

致癌物是氯乙烯，測量它的暴露是關鍵。
若沒有暴露，測量TdGA沒有意義。

- 以往研究及ACGIH提出建議，當環境中氯乙烯濃度低於恕限值時，代謝物TdGA與氯乙烯之相關性是不具任何探討意義。

Urinary Thiodiglycolic Acid Levels for Vinyl Chloride Monomer-Exposed Polyvinyl Chloride Workers

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Thiodiglycolic acid (TdGA) is the major metabolite of vinyl chloride monomer (VCM) detected in human urine. Although urinary TdGA has been reported to be associated with ambient VCM exposure, the relationship between urinary TdGA and a low level of air VCM is not clear. Questionnaires were administered to 16 polyvinyl chloride manufacturing workers to obtain a detailed history of occupation and lifestyle. For each worker, personal air monitoring for VCM was performed and a time-weighted average for VCM exposure was calculated. The urinary TdGA levels at the end of a work shift, and at the commencement of the next shift, were also assessed for each worker. Urine analysis revealed that TdGA levels at the beginning of the next shift were higher than those at the end of that shift. Workers experiencing a VCM exposure greater than 5 ppm in air revealed a urinary TdGA level significantly greater than those experiencing a VCM exposure of less than 5 ppm ($P < 0.05$). The best fit of regression for urinary TdGA on air VCM was $Y = 1.06 + 0.57X$ for urine collected at the commencement of the following work shift, where X is the air VCM concentration and Y is the urinary TdGA concentration ($r^2 = 0.65$, $P < 0.01$). We conclude that the urinary TdGA level is best detected at the commencement of the next shift and that it can be used as an exposure marker for polyvinyl chloride workers when the air VCM level to which they are exposed is greater than 5 ppm. (J Occup Environ Med. 2001;43:934-938)

Vinyl chloride monomer (VCM) exposure has been associated with angiosarcoma of the liver and is classified as a Group 1 carcinogen by the International Agency for Research on Cancer (IARC).¹ To protect VCM-exposed workers from developing diseases associated with their VCM exposure, the environmental VCM level to which they are (occupationally) exposed is periodically monitored to ensure that the air concentrations are below permissible levels.² Environmental monitoring, however, may not reflect the actual worker exposure level because of differences in VCM levels for individual workers. To measure the actual dose of VCM absorbed by a worker, methods to detect urinary TdGA, a major metabolite of VCM in human urine, have been developed.³⁻⁶ Although a VCM-exposed worker's urinary TdGA level has been reported to be associated with his or her air VCM exposure level, these studies have focused on the procedures necessary for detecting the presence of TdGA in urine, and they provide limited information in



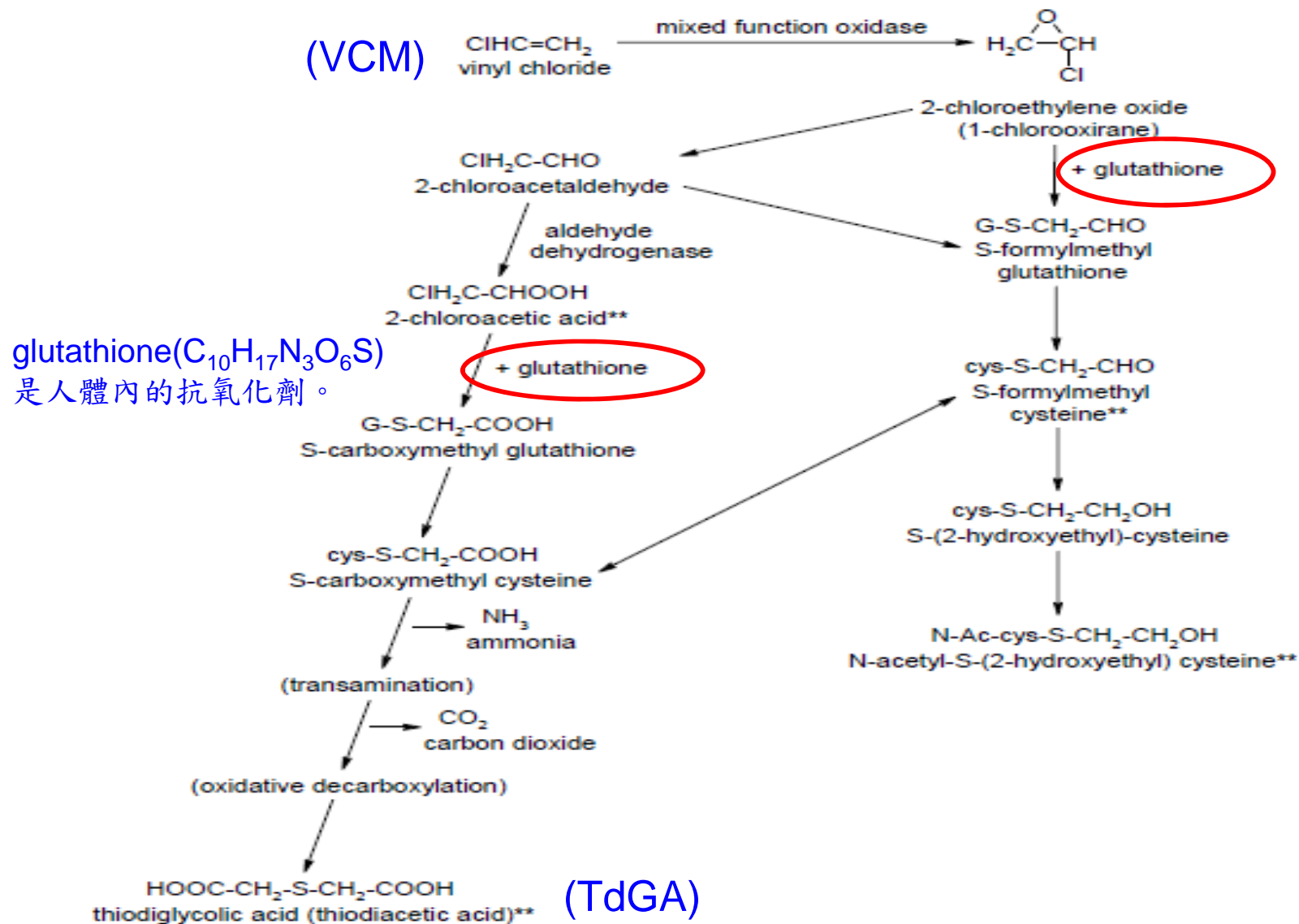
Guidance for Interpreting the BEI[®] Notation

