

职业性铅接触者红细胞嘧啶 5'-核苷酸酶、超氧化物歧化酶活性测定

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提 要 本文对 16 名铅接触者、14 名铅中毒者和 20 名非铅接触者进行了红细胞嘧啶 5'-核苷酸酶 (P5N) 和超氧化物歧化酶 (SOD) 活性测定, 并进行统计分析。结果表明铅可抑制红细胞 P5N 的活性, 其抑制程度与铅毒效应密切相关: 对照组 (非接触组) 活性范围 5.6~14.2, 平均 $10.2 \mu\text{mol}$ 尿嘧啶/h/Hbg/dl; 接铅组活性范围为 2.3~7.2, 平均为 $4.4 \mu\text{mol}$ 尿嘧啶/h/Hbg/dl, 与非接触组比较 $P < 0.001$; 铅中毒组活性范围 1.5~3.7, 平均 $2.5 \mu\text{mol}$ 尿嘧啶/h/Hbg/dl, 与接铅组比较 $P < 0.001$ 。SOD 活性三组间无差别。

关键词 铅 毒效应 红细胞嘧啶 5'-核苷酸酶 超氧化物歧化酶

近年来国外在铅的生物监测方面开展了一些酶学指标的研究, 如精氨酸酶 (Arginase), 超氧化物歧化酶 (SOD), 红细胞嘧啶 5'-核苷酸酶 (P5N) 等。为寻找有效的铅接触生物监测的酶学指标, 我们对铅中毒、铅接触和非铅接触者的 P5N、SOD 活性进行测定分析。

1 对象与方法

1.1 对象

接铅组为某蓄电池厂接铅涂填工 16 名, 年龄 27~47 岁; 铅中毒组为该厂铅中毒患者 14 名, 年龄 22~37 岁。对照组为某蓄电池分厂

统计、劳资职工 20 名, 年龄 30~42 岁。三组人员的社会经济条件相仿。

1.2 方法

1.2.1 红细胞 P5N 活性测定: 取静脉抗凝血, 用高效液相色谱仪进行分析测定^[1]。

1.2.2 SOD 活性测定: 取静脉血, 用亚硝酸盐法测定^[2]。

2 结果

对照组、接铅组、铅中毒组红细胞 P5N、SOD 活性测定结果见下表。红细胞 P5N 三组间有显著差异, SOD 三组间无差别。

红细胞 P5N、SOD 活性测定结果

| | 红细胞 P5N (μmol 尿嘧啶/h/Hbg/dl) | | SOD (亚硝酸盐单位/ml/Hbg/dl) | |
|------|---|-------------------------|------------------------|-------------------------|
| | <i>n</i> | $\bar{X} \pm \text{SD}$ | <i>n</i> | $\bar{X} \pm \text{SD}$ |
| 对照组 | 20 | 10.2 ± 2.3 | 20 | 208.4 ± 27.5 |
| 接铅组 | 16 | 4.4 ± 1.6 | 16 | 195.3 ± 20.9 |
| 铅中毒组 | 14 | 2.5 ± 0.7 | 14 | 209.1 ± 19.9 |

3 讨论

铅中毒主要损害造血、神经和肾脏三个系统。铅还可以与酶或蛋白质中的许多带负电荷的基团如巯基、羧基、咪唑基等结合, 使细胞内许多代谢途径受到影响, 如能量的生成, 蛋白质和核酸的合成等, 从而使体内某些酶活性

发生变化。在血液中 90% 以上的铅与红细胞结合, Buc^[3] 等发现铅可抑制红细胞 P5N 活性, 其抑制机理尚未阐明。本次测定结果, SOD 活性对照、接铅、铅中毒三组间无差别, 红细胞 P5N 活性三组间有明显差别, 显示出该酶活性与铅毒效应有直接的关系。对照组 P5N 活性范围

5.6~14.2, 平均 $10.2\mu\text{mol}$ 尿嘧啶/h/Hbg/dl, 接铅组P5N活性范围2.3~7.2, 平均 $4.4\mu\text{mol}$ 尿嘧啶/h/Hbg/dl; 接铅组与对照组比较 $t=8.28$, $P<0.001$, 有极为显著的差别。铅中毒组活性范围1.5~3.7, 平均 $2.5\mu\text{mol}$ 尿嘧啶/h/Hbg/dl; 与接铅组比较 $t=4.1$, $P<0.001$, 两组间亦有极为显著的差别; 与对照组比较 $t=12.8$, $P<0.001$, 差别也极为显著。本文结果提示红细胞P5N活性可作为铅接触水平的有效指标。据文献报道^[5]职业性接触铅和汞的工人中该酶活性并不受抑制。

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Ⅲ期矽肺长期误诊1例报告

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Ⅲ期矽肺在临床上往往误诊为肺炎、肺癌。现将我院所收治的一例Ⅲ期矽肺长期误诊的病例报告如下。

