
This investigation asks whether a portion of one gene contains information for the synthesis of a protein subunit which might be an integral part of two or more enzymes. A strain of Pseudomonas fluorescens formed an inducible \( \gamma \)-hydroxybutyric acid dehydrogenase (Reaction 1) when grown upon \( \gamma \)-hydroxybutyric acid (\( \gamma \)-HBA), and an inducible \( \beta \)-hydroxypropionic acid dehydrogenase (reaction 2) when grown upon \( \beta \)-hydroxypropionic acid (\( \beta \)-HFA). Nirenberg, M. W. and Jakoby, W. B., J. Biol. Chem. (In press.)

1) \( \gamma \)-HBA + DPN \( \rightleftharpoons \) Succinic Semialdehyde + DPNH + H+
2) \( \beta \)-HFA + DPN \( \rightleftharpoons \) Malonic Semialdehyde + DPNH + H+

An attempt was made to induce the reversible \( \gamma \)-HBA dehydrogenase by both the reactant and the product of the reaction; only \( \gamma \)-HBA was effective. A series of mutant strains blocked in reaction 1 were obtained. Strikingly high \( \beta \)-HFA dehydrogenase levels were found in these strains when \( \gamma \)-HBA was added. Analysis demonstrated that \( \gamma \)-HBA at low concentrations induced the formation of \( \gamma \)-HBA dehydrogenase, and, at higher concentrations, induced the formation of both \( \gamma \)-HBA and \( \beta \)-HFA dehydrogenases. Genetic information did not appear to be shared; instead \( \gamma \)-HBA was found to serve as an inducer for two similar enzymes in different metabolic pathways.