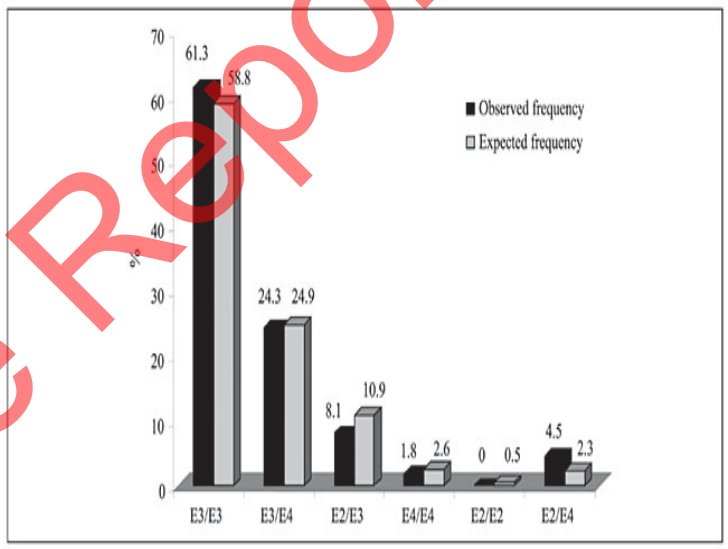

Figure 2. Distribution of observed and expected genotype frequencies of the apolipoprotein E gene polymorphism.

The ApoE gene has recently been studied for its role in several abnormal processes which are not directly related to fat, triglycerides, and cholesterol transport. These include amyotrophic lateral sclerosis (ALS); multiple sclerosis (MS); and other disorders including insomnia and depression. In 1993, $ApoE_4$ was identified as a genetic risk factor for Alzheimer's disease (AD), and may be associated with the accelerated development and progression of several other neurodegenerative diseases.

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