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Antiproliferative activity of protein hydrolysates derived from fish by-products on human colon and breast cancer cells.

Aikaterini Kandyliari^{1,2}, Jaya Prakash Golla², Ying Chen², Nikolaos Papandroulakis³,
Maria Kapsokefalou¹ and Vasilis Vasiliou²

¹Agricultural University of Athens, Athens, Greece,

²Yale School of Public Health, New Haven, USA and

³Hellenic Centre for Marine Research, Herakleion, Greece

Abstract

The consumption of fish is encouraged in dietary guidelines because of its association with health benefits; however, fish processing generates by-products (gills, bones, skin, head), which can rise up to 50–60% of fish weight after filleting. The investigation of bio-activity of fish by-products and subsequent utilization for the development of high added-value food ingredients and/or supplements will reduce waste and create new products of high nutritional value. We studied the antiproliferative activity of fish by-product protein hydrolysates (FPH) on human colon and breast cancer cells. A total of 6 Meagres “*Argirosomus Regius*” (1256.45 ± 232.32g) and 16 Gilthead Sea Breams “*Sparus Aurata*” (403.47 ± 72.92g) were obtained by HCMR Institute in Crete, Greece. The fins, skin, bones, head, and gills were isolated, lyophilized, homogenized and stored separately at -80°C. The protein hydrolysates from each byproduct were prepared using a pH extraction method. Human colorectal adenocarcinoma cells (COLO320 cells) and human breast adenocarcinoma cells (MCF7A cells) were treated with different FPH for 48 hours, and cellular proliferation was measured using the MTT assay. Results are given as mean percentage of triplicate independent analyses. Statistical significance of growth inhibition was estimated following Wilcoxon Signed-Ranks test with $\alpha = 0.05$. In COLO320 cells, FPH induced a the significant antiproliferative activity at 0.5g/L. Specifically, FPH from bones, gills and skin of Meagre showed a growth inhibition of 23.7%, 9.9% and 26.4%, respectively, after 48 h of treatment. The inhibition by the same by-products from the Gilthead Sea bream was 24.6%, 21.9% and 26.4%, respectively after 48 h. In MCF7A cells, FPH exerted a significant growth inhibition at 1g/L. The skin and fins of Meagre induced a growth inhibition of 25.5% and 39.0% respectively; the gills, skin and fins of Gilthead Sea Bream showed a growth inhibition of 28.5%, 47.1% and 39.6%, respectively, after 48 h. These values were in the same range with etoposide (reference anticancer molecule) in the concentration of 3.1µM for COLO320 cells and 50µM for MCF7A. These preliminary data suggest that certain fish by-products could represent a source of anticancer peptides and may cause growth inhibition of human cancer cells. The isolation of responsible bio-active peptides from fish byproducts and the integration of them into food supplements can have beneficial effects on human health.

Conflict of Interest

There is no conflict of interest.