ENVIRONMENTAL CHEMICAL CONTAMINATION OF FOODS IN THE SUB-SAHRAN AFRICA: IMPLICATION FOR CARCINOGENESIS AND CHEMOPREVENTIVE INTERVENTION STRATEGIES

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Abstract: Compelling evidence indicates that dietary factors can contribute to human cancer risk and as such many of the cancer common in the sub-Saharan Africa including liver, colon, prostate and breast cancer have been related to dietary behaviors. In particular, hepatocellular carcinoma which is the fifth leading cause of cancer mortality in the world constitute a major health problem especially in the developing countries where the incidence is estimated at 23% and 26% respectively from 20-30 and 40-59 age periods. The diet of the majority of African populations consists largely of maize and cassava flour which are prone to fungal infestation and thus to contamination by mycotoxins. Dietary carcinogens identified to date include mycotoxins (Aflatoxins, fumonisins), heterocyclic amines formed from fried and barbecued foods and nitrosamines from nitrites used in food industries. Also polycyclic aromatic hydrocarbons from wood and coal smoke used for traditional storage in many African countries can contaminate food during the smoking process. It has been recognized that diet related cancer occur through an imbalance of carcinogens and anticarcinogens. Thus in contrast to those toxicological aspects of African diet leading to the occurrence of cancers in African populations, an expanding body of evidence from epidemiological and laboratory studies have shown that edible plants as whole, or their ingredients have substantial protective effects on human carcinogenesis. An avalanche of dietary and plant-derived compounds (curcumin, kolaviron, gingerol and resveratrol) have been reported to possess anticarcinogenic activities. Most of these agents possess intrinsic antioxidant, and anti-inflammatory activities which have been linked to their chemopreventive properties. Specifically, our data show that curcumin, the natural yellow pigment in turmeric isolated from the rhizome of curcuma longa and kolaviron, a natural biflavonoid antioxidant from the seeds of *Garcinia kola* elicit striking inhibitory effects on diverse biochemical and cellular events associated with the multistage process of carcinogenesis. Our recent work on the molecular mechanisms of action of these compounds, in animals, indicate that curcumin induces heme-oxygenase-1 in rat liver through stimulation of nuclear transcription factor erythroid 2p45 (NF-E2)-related factor 2 (Nrf2). Kolaviron suppressed dimethyl-nitrosamine-induced expression of cyclooxygenase (COX-2) and inducible nitric oxide synthase (iNOS) by inhibiting nuclear factor kappa B (NF-κB) and activator protein-1 (AP-1) in rat liver. Each of these anticarcinogens alone or in combination could provide sustainable chemopreventive intervention in retarding the progress of cancer in different populations of the world especially in the tropics.