# BIOCHEMICAL CHANGES IN THE LIVER ASSOCIATED WITH KWASHIORKOR

Helen B. Burch, Guillermo Arroyave°, Ruth Schwartz°, Ana M. Padilla°, Moisés Béhar°, Fernando Viteri°, and Nevin S. Scrimshaw.
Department of Pharmacology, Washington University School of Medicine, St. Louis, Mo. and Institute of Nutrition of Central America and Panama (INCAP), Guatemala, C. A.



Since certain flavin enzymes are particularly sensitive in rats to protein, amino acid, or riboflavin deficiency, these seemed most likely to change in kwashiorkor. Measurements in liver biopsy samples of 6 enzymes, and 5 other substances were made on 13 Guatemalan patients. During hospital treatment the children were given milk with a varied diet. Samples were obtained initially and after 3 to 4 weeks treatment from 6 children. In these riboflavin, glycolic acid oxidase, DPNH-dehydrogenase, malic dehydrogenase and transaminase showed no change relative to protein. In contrast, xanthine oxidase activity increased from 2.7 mM per kg. of protein per hour before treatment to 6.3 after treatment; D-amino acid oxidase activity from 165 to 441; and oxidized pyridine nucleotides from 3.47 to 4.37 mM per kg. protein. Liver protein increased from 119 g. per kg. wet weight initially to 177. If this represents a true regeneration of protein, the new protein must have been enriched in xanthine oxidase and D-amino acid oxidase. Lipids decreased but cholesterol showed no change. Values for liver biopsy samples after treatment are close to those obtained with autopsy samples from children dying from causes not related to kwashiorkor.

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