

p-AMINOPHENOL EXCRETION AS AN INDEX OF ANILINE EXPOSURE

I. PACSÉRI

Országos Munkaegészségügyi Intézet, Budapest, Magyarország

In view of the fact that aniline is absorbed not only by inhalation but also through the skin, the aerial contamination alone is not an exact indication of exposure. It is necessary to find a biological test which reveals exposure and is independent of the route of absorption. It is conceivable that the *p*-aminophenol excretion in the urine, which is a well-known symptom of aniline intoxication, can fulfil this requirement. However, it is doubtful whether the *p*-aminophenol reaction will allow the degree of exposure to be assessed.

At the International Congress on Occupational Health held in Helsinki Dr Magos and the present author stated that methaemoglobin values above 0.5 g per cent indicate an increased, acute exposure. In experiments on the inhalation of aniline with ourselves as subjects, we found that *p*-aminophenol excretion is also a symptom of acute aniline exposure. With this information we carried out a study to relate the urine *p*-aminophenol values to methaemoglobinaemia in order to estimate the value of the *p*-aminophenol excretion as an index of the degree of aniline exposure. In the course of this study we determined the *p*-aminophenol in the urine, and the methaemoglobin in the blood, of persons working in aniline factories. The samples were taken at the end of the working shifts. Methaemoglobin was estimated in a Pulfrich photometer by the method of Magos and Szirtes¹, *p*-aminophenol was determined by the Greenberg and Lester² method as modified by I. Bátskor³.

It was found that, if the methaemoglobin values were less than 0.5 g per cent, the maximum *p*-aminophenol value was under 12 mg/l. of urine, the average being 2.08–2.7. When the methaemoglobin values were between 0.5–2.0 g per cent, the *p*-aminophenol in the urine varied from 8.0–62.5 mg/l. with an average of 39.44 ± 20.0 mg/l. Above 2.0 g per cent methaemoglobinaemia, the *p*-aminophenol values varied between 27.0–630.0 mg/l., with an average of 236.0 ± 210.0 mg/l.

Since the methaemoglobin values under 0.5 g per cent represent slight exposure, the corresponding figures of *p*-aminophenol excretion, *i.e.*, under 12.0 mg/l., also show slight exposure. The exposure is increased if the methaemoglobin values lie between 0.5–2.0 g per cent, and therefore the corresponding *p*-aminophenol values also represent an increased exposure. (The majority of the figures falls between 19–59 mg/l.) In those cases in which the *p*-aminophenol values exceed 50.0 mg/l., the exposure is certainly serious, since the methaemoglobinaemia is above the toxic limit. One must even reckon here with the possibility of poisoning, but it has to be

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mentioned that in some cases there was poisoning with a *p*-aminophenol excretion as low as 27.0, 32.0, or 45.0 mg/l.

It is obvious that there is a significant difference between the three groups, as has been proved by statistical analysis. From what has been mentioned above, we may draw the conclusion that the *p*-aminophenol test is a useful method of evaluating the degree of exposure, but it has to be pointed out that it can be applied in practice only as a group test.

References

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- ² L. A. Greenberg and D. Lester. "The metabolic fate of acetanilide and other aniline derivatives," *J. Pharmacol. Exptl. Therap.*, **88**, 87 (1946)
- ³ I. Bátskor. "Determination of *p*-aminophenol and aniline in urine and blood," *Lecture delivered at monthly meeting of Scientific Committee of Országos Munkaegészségügyi Intézet* (1953)