# X-Inactivation: (It's the Cat's Meow!) Random or Predetermined?

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If the effects of X-inactivation are observed with tortoiseshell cats, then it will be determined that lyonization is random and not predetermined because each female cell designates X chromosomes as active or inactive during early embryonic development. Materials needed for this project include: 100 color photos of individual tortoiseshell cat faces, lab notebook, Bic Wite-Out Correction pen, ruler, acetate, labels, computer, and Excel program. Gather materials and begin by labeling cat photographs. Prepare acetate by dividing into 12 regions that correspond to the cats' facial features and label each region. Create a chart with rows and columns for each region and determine if the fur in each section is black, orange, or mixed. Summarize the results of the chart and analyze to determine which alleles are represented in the cats. Determine whether data suggests that X-inactivation is random or predetermined in respect to the orange allele. It was predicted for this experiment that the role of X-inactivation would be random and not predetermined by the gene. Further research determined that the process is random, but the experimental data did not yield results that fully supported the hypothesis. After conducting a statistical analysis comparing both halves of all cat faces and applying those tests to all regions of the face, the P-values revealed that lyonization held a significant pattern in this experiment, which could impact future oncology research in breast and ovarian cancers.

**Awards Won:**