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Modulated electro-hyperthermia: A local treatment may evoke distant anti-tumor response in a mice double colorectal allograft model

Tamas Vancsik[1], Csaba Kovago[2], Nora Meggyeshazi[1], Eva Kiss[1], Edina Papp[3], Oliver Szasz[4], Gabor Andocs[5] and **Tibor Krenacs[1]**
[1]1st Department of Pathology and Experimental Cancer Research, Semmelweis University, Hungary
[2]Department of Pharmacology and Toxicology, Faculty of Veterinary Science, St. Istvan University, Hungary
[3]Faculty of Bionics, Pazmany Peter Catholic University, Hungary
[4]Department of Biotechnics, St. Istvan University, Hungary
[5]Department of Radiological Sciences, Graduate School of Medicine and Pharmaceutical Science, University of Toyama, Japan

Modulated electro-hyperthermia (mEHT; tradename: oncothermia) is used as a complementary to radio- and chemotherapy. The electric field and concomitant heat of <42oC can accumulate in malignancies due to their elevated glycolysis (Warburg effect) and conductivity. Previously we showed that mEHT provoke programmed cell death and infiltration of immune cells in colorectal carcinoma xenografts of immunocompromised mice. Here we tested if the local antitumor effect of mEHT affects a distant tumor (abscopal effect) using immunocompetent animals. C26 colorectal carcinoma allografts were implanted into both femoral regions of BalbC mice. A single shot mEHT for 30 minutes was applied on the right side tumor either without or with intraperitoneal injection of a cytotoxic T cell promoting agent. Histomorphologic, immunohistochemical and TUNEL assay results were gained 12, 24, 48 and 72 hours post-treatment. mEHT caused progressive tumor cell damage compared to controls and showed elevated number of activated caspase-3, caspase-8 and TUNEL positive cells, accompanied with cytoplasmic release of chytochrome-c, but without changes in apoptosis-inducing factor (AIF), or BAX patterns. Stress-associated release of HMGB1 protein and increased numbers of CD3 positive T cells were also observed. Besides similar decay in the treated tumor, a prominent anti-tumor response was also observed in the untreated left-side tumors in animals inoculated with the flavonoid-rich agent. In our model mEHT caused tumor destruction dominantly via caspase-dependent programmed cell death both in the treated tumors and in the untreated distant tumors when combined with a T-cell promoting agent, where the release of stress associated HMGB1 may support anti-tumor immunity.

Biography

Tamás Vancsik graduated at the age of 24 years from Eötvös Loránd University in 2014. He is currently a PhD student at the 1st Department of Pathology and Experimental Cancer Research, Semmelweis University, Budapest, Hungary.

vancsik.tamas@gmail.com

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