

min/day. Blood samples of approximately 200 ul from the tail-tip was collected before the operation or hemorrhage on the starting day and at 30 min after the exercise on the 17 consecutive days. Then the total erythrocyte count (RBC), percent hematocrit (HCT), hemoglobin concentration (Hb), reticulocyte count (RET), blood indices (MCV, MCH, MCHC), total leukocyte count (WBC), percent from differential count of lymphocyte (LYM) and neutrophil (NEU), absolute number of lymphocyte (ABS.LYM) and absolute number of neutrophil (ABS.NEU) were determined. Blood and plasma volume were determined by T-1824 dye dilution method on day 1, 7, and 14.

In sham operated rats, the increases in ABS.LYM throughout the experiment may be due to the effects of emotional disturbances. Furthermore the ABS.NEU increased acutely on the 1st day and the 1st week of the experiment. These may be caused by the effects of injected anaesthetic agent and local injuries from blood samplings via tail-tip respectively. The ABS.LYM and ABS.NEU on day 1 were found to increase in all four animal groups.

In group 2, it has been noted that exercise training causes normocytic-hypochromic anemia which is indicated by the decrease in the RBC, HCT, Hb, MCHC, accompanied with the increase in the RET in the early phase, 1st week, of the experiment. The old red cells are more vulnerable to the hemolysing events which may be due to the decrease in glycolytic enzymes activities in aged red cells, and the hemolysing factor released into the circulation from catecholamines-induced contraction of the spleen

during physical exercise. When the exercise training program was prolonged, the anemia disappeared by the result of an inhibition of red cell destruction (intravascular hemolysis) rather than the stimulation of new red cells synthesis since no reticulocytosis could be observed. The adaptive mechanisms for the inhibition of red cell destruction in the late phase of this experiment are still not completely determined, but one of those may be the decrease in the degree of exercise-induced catecholamines release in trained subjects when compared to the untrained subjects at a given level of exercise intensity. The physical training also caused neutrophilia (the increase in both %NEU. and ABS.NEU) and lymphocytosis (the increase in ABS.LYM) throughout the experiment. This neutrophilia may be caused by the shift of marginated neutrophil pools (MNP) into the circulating neutrophil pools (CNP). In addition, exercise-induced muscle injuries may be another caused of neutrophilia in the late phase of exercise training program.

In group 3, single blood loss of 2 % of body weight caused the mark reductions in RBC, HCT, Hb, and MCHC which returned to the corresponding levels in 1 week, meanwhile the RET was highly increased. This means that the animals responded to hemorrhage by increasing the circulating reticulocytes without any change in average cell size but with the decrease in Hb or normocytic-hypochromic. Within two weeks the MCHC returned to normal value, this indicates that the anemic rats was completely compensated within two weeks. When physical training was introduced to anemic rats in group 4, there was no significant changes in the hematological parameters from those found in the

anemic non-exercising rats in group 3 eventhough the same intensity of exercise training in normal (non-hemorrhage) rats did significantly decrease many hematological parameters. Since post-anemic erythrocytes were reported to increase the intraerythrocytic glycolytic enzymes activities, then the erythrocyte disintegration following physical exercise training was less likely appeared. The increase of ABS.NEU and % NEU in both anemic groups on the 1st day and the first week may be due to the effects of acute blood loss in addition to the effects of anaesthesia. After a week of the experiment, the effects of blood loss which stimulated both the erythropoiesis and the granulopoiesis, caused the increase of ABS.NEU in both anemic groups.