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Spices and Cancer: Looking for Evidence

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Editorial

It is believed that spices can be useful to fight cancer or can act by reducing the risk to develop malignancies. Many works have been explored these issues, but to date a clear, unequivocal and undisputable answer to these hoary questions still lacks.

Spices are defined as seeds, fruits, roots, barks, berries, buds or other vegetable substances essentially used for flavoring, coloring or preserving food [1]. Spices have been used since ancient times, but only in the nineteenth century their use has started to be scientifically investigated as a potential therapeutic tool. Consequently they were also used in the fight against cancer. It is worth to pointing out that cancer is the second cause of death in the world and the number of new cases is expected to rise by about 70% over the next 2 decades [2]. Among spices with proven anticancer effects in preclinical models, the most important seem to be basil, caraway, cardamom, cinnamon, clove, coriander, cumin, curcumin, dill, garlic, ginger, ginseng, oregano, pepper, rosemary, saffron, thyme, wasabi. It is important to consider that compounds derived from spices show usually low bioavailability; nonetheless many procedures have been applied to overcome this problem. This is particularly true for curcumin, to which many different approaches revealed beneficial, such as molecular complexation with pH sensitive cationic copolymer, nanocarrier loading, microparticles [3-6].

It is well known that plant secondary metabolites are an infinite source of new potential drugs, even in spices. In this regard, many extracts or compounds have been evaluated for their anti-inflammatory, antioxidant or anti-proliferative effects [7]. They have been extracted from vegetables, fruit, trees, herbs and spices, relying on traditional and ethnopharmacological use made by indigenous people, where these natural products were found. In the literature many works on spices reported their efficacy, at least in preclinical models (*in vitro* and *in vivo* experiments) [4,8,9]. These studies suggested that the main biological pathways implicated in the favourable effects are related to the targeting of specific key transcription factors such as Activator Protein (AP-1), nuclear factor κB (NF-κβ), Signal Transducers and Activators of Transcription (STAT), caspases, Tumor Necrosis Factor-Related Apoptosis Inducing Ligand (TRAIL), Mitogen-Activated Protein Kinase (MAPK), Akt (Protein kinase B) and many others [10-13]. The above mentioned key elements have a fundamental role in proliferation, survival, apoptosis, metastasis, angiogenesis, inflammation, and immunity, giving a strong bio molecular background for the use of spices as therapeutic agents [14]. Many compounds derived from spices can exert anticancer properties in both animal and cells models, suggesting that they can be effective also in human cancers. Regrettably, when preclinical research tries to move to humans, things are more complicated and no clear result can emerge. Many clinical trials have been attempted to demonstrate the potential benefit of natural products (such as plant extracts, essential oils, single biochemically defined drug derived from herbs or spices) in fighting cancer, but only 8 trials in phase 3 are reported [15]. Of these only 1 attempts to impact on cancer development: Effects of Selected Vegetable and Herb Mix (SV) on Advanced Non-small Cell Lung Cancer, in which a selected vegetables and herbs mix has used in non-small cell lung cancer patients (no result available). The others are educational, behavioural, employ mushroom extract or treat side effects of cancer (depression, sleeplessness, etc.). These data reveal that many efforts are still needed to successfully demonstrated the beneficial effects of spices or more in general, natural products.

It is undoubtable that cancer and nutrition are strictly connected and more in general diseases and nutrition. The American Cancer Society suggests that at least one third of cancer cases could be avoided if people would follow a correct diet and life style. Indeed according to recent estimates, cancer cases are imputable to diet (35%), tobacco (30%) and many other minor factors (Society 2016). Yet there is the strong belief that cancer is not an incurable, but rather a preventable disease. Man has at his disposal a great weapon to use: Food and in particular vegetables from which are usually derived spices. Eating an appropriate diet, as recommended by the American Cancer Society, gives the opportunity to noticeably reduce cancer risk and ameliorate the quality of life, in both healthy and sick patient [16]. Certainly more information are necessary to understand the role of spices in human health (and cancer), not only about the desired or positive effects but also about the negative overfeed with substances that we need in the right quantity or sometime we need to avoid. Further it should not be forgotten that every plant or spice we eat can potentially interact with conventional drugs, a new field of concern powerfully emerged in the last decade, to which the physician has to face.

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