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PREOPERATIVE AUTOLOGOUS BLOOD DONATION CAUSES IMMUNOMODULATION IN PATIENTS UNDERGOING ELECTIVE HIP REPLACEMENT SURGERY

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Background: Preoperative autologous blood donation (PABD) has been shown to decrease NK cell function in cancer patients. It is unclear whether PABD leads to other immunomodulatory effects that might affect more short term risks like postoperative infectious complications in surgical patients.

Aims: It was the aim of this study to investigate in autologous blood donors changes of parameters of immune function that are relevant for the resistance against perioperative infectious complications.

Materials and Methods: Leukocyte (granulocytes, lymphocytes, monocytes) and lymphocyte subsets (CD4+-T-cells, CD8+-T-cells, B-cells, NK cells) were determined in 86 consecutive patients donating 2 units of autologous whole blood, 500 mL each, in two successive weeks, two to five weeks prior to elective hip replacement surgery. In addition, in a random subgroup of 58 patients, tumour necrosis factor (TNF) secretion of monocytes upon stimulation with lipopolysaccharide, and interferon gamma (IFN-gamma), interleukin 2 (IL-2), IL-4, and IL-10 secretion of lymphocytes upon stimulation with either phytohaemagglutinin or concanavalin A were determined after 24-hour incubation in a whole blood cell suspension culture. Analyses were performed from samples taken before the first donation and on the day prior to operation.

Results: The total number of leukocytes did not change between measurement time points: 6.7 (1.8) vs. 6.6 (2.0) G/L. The following changes were statistically significant with a Bonferroni adjusted p-value < 0.01 (subset proportions are presented as means, with standard deviation in parentheses, TNF secretions presented as medians, with interquartile range given in parentheses): granulocytes increased from 63.3 (7.3) to 66.2 (7.9) % (+4.6 %) during the donation phase; lymphocytes decreased from 29.4 (7.1) to 26.8 (7.6) % (-8.8 %), accompanied by a relative increase of CD4+-T-cells from 44.7 (9.4) to 49.5 (8.5) % (+10.7 %) and B-cells from 11.6 (4.6) to 12.8 (4.7) % (+10.3 %), and a remarkable fall in NK cells from 18.2 (8.4) to 14.4 (7.4) % (-20.9 %); the stimulated TNF secretion of monocytes was suppressed from 9.45 (6.01) to 8.29 (7.27) nanograms per 1 million monocytes (-12.3 %). The effect of PABD on cytokine secretion of lymphocytes and the Th1/Th2 balance was variable and was dependent on the antigenic stimulus used in vitro.

Conclusions: In autologous blood donors, immunological changes occur, only part of which can be explained by psychological stress presumed to develop prior to surgery. Thus, donation of one litre of autologous blood within two weeks appears to modulate several parameters of the immune system of patients undergoing elective hip replacement surgery. Although the net effect and clinical relevance of these changes need further evaluation, this study suggests that PABD might influence the propensity to perioperative infectious complications.