• 系統編號	RC8901-0150
• 計畫中文名稱	磷化氫在體內試驗所引起氧化性毒害之探討
• 計畫英文名稱	Phosphine-Induced Oxidative Damage in vivo
• 主管機關	行政院國家科學委員會
• 計畫編號	NSC88-2314-B038-148
• 執行機構	台北醫學院公共衛生系
• 本期期間	8801 ~ 8807
• 報告頁數	0 頁
• 使用語言	英文
• 研究人員	徐景宏 Hsu, Ching-Hung
• 中文關鍵字	膦；氧化損傷；體內；褪黑激素
• 英文關鍵字	Phosphine；Oxidative damage；in vivo；Melatonin
• 中文摘要	磷化氫是一種高毒性氣體。它是一廣泛使用之工業物品,其主要用途包括在半導體製造上做爲摻雜劑及農產品薰蒸劑、滅鼠劑(可經由磷化鋁、磷化鎂或磷化鋅潮解而產生)。由於鹵化碳氫化物類殺蟲劑及甲基溴的限用,再在加上半導體產品的普及化,未來預期會提高磷化氫之使用量。以往相關研究顯示磷化氫可造成昆蟲、哺乳動物及哺乳動物細胞株之氧化性傷害。 本研究探討磷化氫對大白鼠造成氧化性傷害及使用抗氧化劑保護之情形。Wistar 雄性大白鼠以腹腔注射 2mg/kg 的磷化氫,30 分鐘後,將大白鼠殺死取出腦、肝及肺,分析其麩胺基硫及脂質過氧化產物變化情形,並於腦及肝中觀察其 8-hydroxydeoxyguanosine(8-OH-dGuo)之含量。結果發現磷化氫明顯下降麩胺基硫之濃度、0 明顯增加脂質過氧化:腦部改變值爲 36-42%,肺改變值爲 32-38%,肝改變值爲 19-25%;腦及肝中的 8-OH-dGuo 亦顯著增加:腦部增加 70%、肝則增加 39%。 另一組大白鼠則於注射磷化氫 30 分鐘前,先投予抗氧化劑:褪黑激素 10mg/kg、維生素 C 30mg/kg 及.beta.-胡蘿蔔素 6mg/kg。結果發現磷化氫所引起氧化性傷害被褪黑激素明顯或完全抑制,維生素 C 及.beta.-胡蘿蔔素則活性較弱甚至無作用。本研究證實磷化氫造成大白鼠的腦、肝及肺氧化傷害,褪黑激素對其具相當之保護功能,此外易反應之含氧物種在磷化氫之基因毒性上扮演了相當重要的角色。
• 英文摘要	Phosphine (PH/sub 3/), from hydrolysis of aluminum, magnesium and zinc phosphide, is an insecticide and rodenticide. Earlier observations on PH/sub 3/-poisoned insects, mammalian cell lines and humans led to the proposed involvement of oxidative damage in the toxic mechanism. This investigation focused on PH/sub 3/-induced oxidative damage in rats and antioxidants as candidate protective agents. Male Wistar rats were treated ip with PH/sub 3/at 2mg/kg. Thirty min later the brain, liver, and lung were analyzed for glutathione (GSH) levels and lipid peroxidation (as malondialdehyde and 4-hydroxyalkenals) and brain and lung for 8-hydroxydeoxyguanosine (8-OH-dG). PH/sub 3/ caused a significant decrease in GSH concentration and elevation

in lipid peroxidation in brain (36-42%), lung (32-38%) and liver (19-25%) and significant increase in 8-OH-dG in brain (70%) and liver (39%). Antioxidants administered ip 30 min before PH/sub 3/ were melatonin, vitamin C and .beta.-carotene at 10, 30 and 6mg/kg, respectively. The PH/sub 3/-induced changes were significantly or completely blocked by melatonin while vitamin C and .beta.-carotene were less effective or inactive. These findings establish that PH/sub 3/induces and melatonin protects against oxidative damage in the brain, lung and liver of rats and suggest the involvement of reactive oxygen species in the genotoxicity of PH/sub 3/.