- Refers to existence of a Biological Exposure Index (BEI[®]) for the agent
- Biomonitoring serves as a complement to exposure assessment by air sampling
- Most BEIs[®] based on direct correlation to TLV[®] (conc. of determinant at TLV[®] exposure)
- BEIs[®] used as guidelines in evaluation of potential hazards

資料來源：<https://www.acgih.org/tlv/TLVNotesDesign.pps>

VCM在人體內代謝過程中產生TdGA之路徑

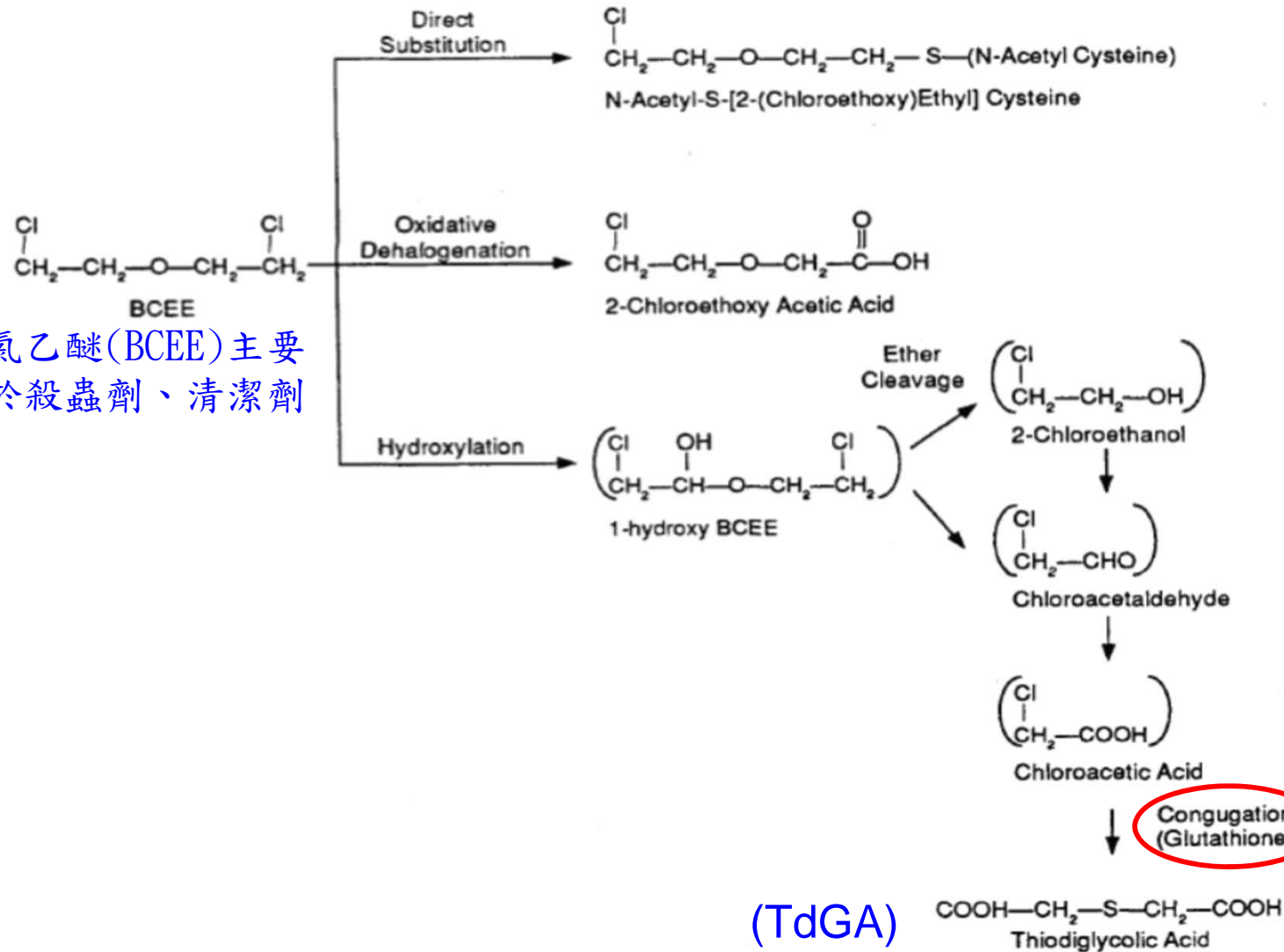
Figure 3-3. Proposed Metabolic Pathways for Vinyl Chloride*



*Derived from Bolt et al. (1980); Cogliano and Parker (1992); Hefner et al. (1975b); Park et al. (1993); and Plugge and Safe (1977).

二氯乙醚(BCEE)在動物體內代謝過程中產生TdGA之路徑

二氯乙醚(BCEE)主要用於殺蟲劑、清潔劑



glutathione(C₁₀H₁₇N₃O₆S)是動物體內的抗氧化劑。