Alpha-Thalassemia and Malaria in Papua New Guinea

Name: _____

Scientists studying populations in Papua New Guinea have developed a mathematical model to investigate whether people who have thalassemia have a higher risk of developing severe malarial anemia. Severe malarial anemia is often fatal unless the individual receives a blood transfusion within a short time.

The scientists use a statistic from medical studies called an "odds ratio," which compares the level of risk for different groups. People with thalassemia have at least one nonfunctional copy of the alpha-globin gene.

For this study, an odds ratio

- **equal to 1** means that individuals with thalassemia are as likely to have severe malarial anemia as are normal individuals;
- **greater than 1** means that individuals with thalassemia are **more** likely to have severe malarial anemia than are normal individuals; and
- **less than 1** means that that the individuals with thalassemia are **less** likely to have severe malarial anemia than are normal individuals.

Table 1. Alpha-Thalassemia and Severe Malarial Anemia

Risk factor	One nonfunctional allele of the alpha-globin gene	Two nonfunctional alleles of the alpha-globin gene
Risk of developing severe malarial anemia	0.74	0.52

Source: Data from F.J.I. Fowkes et al. 2008. Increased microerythrocyte count in homozygous α^+-thalassaemia contributes to protection against severe malarial anaemia. *PLoS Medicine, 5*(3): 494-501: e56. doi:10.1371/journal.pmed.0050056

Questions: Fill in the missing word or words for each sentence below.

1. A person who has one nonfunctional allele of the alpha-globin gene is _____ likely to develop severe malarial anemia than a normal individual (all alleles of the gene are functional).

2. A person who has two nonfunctional alleles of the alpha-globin gene is _____ likely to develop severe malarial anemia than a normal individual (all alleles of the gene are functional).

3. After analyzing the data, summarize what you have learned about the relationship between alpha-thalassemia and malaria by completing the following sentence.

   The data suggest that individuals with alpha-thalassemia _____

   _____

   _____

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