Abstract

Presented work is focused on heme metabolism with the main interest in bile pigments. Recent data indicate that bilirubin is not only a waste product of the heme catabolic pathway, but also emphasize its important biological impacts, including possible antiproliferative effects. Until today metabolism of bilirubin has not been completely elucidated, which has prevented detailed evaluation of its potential anticancer action. The aim of this study was to clarify some aspects of heme catabolism with respect for antiproliferative properties of its products.

Based on the fact that bilirubin potently affects carcinogenesis of the intestine, we initially investigated not properly known bilirubin metabolism by intestinal bacteria. We studied bilirubin neurotoxic effects in hyperbilirubinemic Gunn rats - its distribution in the brain tissue and its degradation during pathological conditions, such as severe newborn jaundice or Crigler-Najjar syndrome. Possible approaches to improve the treatment of severe unconjugated hyperbilirubinemias, combination of the phototherapy and human albumin administration were also investigated. The main reason of these studies was the fact that mechanisms of neurotoxic effects of bilirubin are predominantly identical with those, by which bilirubin inhibits cancer cells growth. We were also concerned with anticancer impact of other important heme catabolic pathway´s product, which is carbon monoxide. The evolutionary conserved tetrapyrrolic structure of human bile pigments led us to study biological effects of cyanobacterial and plant tetrapyrroles as well, for which important antioxidant and anticancer activities were proved.

Keywords: Bile pigments, bilirubin, phycobilins, chlorophyll, tetrapyrroles, heme metabolism, hyperbilirubinemias.