

## ***Effect of phytoncide from trees on human natural killer cell function.***

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1. Int J Immunopathol Pharmacol. 2009 Oct-Dec;22(4):951-9.

Effect of phytoncide from trees on human natural killer cell function.

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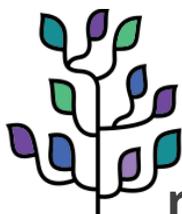
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We previously reported that the forest environment enhanced human natural killer (NK) cell activity, the number of NK cells, and intracellular anti-cancer proteins in lymphocytes, and that the increased NK activity lasted for more than 7 days after trips to forests both in male and female subjects. To explore the factors in the forest environment that activated human NK cells, in the present study we investigate the effect of essential oils from trees on human immune function in twelve healthy male subjects, age 37-60 years, who stayed at an urban hotel for 3 nights from 7.00 p.m. to 8.00 a.m. Aromatic volatile substances (phytoncides) were produced by vaporizing *Chamaecyparis obtusa* (hinoki cypress) stem oil with a humidifier in the hotel room during the night stay. Blood samples were taken on the last day and urine samples were analysed every day during the stay. NK activity, the percentages of NK and T cells, and granulysin, perforin, granzyme A/B-expressing lymphocytes in blood, and the concentrations of adrenaline and noradrenaline in urine were measured. Similar control measurements were made before the stay on a normal working day. The concentrations of phytoncides in the hotel room air were measured. Phytoncide exposure significantly increased NK activity and the percentages of NK, perforin, granulysin, and granzyme A/B-expressing cells, and significantly decreased the percentage of T cells, and the concentrations of adrenaline and noradrenaline in urine. Phytoncides, such as alpha-pinene and beta-pinene, were detected in the hotel room air. These findings indicate that phytoncide exposure and decreased stress hormone levels may partially contribute to increased NK activity.

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Tags:

phytoncide, killer cells, NK, essential oils, immune function, trees, Chamaecyparis obtusa, hinoki, cypress, evergreen, Japan, aromatherapy, adrenaline, noradrenaline, epinephrine, norepinephrine, adrenalin, noradrenalin, perforin, granulysin, granzyme A/B-expressing cells, decreased stress, hormone, aerial diffusion, aerosolization, cancer

