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Cellular immune response in intestinal villi of rats after consumption of onion (*Allium cepa* L.) or Quercetin

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Mucosal epithelia are primary sites for antigen entry. The microenvironment in these mucosal barriers has a marked influence on the immune response that ultimately ensues⁽¹⁾. The bioactive compounds present in foods would have an impact on the immunocompetence, especially in the intestinal villi (IV). In this way, the attention is focused on the possibility of modulating the immune response for enhancing health and quality life.

Allergy problems due to dietary factors were increased during the last few years almost at epidemic levels⁽²⁾. It is known that polyphenols have some effects related to immune response but results are partial and controversial. Immunoglobulin E (IgE) has a central role in allergic responses and secretory immunoglobulin A (SIgA) is important to generate immune protection without inflammation.

Onion is a food that presents a remarkable combination of bioactive compounds with high content of Quercetin (polyphenol). The aim of this study was to evaluate *ex vivo* the effect of consumption of onion or pure Quercetin on cellular immune responses in IV. An experimental model was used to evaluate the effect of protein malnutrition and allergy response. Weanling rats of *wistar* strain were fed a protein-free diet until they lost 25% of their initial body weight. Re-feeding was performed by the administration of an experimental diet containing 20% casein as the only source of protein (re-nourished group = R). Other experimental groups received this experimental diet plus onion juice (R+O) in quantity equivalent to normal consumption of an adult man or Quercetin (R+Q) in quantity equivalent to that containing in R+O, both added to drinking water during 40 days. Three well-nourished groups were used as normal controls (C) which were fed with standard commercial diet or the same diet plus onion juice (C+O) or plus Quercetin (C+Q). The small Intestine was removed and processed by Saint-Marie's technique. IgA⁺ and IgE⁺ B cells, CD5⁺ T-cells and CD4⁺ T sub-population in IV were assessed by indirect immunofluorescence technique. The animal protocol was approved by the ethical committee of the University of Buenos Aires and all procedures were in accordance with the department's guide for the care and use of laboratory animals. Results showed: (1) T lymphocytes, CD4 helper sub-population on intestinal Lamina Propria showed no significant difference. Instead, CD5 population showed significant difference ($P = 0.047$) for R: (mean; SE) 193; 11 compared to C: 227; 12 and within the R groups for R+Q: 153; 19 compared to R: 200; 19 ($P = 0.018$). This reveals that Quercetin consumption reduced CD5 T-cells. (2) IgA⁺ B lymphocytes showed no significant difference in R related to onion or Quercetin consumption (R+O, R+Q) but they presented significantly lower levels in R: 188; 12 compared to C: 254; 13 ($P = 0.001$). (3) IgE⁺ B cells were increased in R: 165; 7 as compared to C: 62; 7 ($P > 0.0001$) probably due to the administration of the experimental diet in this model of malnutrition. The IgE⁺ B cells population was significantly decreased in R+O: 79; 9 ($P < 0.0001$) arriving to the levels of the well-nourished group (C). Consumption of Quercetin also decreased IgE⁺ B cells, but it was less effective compared to onion (R+Q: 99; 6). These results indicate that onion and Quercetin would have a potential immuno-regulatory effect in allergic processes.

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2. Finkelman F & Vercelli D (2007) *J Allergy Clin Immunol* 120, 544–550.