CHAPTER 1

INTRODUCTION

1.1 Statement and significance of the problem

Alpha-thalassemia-1 is defined as the deletion of the two α-globin genes on each chromosome 16. The most common α-thalassemia-1 deletion in Thailand is the Southeast Asian type deletion ($--^{SEA}$) which approximately removes 20 kb of DNA. In Northern Thailand, its prevalence is 8%, giving an expected homozygous α-thalassemia-1 incidence of 2 cases per 1,000 pregnancies. Homozygous α-thalassemia-1 is the most severe form of α-thalassemia resulting in hemoglobin Bart's hydrops fetalis. An affected fetus is not viable. Usually these infants are stillborn. A hydrops fetus also poses a risk to mother. The treatment of homozygous α-thalassemia at present is not appropriate. Prenatal diagnosis by polymerase chain reaction (PCR) can be carried out on DNA obtained by chorionic villi sampling (CVS) or by amniocentesis. When homozygous α-thalassemia is recognized there is the option of abortion. For some couples with a repeated hydrops pregnancy, *in vitro* fertilization (IVF) and preimplantation genetic diagnosis (PGD) offers the possibility to have a healthy child and avoid abortions.

Usually PGD is performed on 1 or 2 blastomere cells removed from 8- to 10-cells embryos. For now, only a PCR based method has a high enough sensitivity to analyze a single genome genetically. In this study, primer-extension-preamplification (PEP) and specific gene analysis were chosen to detect hemoglobin Bart's hydrops fetalis from preimplantation embryos.

The limited number of target sequences were amplified under optimal conditions, to avoid amplification failure and contamination.

1.2 Objective

To optimize PCR condition for diagnosis of homozygous α-thalassemia from preimplantation embryos.