A Novel Inflammation Detection Device Through Hydrogen Peroxide Decomposition

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Hydrogen peroxide (H_2O_2) is crucial indicator of inflammatory diseases due to its extensive role in the inflammation process. However, despite its importance as a diagnostic indicator, there is currently no viable method of detecting H_2O_2 within the gastrointestinal tract (GI). This experiment employs an analysis of the viability of a novel H_2O_2 detection device, using a Thermochron temperature logger coated with MnO_2.The device works by measuring the heat released as MnO_2 catalyzes the decomposition reaction of H_2O_2 inside the GI tract. This experiment investigates whether the temperature logger on the device could detect a rapid, statistically significant temperature difference between the reaction with and without catalyst at 37° (body temperature). The control group without the catalyst yielded a slow temperature increase, which did not surpass the rapid temperature increase of the experimental group. After running the results through an independent two-tail T-test, a large discrepancy was found between the groups, indicated by a p-value less than 0.0001 (designating the measured temperature difference to be highly statistically significant).The significant difference proves the capability of the device to be a successful indicator of inflammation. The implications of this device are vast, with the capability to be miniaturized into an electronic pill. Based on the location of the reaction, the pill can identify the location of the inflammation. This inexpensive system could aid in the diagnosis of diseases such as Crohn's which requires identification of the site of inflammation, as well as other inflammatory bowel diseases, Celiac, and abdominal tuberculosis.

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