Thanin Singkanya 2010: Oxidative Stress in Canine Red Blood Cells Storage. Master of Science (Animal Physiology), Major Field: Animal Physiology, Department of Physiology.
Thesis Advisor: Assistant Professor ML. Soontaranee Tongyai, Dr.3e Cycle. 86 pages.

Oxidative stress of red blood cells was a major problem in blood storage which has been extensively studied in human blood bank but not in canine banked red blood cells. The present study was conducted to obtain the information for effective use of canine blood. Blood collected from 7 healthy donor dogs and stored in a standard blood storage bag containing citrate phosphate dextrose adenine (CPDA) was sampled in 5 successive durations: fresh whole blood before storage in CPDA (C), 3 hours after storage in CDPA (0), 14 days (14), 28 days (28) and 42 days (42) of storage. To confirm the oxidative damage of cells, analyses were conducted on glutathione (GSH) concentration as indicator of cellular antioxidant status, the activity of total antioxidant capacity (TAC) in the plasma, malondialdehyde (MDA) and protein carbonyl content as indicators of lipid peroxidation and protein oxidation, respectively. Moreover, affects on red cells survival were measured using of Mean Corpuscular Fragility (MCF) and Hematocrit (Hct) levels.

The results revealed that GSH decreased significantly when stored up to 14 days. However the continuing reduction of glutathione after 14 days until 42 days was not significant. This change might have resulted from oxidative modification of stored red blood cell causing a decline in antioxidant defense system thus leading to cellular imbalance and initiation of oxidative cell damage. TAC reduction in plasma at 0 when compared to C also demonstrated reduced plasma antioxidant function. However, when stored blood from 14, 28 to 42 days, plasma TAC increased significantly which could be due to the leakage of antioxidants to plasma taking into consideration of the elevation of the MCF. The declination of antioxidant activity significantly elevated both oxidative indicators of lipid (MDA) and protein (carbonyl protein content). Thus, when considered with the significant elevation of MCF and reduction of Hct ($P<0.05$) at 28 and 42 days of storage confirmed the occurrence of oxidative stress under prolong storage leading to the damage of lipid and protein of red blood cell and consequently to the membrane lipid structure and function of the cells, eventually causing cell deterioration. Therefore, canine red blood cells storage up to 28 days may not provide maximal effective treatment.

_____ _____ ___ / ___ / ___

Student's signature Thesis Advisor's signature