氏　　名	MD. MOKLESUR RAHMAN SARKER
授与した学位	博士
専攻分野の名称	学術
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学位授与の要件	博士の学位論文提出者 （学位規則第５条第１項該当）
学位論文の題目	Studies on the enhancement of antigen-specific antibody production in murine B cells by the extract of bell pepper flesh （ピーマン果肉抽出物のマウスＢ細胞における抗原特異的抗体産生増強作用に関する研究）
論文審査委員	教授　合田　榮一　　教授　龜井　千晃　　教授　川崎　博己

学位論文内容の要旨

The impairment of immune response is known to cause autoimmune diseases or inability of immune system to fight against infection. Therefore, the advent of novel immunostimulators might be expected due to the fact that safe and effective drugs are of critical importance in control of infectious diseases, and tumor development. Dietary materials have direct impact on health because our body can get different bioactive chemicals that directly influence the functional activities of human body for its growth, nutrition, and protection from invaders. Many health foods and plant-derived substances touted to improve health are sold around the world. However, conclusive evidence for their benefits is frequently lacking. Bell pepper (*Capsicum annuum* L.) fruit is an important vegetable used for our daily consumption. It is a good source of vitamins C and E, carotenoids, and also contains various phenolics and flavonoids and possesses antioxidant and antimicrobial activities. However, so far, no investigations have been done in search of its immunological properties. Thus the present study was designed for the investigations of the effect of bell pepper extract on the humoral immune responses in murine cells *in vitro*.

The level of antibody production in culture supernatants was measured by ELISA, and DNA synthesis was determined by pulse-labeling cells with [^{3}H]thymidine. The effect of bell pepper extract on the differentiation of B cells to plasma cells were also determined by measuring CD138^{+} cells using flow a cytometer and enumerating the antibody secreting cells by ELISPOT technique.

Experimental results showed that bell pepper extract significantly stimulated the proliferation of B cells, enhanced the level of CD138^{+} cells, elevated the levels of antibodies (polyclonal IgM, KLH-specific IgM, and KLH-specific IgG) in culture supernatants, and increased the antibody secreting cells (polyclonal IgM and KLH-specific IgM secreting cells).

Overall, the experimental data supports that bell pepper extract significantly enhanced the polyclonal and antigen-specific humoral responses through the proliferation and differentiation of B cells to plasma cells. Thus, the bell pepper extract may be useful as medicament or as foodstuff in case of inadequate immune responses. So far as my knowledge, this is the first report about the effect of bell pepper on antigen-specific antibody responses, and our research team is the first to investigate of its immunostimulating activities.

論文審査結果の要旨

免疫機能は加齢やがん、糖尿病、火傷、紫外線、ストレスなど様々な要因により低下することが知られており、化学療法や放射線療法の副作用の影響も受けやすい。当研究室では、低下した免疫力を増強させるため、より安全で日常的に摂取する野菜を中心に抗体産生を促進する抽出物の探索を行い、世界各地で栽培されている赤ピーマン果肉の抽出物が精製Ｂ細胞における IgM 産生を促進することを見出している。本論文で著者はその作用についてさらに詳細に解析するとともに、抗原特異的抗体産生に及ぼす影響について検討した。赤ピーマン果肉抽出物はＢ細胞の増殖を促進し、抗体産生細胞数および形質細胞のマーカーを発現する細胞数を増加させることから、Ｂ細胞から形質細胞への分化も増強することが示された。ピーマン抽出物は、スカシガイヘモシアニン（KLH）で感作したマウスから調製した脾細胞による抗 KLH IgM 抗体および抗 KLH IgG 抗体の産生量ならびに抗 KLH IgM 抗体産生細胞数を増加させた。以上のように赤ピーマン抽出物はポリクローナル抗体産生および抗原特異的抗体産生を促進することから、本野菜の体液性免疫応答増強作用が示唆され、感染症の予防・治療等に対する有用性が期待される。本論文は学位（博士）論文に関する評価基準を満たしており、博士（学術）の学位に値すると判断する。