

有显著统计学意义的改变($P < 0.001$), 提示兴安升麻是个潜在的抗突变剂。

关键词 兴安升麻; SCE频率; 抗突变; 丝裂霉素C(MMC); 突变

THE EFFECT OF CIMICIFUGA DAHURICA SAPONINS ON SCE FREQUENCY INDUCED BY MMC IN PERIPHERAL LYMPHOCYTES OF HUMAN

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Abstract The effect of *Cimicifuga dahurica* Saponins on SCE frequency induced by MMC in peripheral lymphocytes of healthy human was studied. There were six experimental groups, i. e. 10.94 μ g/ml, 43.75 μ g/ml, 175.0 μ g/ml *Cimicifuga dahurica* Saponins, DMSO control group, MMC positive control group and negative control group, compared with each of three control groups, all three *Cimicifuga dahurica* Saponins groups showed dramatic changes ($P < 0.001$). The fact that *Cimicifuga dahurica* Saponins effectively inhibits the SCE frequency induced by MMC in peripheral lymphocytes of normal human indicated that *Cimicifuga dahurica* Saponins is a potential antimutagenic agent.

Key words *Cimicifuga dahurica*; Sister Chromatid Exchange-frequency; Mitomycin C(MMC); Mutagenesis; Anti-mutagenesis.

兴安升麻(*Cimicifuga dahurica*)为毛茛科植物,以根状茎入药,其传统疗效为解“毒”,即对中医辨证定性为“毒”的情况,如“温毒”、“火毒”、“疫毒”和误食某些食物或药物等情况均有一定的解毒功效⁽¹⁾。现代医学研究表明兴安升麻具有较强的抗炎⁽²⁾,抗突变⁽³⁾作用。为了进一步从细胞染色体水平阐述其抗突变作用,进行了人体外周血细胞姐妹染色单体交换(SCE)试验。

材料和方法

1. 药品 兴安升麻总皂甙(*Cimicifuga dahurica* Saponins, Cd-S)由本所化学室提供,为棕黑色固体粉末。用时用 DMSO 配制,终浓度分别为 10.94 μ g/ml、43.75 μ g/

ml、175.00 μ g/ml。丝裂霉素 C(MMC)为 Sigma 公司产品、终浓度为 0.5 μ g/ml。

2. 细胞培养与实验处理,将 RPMI 1640 培养液(FBS20%, PHA0.4mg/ml)分装入 12 只 25ml 培养瓶,每瓶含培养液 5ml,将采集的正常人静脉血(肝素抗凝)无菌条件下接种于培养基内,每瓶 400ml,轻轻摇匀,37 $^{\circ}$ C 温箱培养 26h 后,从温箱中取出,将 12 只培养瓶分成 6 组,3 个对照组和 3 个升麻实验组,对照组每组 2 瓶,分为空白对照组, DMSO 对照组和 MMC 阳性对照组。实验组 3 瓶分别加 100 μ l 兴安升麻总皂甙(Cd-S)液,终浓度分别为 10.93 μ l/ml、43.75 μ g/ml、175 μ g/ml,同时加 MMC(5 μ g/ml) 100 μ l。实验组另外 3 瓶只加相同浓度的兴安

升麻皂甙液。对照组和实验组于无菌条件下，每瓶加5-溴脱氧尿嘧啶核苷(5-BUdR) 50 μ g，混匀后于37 $^{\circ}$ C温箱中继续培养至70h(终止培养前2h)，向各培养液中加入5 μ g/ml秋水仙素100 μ l，其终浓度为0.1 μ g/ml，使细胞分裂停止于中期，于37 $^{\circ}$ C温箱中继续培养2h。

3. 按常规方法制备染色体标本，SCE分化染色和SCE计数如前文⁽⁴⁾。

结 果

单加兴安升麻皂甙(Cd-S)实验组外周血淋巴细胞SCE频率的分析，与各自空白对照组和DMSO对照组SCE频率比较，无统计学差异($P>0.05$)，与各自单加MMC阳性对照组SCE频率比较，均有非常显著统计学差异($P<0.001$)，见表1。兴安升麻总皂甙(Cd-S)加丝裂霉素C(MMC)实验组外

