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This research is a step forward in developing a more conclusive and reliable technique for detecting carcinogens and mutagens. With this technique we would like to attain a lower rate of false negatives and false positives than current methods such as the Ames test or animal modeling. In addition, our method may potentially lead to development of a “danger” rating system, rather than just a simple true/false test for the presence of carcinogens. The focus is to monitor mutations on the molecular level specifically by exploring protein expression of an organism using Two Dimensional Gel Electrophoresis (2DE). The bacterium *Pseudomonas Putida KT2440* is the organism of choice because of its heightened ability to metabolize aromatic compounds. The aim of my specific project is to grow the bacteria on succinate in the presence of caffeine, and extract the protein expressed during this growth at the mid-log phase (when bacteria growth is exponential). The mid-log phase has been found to be approximately 6 hours and 41 minutes. Caffeine is a known false positive when tested using the Ames test. The extracted protein will be quantified and analyzed using 2DE. The proteins expressed will be compared to several others expressed by the same bacteria in the presence and absence of carcinogens. This research is beneficial because using this method will allow researchers to detect carcinogens without testing on animals, and is more reliable than the Ames test, which indicates something as simple as caffeine is a carcinogen, which we all know it is not.