

Influence of Hyperbilirubinemia on Spectrophotometric Measurement of 30 Biochemical Tests, using the Roche® Modular P-module

Goffinet J.*, Bodson Q.*, Chapelle J-P, Gielen J, Ferir A.-M.

Laboratory of Clinical Chemistry, University of Liège, CHU Sart-Tilman, Liège/B

*both authors contributed equally to this article

Purpose: An elevated bilirubin concentration can interfere with the spectrophotometric measurement of various analyses, and sometimes directly interacts with the chemical reaction. A change in our chemistry workstation Roche® Modular P-module occurred recently; before introducing the new methods, we aimed at defining for all tests measured by spectrophotometry the bilirubin concentration above which the validation program automatically replaces the numerical result by the comment "icteric sample". These limits were compared with the values recommended by Roche®.

Method: Using Roche5 Modular P900-module, we measured in duplicate 30 routine biochemical tests on 4 serum pools characterized by a low concentration of bilirubin (<3 mg/l). Aliquots of these pools were spiked with increasing volumes of a fresh bilirubin solution (approximately 3000 mg/l). The maximal bilirubin level in the spiked samples was about 300 mg/l (30 mg/dl), a concentration rarely observed in clinical practice. The mean changes in concentrations of the 30 tests in the aliquots of the four pools were analyzed in relation to bilirubin concentrations. Variations higher or lower than 10% from the initial values were considered as unacceptable interferences. As NaOH 0.1 M was used to solubilize bilirubin, we also evaluated the influence of small pH variations, by measuring serum pool with the same concentrations of NaOH but without addition of bilirubin.

For all tests, measurements on aliquots containing NaOH were not influenced.

Results: Bilirubin causes no or little variations (<10%) on the different tests except the following analyses:

- Total cholesterol: 10% decrease at 130 mg/l bilirubin (Roche® value: 100 mg/l)
- Triglycerides: 10% increase at 240 mg/l bilirubin (Roche® value: 270 mg/l)
- Magnesium: 10% increase at 250 mg/l bilirubin (Roche® value: 370 mg/l)
- Total proteins: 10% decrease at 250 mg/l bilirubin (Roche® value: 250 mg/l)

Conclusions: Most of the tests are not significantly influenced by hyperbilirubinemia, except the following analyses: magnesium, total cholesterol, total proteins, and triglycerides.

In practice, our results were in agreement with thresholds announced by Roche®. However, differences were recorded for magnesium that we found lower (250 mg/l vs 370 mg/l), total cholesterol slightly higher (130 mg/l vs 100 mg/l) and triglycerides lower (240 mg/l vs 270 mg/l).