Tab 1. The effect of Cimicifuga dahurica Saponins on SCE frequency in peripheral lymphocytes of normal human

| Group | MMC μ g/ml | Cd-S μ g/ml | Numbers of cell | SCE/cell \pm s |
|------------------|-------------------|--------------------|--------------------|--------------------|
| Negative control | 0 | 0 | 25 | 9.41 \pm 1.863 |
| DMSO control | 0 | 0 | 25 | 9.68 \pm 1.725 |
| MMC control | 0.05 | 0 | 25 | 36.08 \pm 3.559 |
| Cd-S | 0 | 10.94 | 25 | 9.72 \pm 2.622* |
| | 0 | 43.75 | 25 | 10.04 \pm 2.188* |
| | 0 | 175.00 | 25 | 10.96 \pm 2.189* |

Cd-S = Cimicifuga dahurica Saponins. * $P>0.05$ As compared with Negative control and DMSO control, * $P<0.001$ As compared with MMC control group.

周血淋巴细胞SCE频率分析，与各自的空白对照组，DMSO对照组及单加MMC阳性对照组SCE频率比较，均有非常显著的统计学差异($P<0.001$)。随着兴安升麻皂甙(Cd

-S)剂量的增加，兴安升麻皂甙实验组SCE频率逐渐减少，剂量一效应呈负相关($r = -0.7194$, $P<0.05$)，见表2及图1。

Tab 2. The inhibitory effect of Cimicifuga dahurica Saponins on SCE frequency induced by MMC in peripheral lymphocytes of normal human

| Group | MMC μ g/ml | Cd-S μ g/ml | Numbers of cell | SCE/cell \pm s |
|------------------|-------------------|--------------------|--------------------|--------------------|
| Negative control | 0 | 0 | 25 | 8.00 \pm 2.500 |
| DMSO control | 0 | 0 | 25 | 8.33 \pm 2.872 |
| MMC control | 0.05 | 0 | 25 | 31.64 \pm 6.658 |
| Cd-S | 0.05 | 10.94 | 25 | 20.16 \pm 3.671* |
| | 0.05 | 43.75 | 25 | 16.08 \pm 3.265* |
| | 0.05 | 175.00 | 25 | 13.40 \pm 2.799* |

Cd-S = Cimicifuga dahurica Saponins. $P<0.001$ As compared with Negative control group, DMSO control group and MMC control group,

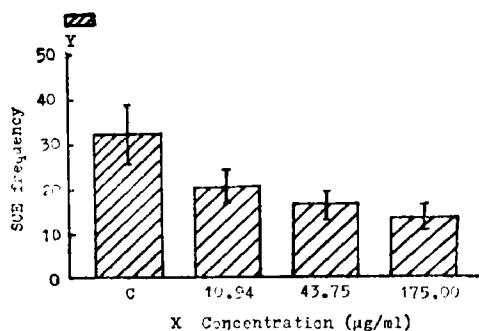


Fig 1. The inhibitory effect of *Cimicifuga dahurica* with different doses on SCE frequency induced by MMC in peripheral lymphocytes of normal human. C = MMC control group.

讨论

SCE的机理虽尚未彻底搞清,但多数学者认为它是一种对DNA损伤的修复方式(重组修复),从而可阻止基因的突变。它包括了DNA损伤引起的继发性修复和DNA合成的过程⁽⁵⁾。因此,SCE与基因突变有高度相关性⁽⁶⁾。它已被越来越广泛地用作一种快速检测致突变剂⁽⁷⁾和抗突变剂⁽⁸⁾的方法。兴安升麻皂甙实验组外周血淋巴细胞SCE频率分析表明,兴安升麻对健康人外周血淋巴细胞SCE频率均在正常范围内,表明兴安升麻总皂甙本身在试验浓度范围,对染色体DNA无损伤作用,是个安全的临床常用药。

已有报道,MMC是一个很强的诱变剂,可诱发微核⁽⁹⁾、SCE频率升高及染色体畸变⁽¹⁰⁾。以兴安升麻总皂甙为拮抗剂,观察它对MMC诱发人外周血淋巴细胞SCE频率的影响。兴安升麻皂甙加MMC实验组人外

周血淋巴细胞SCE频率分析表明,兴安升麻总皂甙(Cd-S)有明显抑制MMC诱发人外周血淋巴细胞SCE频率。并随着兴安升麻皂甙剂量的提高,其抑制作用加强,剂量与SCE频率呈负相关($r = -0.7194$ $P < 0.05$),提示兴安升麻总皂甙是个潜在的抗突变剂,其作用机理可能与提高抗氧化酶和谷胱甘肽S-转移酶活性有关⁽¹¹⁾。

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