

3

Correlation between the biological functions of molecular hydrogen (H₂) and cancerRoland Amir¹¹ *Centre de Santé des Fagnes, Chimay, BELGIUM*

Oxidative stress in the cell result from the oxidizing potential of excess reactive oxygen species (ROS). Acute oxidative stress may result from various conditions, among several others causes, such as vigorous exercise, inflammation, ischemia and tissue transplantation. Chronic oxidative stress is related to the pathogenesis of many lifestyle, related diseases, aging and cancer. Elevated rates of ROS have been detected in many cancers. It has been demonstrated a strong correlation between ROS and cancer heterogeneity which may contribute to modulate therapy. It is well known that heterogeneity is affected by increasing levels of ROS. Tumour cells express increased levels of antioxidant proteins to detoxify from ROS, suggesting that a delicate balance of intracellular ROS levels is required for cancer function. ROS causes oxidative DNA and protein damage, as well as damage to tumour suppressor genes. It has been clearly demonstrated that H₂ reduces oxidative stress, protects DNA, suppresses genetic mutations and cancer cell growth, by effective action on angiogenesis. H₂ inhibits tumour growth by reducing oxidation products. H₂ induces cancer cell death apoptosis and act as suppressing the spread of cancer metastasis. Moreover, H₂ helps anti-cancer drugs and protects from radiation therapy. H₂ improve the quality of live for radiation and chemotherapy patients and increases survival rates of cancer patients. More recently, it has been suggested that hydrogen water enhances 5-fluorouracil induced inhibition of colon cancer and a recent study has demonstrated a protective effect of hydrogen-rich water on liver function of colorectal cancer patients treated with Folfox 6 chemotherapy. H₂ can modulate signal transduction across multiple pathways, but its primary molecular targets have not been determined. Examining critical overlapping signalling molecules would help map cross talk among critical pathways. To fully explain the biological functions of H₂, its molecular mechanisms of action must be clarified.