患者, 男, 50岁。于1960~1961年、1969~1971年在某部队参加国防施工, 打山洞, 为干式作业, 粉尘浓度较大, 无防尘措施。1982年体检时发现左肺下区有边缘模糊阴影, 疑似肺癌, 到沈阳某院住院6个月, 出院诊断: 肺良性假瘤。1986年因感冒、发热复查胸片, 肺内阴影扩大, 又到结核病院住院, CT提示肺癌, 排除职业病。因患者状态较好, 继续工作。1992年开始胸闷、气短加重, 并伴有胸痛, 收入我院。

查体: $T36.3^{\circ}\text{C}$, $P60$ 次/分, $BP13.0/8.0\text{kPa}$, 发育正常, 营养中等, 精神佳。全身表浅淋巴结不肿大, 颈软, 气管居中, 甲状腺不大, 无颈静脉怒张及颈动脉异常搏动。胸廓对称, 肺肝界在右锁骨中线第七肋间, 两肺呼吸音减弱。心界不大, 心率60次/分, 律齐, 无杂音。腹软, 肝、脾未触及, 四肢无异常, 生理反射存在, 病理反射未引出。

实验室检查: $\text{Hb}122\text{g/L}$, $\text{WBC}5.28\times10^9/\text{L}$, 尿常规正常, 心电图示窦性心动过缓, 心率58次/分。胸片: 1982年6月8日, 左肺下区有密度淡薄 $3\times4\text{cm}$ 边缘模糊阴影; 1986年7月7日左肺下区阴影增大, 密度稍高为 $3\times6\text{cm}$, 右肺中下区可见散在点状影; 1992年7月25日左肺上区可见 $4\times6\text{cm}$ 团块影, 中下区可

见 $4.5\times9\text{cm}$ 团块影, 边界较清楚, 形似马蹄, 右肺上区外带 $3\times3\text{cm}$ 阴影, 下区可见 $5\times4\text{cm}$ 团块影, 双肺均有密度一致, 大小不等点状阴影, 左膈肌粘连。诊断: Ⅲ期矽肺。

讨论: 本例误诊原因: (1) 忽略了职业史, 该患因为接触石英粉尘, 用风钻机干打眼, 粉尘浓度大, 个人防护条件差, 故病情进展快。由1982年肺内一块阴影到1992年肺内数块矽结节融合影, 且1986年以后没有跟踪观察胸片改变, 以致到1992年才确诊为Ⅲ期矽肺。(2) 本例为进展较快的矽肺, 缺乏典型由Ⅰ→Ⅱ→Ⅲ期的演变过程。(3) 综合医院医生对矽肺大阴影与周围性肺癌及肺结核大块实变的特点缺乏认识。矽肺大阴影多在Ⅰ、Ⅱ期的基础上逐渐形成, 两肺对称, 呈纵轴走行, 跨叶分布, 少数矽肺的大块阴影表现不典型, 可以在一侧肺区出现, 但其边界可发现周边性肺气肿征, 而周围性肺癌易出现凹迹、脐征、分叶状、边缘毛糙等。追踪观察矽肺块影形态变化慢, 而肺癌病变进展快。结核大块干酪化, 密度高但不均匀, 按肺叶分布, 实变外有不规则播散病灶, 高千伏或体层摄影可能显示其中的新鲜空洞。本例自1982年出现肺内有边缘不清楚密度稍高阴影, 经抗炎对症治疗, 肺内阴影不但不缩小, 反而越来越多、越来越大, 结合职业史, X线有上述特征, 故确定为Ⅲ期矽肺并不困难。

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Abstracts of Original Articles

Investigation on Diagnostic Indices and Diagnostic Criteria in Chronic Lead Poisoning

Zhang Jimei, et al

Under the centralized quality control program, a nationwide cohort study on occupational lead poisoning was done in the year 1991 to 1993. The lead-exposed group comprised 1600 workers employed at different lead plants and smelters in 12 selected cities, and 1588 nonlead-exposed healthy persons served as a reference group. By the study, the commonly used diagnostic indices in chronic lead poisoning were statistically analyzed and evaluated. According to the statistical data and discriminant analysis with Bayes formula, regression analysis, and comparing with previous studies, the Normal Reference Value (NRV), Biological Exposure Limit Value (BELV) and Diagnostic Value (DV) of blood lead (PbB), urinary lead (PbU), erythrocyte protoporphyrin (EP), zinc protoporphyrin (ZPP) and urinary δ -ALA, had been suggested. Depending on the "Three Values" mentioned above, a discussion dealing with the revision on the National Diagnostic Criteria for Occupational Lead Poisoning of China (GB 11504-89) was also made in the paper.

