

type described above, they will not be entirely free from this effect. Creatinine excretion rate does vary between individuals—it is, for example, related to muscle mass—and also within an individual over time as, for example, in relation to physical activity.² Thus a urine sample from an individual who has a high excretion rate of creatinine will tend to have lower concentrations of other urinary solutes, if these are expressed per unit creatinine excretion. The low creatinine excretor will conversely tend to have apparently higher concentrations of other solutes even when rates of excretion per unit time of such solutes are equal. This effect gives rise to artificial positive correlations between urinary concentrations expressed per unit creatinine excretion. This is not to say that any such correlation observed is wholly due to this artifact, but rather that it will be difficult to disentangle a real from a spurious relationship.

In the study of Flack *et al* a statistically significant positive correlation was also found between MT in urine and cumulative exposure to Cd.¹ Individuals with “high” values of two or more of glucose, total protein, or beta-2-microglobulin in urine also had a significantly higher mean concentration of MT in serum. Since these relationships are not subject to the artificial causes described above, it seems likely that those observed between urinary concentrations are not wholly spurious either. By contrast, in a recent study of workers exposed to low levels of cadmium a statistically significant relationship was observed between urinary concentrations of cadmium and beta-2-microglobulin (expressed per unit creatinine excretion) but not between beta-2-microglobulin concentration in urine and cumulative exposure to cadmium.³ In this study it was considered more likely that the relationship between urinary concentrations was due to the effect described above.

We cannot see any wholly adequate way of avoiding this problem. Concentrations corrected by specific gravity will be subject to similar spurious correlations to those noted above. Use of specific gravity to correct one urinary concentration and expressing a second per unit creatinine excretion may possibly reduce the spurious correlation between them, since the “errors” of each method of correction may not be appreciably correlated. Alternatively it is possible to quantify the strength of the relationship that would be caused by this effect if, for example, the distribution of the rate of creatinine excretion between individuals were known. A relationship stronger than this would then be evidence for an effect additional to the spurious one. Effects of the type described will be present however relationships between urinary concentra-

tions are investigated. In particular, dichotomising one or both concentrations to give “normals” and “abnormals” does not avoid the problem.

More generally, such spurious correlations may also arise between any two independent variables in urine, each of which may be related to the functional status of the kidney, and we speculate that similar confounding may cause weak relationships between many biological variables. We should, therefore, be cautious in interpreting data exhibiting such relationships.

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Book review

Toxic Hazards of Rubber Chemicals. By AR Nutt. (Pp194 +xi, £25.) London and New York; Elsevier Applied Science Publishers, 1984.

This short book reports some risks to health that are known to be associated with rubber technology. The layout is excellent, and the scientific data appear at first sight to be exceptionally well marshalled and displayed.

Part II provides an annotated catalogue of substances used in the manufacture of rubbers, exhaustive compilations of the appropriate proprietary names, a note on their physical form, and succinct toxicity data, but there is no reference at all to the corresponding physical properties and characteristic chemical reactions, such as spot tests. Curiously, the only reference to the anils, which were mandatory ingredients of heavy duty rubbers during the second

world war, is made in part I at the beginning of chapter 3 which deals with "hazards from aromatic amines, polycyclic aromatic hydrocarbons, and nitrosamines."

This book would have benefited substantially from the incorporation of a straightforward account of the manufacturing processes and of the chemistry of rubber compounding. The missing material would have properly constituted part I and would have provided perspective for the rest of the narrative. This argument applies particularly to the reactive rubber constituents which are transformed in manufacturing into highly reactive and toxic products, which also contribute to the risks attendant on rubber manufacture. In the book, on the other hand, very brief reference to some of these important chemical changes is tucked away in chapter 3. Similarly, the reader meets methods of atmospheric monitoring (chapter 16), largely divorced from manufacturing conditions, except in so far as these may have been mentioned in the preceding text.

On the basis of such incorporation, part III might have contained a description of (a) exposures in the workplace, such as an extended version of chapter 16, including material from chapter 3, etc, (b) the biological effects—for example, chapter 2, which deals with "bladder cancer in the rubber industry," and chapter 3—and (c) epidemiological studies in human beings (chapter 1). Other explanatory material included by the author, might have been consigned to a glossary.

Notwithstanding the foregoing criticisms, this is a useful source book of information for workers in occupational medicine and industrial hygiene as well as those whose responsibilities bring them into contact with rubber chemicals and rubber operatives.

D E HATHWAY

Notice

12th International Colloquium on the Prevention of Occupational Risks in the Construction Industry, Hamburg, 17–20 September 1985

The 12th International Colloquium on the occasion of the centenary, on 1 October 1985, of the creation of the Bau-Berufsgenossenschaften in Germany (insurance against occupational risks) is organised by the Arbeitsgemeinschaft der Bau-Berufsgenossenschaften of the Federal Republic of Germany in cooperation with the International Section of the ISSA for the Prevention of Occupational Risks in the Construction Industry. The purpose of the colloquium is to promote the exchange of experience and information in such fields where problems related to safety and health of construction workers have not yet found a satisfactory solution. The general theme of the colloquium will be safety in construction work: human task and economic factor. The official languages of the colloquium are English, German, and French. For additional information please apply to the Secretariat of the Colloquium, Bau-Berufsgenossenschaft Hamburg, Holstenwall 8–9, D-2000 Hamburg 36 (Federal Republic of Germany) or to the Secretariat of the International Section.



Toxic Hazards of Rubber Chemicals

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