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SARISTHA SODSRI : RED CELL DENSITY GRADIENT FOR
DETERMINATION OF MALARIA INFECTION IN RED CELLS FROM BETA-
THALASSEMIA HETEROZYGOTES. THESIS ADVISORS : AHNOND
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Various factors have been suggested to contribute to the protective mechanism against malaria infection in thalassemias. The purpose of this research is to determine factors that may influence invasion and growth of *Plasmodium falciparum* in β -thalassemia trait red blood cells (RBCs). A new experimental design using Percoll density gradient method and co-culture system was employed. Blood samples were obtained from 22 subjects, some of who had β -thalassemic trait alone, β -thalassemic trait with other red cell defects and normal blood. Percoll density gradient method was used to separate the RBCs in each of the samples into fractions of different densities. Three distinct fractions were selected for culture and RBC measurement. The result showed that the density increased with decreasing mean cell volume (MCV). Cellular hemoglobin concentration mean (CHCM) and hemoglobin A_{1c} (HbA_{1c}) increased as the density increased. Co-culture system using biotin/streptavidin and flow cytometry technique was applied to compare maturation and growth rates in *Plasmodium falciparum* malaria parasites in two distinct RBC populations. Invasion and growth of *Plasmodium falciparum* were dependent on red cell age more than red cell size. Comparison of the same density fractions from different subjects of the same genotype was used to assess the effect of RBC size. The results showed that the subjects having larger RBC size can support parasite growth better than those having smaller RBCs. The effect of genotype was observed by comparing the same density fractions from subjects of different genotype. Results showed that percent parasitemias was more dependent on genotype than on RBC size. These findings suggest that invasion and growth of *Plasmodium falciparum* are dependent on age, size and genotype of RBCs.