In vitro interaction between murine carcinoma cells and macrophages after treatment with Carbo animalis

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Abstract

Clinical reports show improvement of the quality of life of cancer patients following treatment with homeopathic medicine Carbo animalis, although the literature on this subject is still rare and the mechanisms of action unknown. Previous results obtained by our group indicated that treatment of mice with Carbo animalis 6cH increased the migration of macrophages and B1 cells (phagocyte progenitors) to Ehrlich tumor primary site. In the present study we analyzed the interaction of macrophages with murine breast cancer cells (4T1) after treatment with Carbo animalis in different homeopathic dilutions: 6cH, 30cH and combination 30cH + 6cH (MIX). All dilutions and vehicles were physically and chemically analyzed for conductance and composition of microparticles in suspension by means of energy-dispersive x-ray spectroscopy (EDX). Exposure of macrophages co-cultured with 4T1 cells to treatments over a period of 48 hours led to the following significant changes: 1) reduction of TNF-alpha production in co-cultures compared to simple macrophage culture, indicating an inhibitory effect of the tumor on macrophage activity; b) higher expression of pseudopodia and IL-6 production after exposure to all treatments; c) increase of the cell number per microscopic field, increase in the interaction (cell-cell contact) between macrophages and 4T1 cells and increase in production of GM-CSF, IL-12p40 and MCP-1 after treatment with Carbo animalis 6cH; d) increase of VEGF production in cells treated with Carbo animalis 30cH. There was no change in nitric oxide production with any treatment. Physical-chemical analysis of the drugs co-cultured with 4T1 cells to treatments over a period of 48 hours led to the following significant changes: 1) reduction of TNF-alpha production in co-cultures compared to simple macrophage culture, indicating an inhibitory effect of the tumor on macrophage activity; b) higher expression of pseudopodia and IL-6 production after exposure to all treatments; c) increase of the cell number per microscopic field, increase in the interaction (cell-cell contact) between macrophages and 4T1 cells and increase in production of GM-CSF, IL-12p40 and MCP-1 after treatment with Carbo animalis 6cH; d) increase of VEGF production in cells treated with Carbo animalis 30cH. There was no change in nitric oxide production with any treatment. Physical-chemical analysis of the drugs revealed a significant increase in the conductivity of Carbo animalis 30cH and MIX samples compared to the vehicle (30% alcohol). The microparticles exhibited an extremely diverse composition, including Na, Si, Cl, F, Pb, S, Ca, Mg, Al, K, Nb, B and Be. Only Carbo animalis 6cH exhibited boron and beryllium with frequency above 50% per particle, and this drug induced the most significant changes on the macrophage-tumor interaction. However, the role of these elements in the immunomodulatory activity observed both in vivo and in vitro still deserves further investigation.

Keywords: Mammary adenocarcinoma, 4T1 cells, homeopathy, macrophage, phagocytosis, Carbo animalis, EDX