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Gene Frequencies of Pancreatic Amylase (Amy_2) in Western Germany (Düsseldorf Region)

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Summary. Amy_2 phenotypes were determined by agarose gel electrophoresis on samples from 590 unrelated individuals. The frequencies of the allelic genes were found to be Amy_2^1 0.9525, and Amy_2^2 0.0475.

Key words: Blood groups, Amy_2 – Amy_2 phenotypes – Amy_2 polymorphism – Amy_2 gene frequencies

Zusammenfassung. Bei 590 nicht verwandten Individuen wurden die Amy_2-Phänotypen mittels Agarose-Gelelektrophorese bestimmt. Folgende Genfrequenzen wurden gefunden: Amy_2^1 0.9525, Amy_2^2 0.0475.

Schlüsselwörter: Blutgruppen, Amy_2 – Amy_2-Phänotypen – Amy_2-Polymorphismus – Amy_2-Genfrequenzen

Genetic variation in human amylases was first described by Kamaryt and Laxova (1965). They detected genetic heterogeneity of the pancreatic amylase (Amy_2) and supposed an autosomal-codominant mode of inheritance. Recently, new investigations on Amy_2 isozymes were made by Rosenblum und Merritt (1978, urine) and by Kömpf et al. (1979, serum). The results of Kömpf et al. (1979) confirmed the formal hypothesis of two common codominant and autosomal alleles Amy_2^1 and Amy_2^2.

This paper presents data on the distribution of Amy_2 phenotypes and gene frequencies in a population of Western Germany (Düsseldorf region).

Material and Methods

Plasma from 590 apparently healthy and unrelated blood donors (without foreigners) were examined. Samples were stored at −30° C prior to analysis. For identification of salivary amylase (Amy_1) coelectrophoresis of plasma and diluted human saliva (1:100, v/v) was performed (not shown in Fig. 1). Gel electrophoresis was performed according to Kömpf et al. (1979) in 1%-agarose gel with some modifications. The bridge buffer consisted of 0.08 M tris, 0.06 M histidine

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Table 1. Distribution of Amy_2 phenotypes and gene frequencies in Western Germany (Düsseldorf region)

Phenotype	Observed	Expected
Amy_2 1	537	535.33
Amy_2 2-1	50	53.39
Amy_2 2	3	1.33
Total	590	

Gene frequencies

	This investigation	Kömpf et al. (1979) (Southwestern Germany)
Amy_2^1	0.9525	0.951
Amy_2^2	0.0475	0.048
Amy_2^3/Amy_2^4	—	0.001

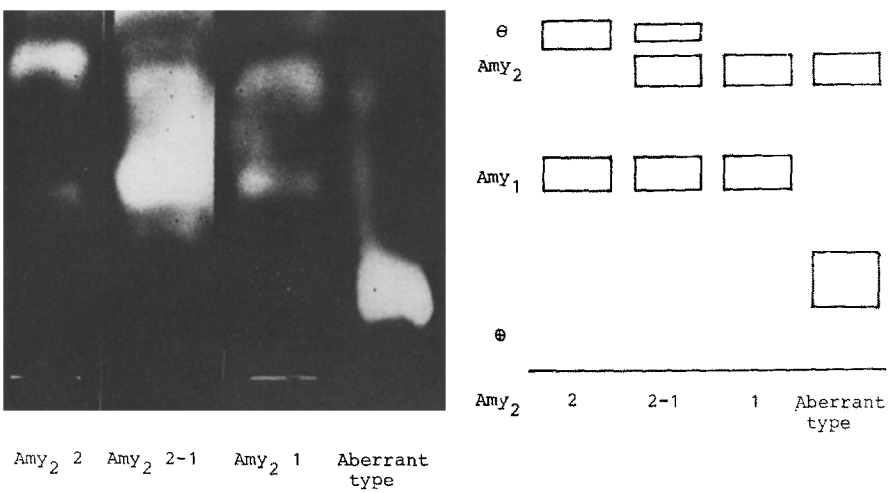

Fig. 1. Phenotypes of pancreatic amylase (Amy_2)

× HCl, 2.3 mM Ca-lactate (pH 7.6). The gel buffer was a 1:1 dilution of the bridge buffer with H_2O, containing 40% w/v sucrose. Electrophoresis was carried out on 210 × 350 × 3 mm gels for 17–18 h at 35 mA. After run, the gels were incubated in a barbital buffer pH 8.5 containing 1% starch, 0.5% NaCl, and 0.06% Ca-lactate for 1.5 h, rinsed with tap water, and stored at 37° C for about 2 h. The gels were then stained in Lugol's solution, showing amylase isozymes as white zones on a blue background.

Results and Discussion

Table 1 summarizes the results of our investigation, which are in good agreement with those of Kömpf et al. (1979). In our population (Düsseldorf region) we did not

find the rare phenotypes 3-1 and 4-1 as described by Kömpf et al. (1979, Southwestern Germany), probably due to the smaller population sample studied by us. One aberrant type of Amy_1 (?) was found in one case (Fig. 1), and cannot be explained at this time. The expected values shown in Table 1 were calculated on the basis of Hardy-Weinberg conditions.

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