Key words: lead, lead poisoning, diagnostic indices, diagnostic criteria

Study on the Oral DMPS Provocative Test for Mercury

Xu Zhaofa, et al

The DMPS provocative test (300mg p. o.) for mercury was given to five different groups exposed to mercury, persons with dental amalgams, dental technicians, dentists, skin lotion makers and skin lotion users, and three corresponding control groups. Urine samples of 6 hours before and 6 hours after DMPS administration were collected and the urinary mercury levels were determined by cold vapor atomic absorp-

tion spectrophotometry. The results indicated that the mean urinary mercury levels in the five groups exposed to mercury were significantly higher than those of corresponding referent groups both before and after DMPS administration. The mean urinary mercury values excreted within 6 hours after DMPS were also increased significantly in all groups compared with those before DMPS administration. The administration of the DMPS provocation in five groups exposed to mercury resulted in 24, 87, 48, 44 and 86-fold increase, respectively, of 6 hour urinary mercury compared with those during the 6 hour period before the administration of this chelating agent. The increase in urinary mercury from the DMPS provocative test was 18, 24 and 37-fold in the three corresponding referent groups respectively. The results suggested that the oral administration of DMPS was a good measure for the removal of mercury from the body and it was very helpful to the prevention, diagnosis and treatment of mercury poisoning.

Key words: sodium 2,3-dimercaptopropane-1-sulfonate, provocative test for mercury exposure, urinary mercury

The Activity Determination Activity of the Erythrocyte Pyrimidine 5'-nucleotidase and Superoxide Dismutase in Occupational Lead Exposed Workers

Li Zhong, et al

The present study determined the activity of erythrocyte pyrimidine 5'-nucleotidase (P5N) and superoxide dismutase (SOD) in 16 lead-exposed workers, 14 lead poisoning workers and 20 non lead exposed workers (the controls). The results showed that the P5N activity was significantly inhibited by lead, which was closely related to the toxic effect of lead; the activity in control group ranged from 5.6 to 14.2 μmol

uridine/h/gHb/dl with a mean value of 10.2, the lead-exposed group ranged from 2.3 to 7.2 μmol uridine/h/gHb/dl with a mean value of 4.4, significantly lower than that of the control group ($P < 0.001$), the activity of P5N in lead poisoning group ranged from 1.5 to 3.7 μmol uridine/h/gHb/dl with a mean value of 2.5, that was significantly lower than that lead-exposed group ($P < 0.001$). The SOD activity did not show any obvious difference among three groups. It was suggested that the P5N activity might be one of the most liable indicators for evaluating the level of lead exposure.

Key words: lead, toxic effect, erythrocyte pyrimidine 5'-nucleotidase (P5N), superoxide dismutase

A Study on the Content of MDA and Activity of Antioxidizing Enzymes in Blood of Welders

Wang Xuejun, et al

The content of MDA and activities of antioxidizing enzymes in blood of 58 welders were studied. The MnO_2 concentration in air of workshop was $0.13 \sim 0.33 \text{ mg/m}^3$ on average annually. The results showed that the MDA level in blood of welders exposed to manganese was $7.80 \pm 2.05 \text{ mol/L}$, and $5.52 \pm 3.18 \text{ mol/L}$ in the control group. The difference between two groups was significant ($P < 0.01$). The activities of GSH-Px, CAT, SOD were not significantly different from those of the control group. A research in different standing groups it was found that the GSH-Px, SOD levels in welders with exposure duration > 0 years was significantly lower than those of the control group ($P < 0.05$) while the GSH-Px, SOD levels welders in 10-years exposure group began to increase to the level of the control group, showing a positive correlation between the GSH-Px, SOD activity and the duration of manganese exposure ($r = 0.499, 0.364, P < 0.01$).

Key words: lipid peroxidation, CAT, SOD, GSH-Px

Match Study on Impairment of Lung Function

in Steel Foundry Workers and Iron Foundry Workers

Xu Xueying, et al

Lung function test and match analysis was carried out on 52 pairs steel foundry workers and iron foundry workers to exclude the effects of age height, and smoking, etc. The results showed that the steel foundry workers had lower levels of FVC, $\text{FEV}_{1.0}$, $\text{FEF}_{25 \sim 75}$, V_{75} , V_{50} , V_{25} than that of iron foundry workers. Match study revealed that at same exposed years and same accumulative exposed quantities when exposed years were less than 20 or accumulative exposed quantities were less than 500 mg/year , there were no difference in lung function between steel and iron foundry workers; but when exposed years were more than 20 or accumulative exposed quantities were more than 500 mg/year , the lung function indices of steel foundry workers were significantly lower than that of iron foundry workers.

Key words: dust, lung function, match study

A Study on the Risk Factors for Female Breast Cancer in Mining District

An Lianzhen, et al

In order to study the risk factors associated with female breast cancer in coal mining district. A 1:2 matched case-control study was conducted from 1991 to 1993 in Ping Ding Shan mining district in He Nan province. The results of multivariate conditional logistic regression analysis showed that history of breast diseases, number of births, menstrual disorder, family history of breast cancer were major risk factors for breast cancer in this population. Their adjusted attributable risks were 0.1487, 0.4781, 0.1282, 0.0791 respectively. Summary population attributable risk for four factors of breast cancer was 0.6952.

Key words: breast cancer, logistic regression, risk factor, population risk