A key characteristic of cancer cells is that they are no longer constrained by the standard cell cycle controls that normally coordinate cell division activity. Consequently the timing of mitosis in cancer cells is altered. You may have heard of cancer cells being “runaway” which have no controls on their rate of reproduction. It is this characteristic that allows some cancer cells to grow and spread quite rapidly.

**OBJECTIVE: Analyze data to determine the differences in timing of mitosis between normal stomach cells and cancerous stomach cells of a chicken.**

There is a direct relationship between the number cells counted in a given stage of mitosis and the time that that stage takes to complete. This may be calculated if the total time for mitosis in a particular cell type is known. (That total time is measured from interphase to interphase.) The total time for mitosis in the stomach cells of a chicken is 625 minutes.

**Table 1: Mitosis in healthy and cancerous chicken stomach cells**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Healthy Stomach Cells | | | | Cancerous Stomach Cells | | |
| Cell Cycle Phase | Total # Cells | % Cells in Phase | Time (minutes) | Total # Cells | % Cells in Phase | Time (minutes) |
| INTERPHASE | 2909 |  |  | 2171 |  |  |
| M PHASE | 67 |  |  | 117 |  |  |

1. Calculate the percent of cells in each phase for healthy stomach cells:

**Total number of cells in phase = Percent of cells in phase**

**Total number of cells counted**

1. Calculate the amount of time spent in each phase for both healthy and cancerous cells:

**Percent of cells in phase x 625 minutes = Minutes of cell cycle spent in phase**

1. Prepare a bar graph that compares the length of time spent in each phase of the cell cycle for healthy and cancerous cells.
2. Run a chi-square analysis on the data from Table 1 to determine whether there is a significant difference in the number of cells found in each phase for cancerous stomach cells.
   1. To determine your expected values, you will need to use the percentage of cells in interphase and M phase in the healthy cells.
   2. Multiply the percentages by the total number of cells in the cancerous cell sample. This will give your expected numbers.

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| Chi Square Calculations: |

Analysis of PART I Data:

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