



Potential immunomodulatory effects of casein-derived bioactive peptides in human T cells

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The hydrolysis of casein has been shown to produce bioactive peptides which possess immunomodulatory, antihypertensive, opioid, mineral binding and antibacterial activity⁽¹⁾. The bioactivity of casein hydrolysates is dependent on the size and sequence of the peptides which varies depending on the method of hydrolysis used. The objective of this study was to determine the effect of novel casein-derived bioactive peptides on the inflammatory response in Concanavalin A (Con A)-stimulated human Jurkat T-cells.

Eleven different hydrolysates, termed H1 to H11, were produced from sodium caseinate using various food-grade enzymes derived from mammalian, bacterial and plant sources. Following hydrolysis, the samples were subjected to ultrafiltration through membranes having different molecular mass cut-off values. The MTT assay was used to measure cell viability and determine non-cytotoxic concentrations of each hydrolysate. Jurkat T-cells were then stimulated with Con-A and treated with the hydrolysates at concentrations of 0.05% and 0.5% (w/v), for 24 hours at 37 °C. The release of three pro-inflammatory cytokines; Interleukin (IL)-6, IL-2 and Interferon (IFN)- γ , and the anti-inflammatory cytokine, IL-10 were measured by ELISA. The data are expressed as a percentage of untreated (control) cells.

	Interleukin-6 (% Control)		Interleukin-2 (% Control)		Interleukin-10 (% Control)		Interferon-gamma (% Control)	
	0.5%	SD	0.5%	SD	0.5%	SD	0.5%	SD
Control	100.0	7.8	100.0	5.9	100.0	3.9	100.0	10.9
H 1	76.0*	7.0	108.4	8.4	105.9	6.9	91	9.7
H 2	81.7*	5.4	99.4	6.3	111.3	5.9	89.1	9.6
H 3	79.0*	10.5	99.9	18.9	106.7	10.7	87.8	11
H 4	79.5*	2.6	88.7	14.0	102.7	8.9	94.3	7.9
H 5	83.6*	2.1	99.2	7.9	106.9	6.6	103.6	8.8
H 6	79.5*	3.8	95.8	11.2	111.2	13.2	93.6	6.5
H 7	80.9*	3.9	98.7	14.5	116.1	10.6	88.9	6.8
H 8	87.2*	5.4	101.2	8.5	102.1	8.8	97.3	3.5
H 9	83.4*	3.1	104	5.9	104.1	5.9	90.7	5.3
H 10	81.4*	3.4	93.4	5.5	101.8	8.2	85.5	3.7
H 11	85.4*	4.0	96.6	4.7	102.5	11.8	91.8	8.3

H: Hydrolysate. Values are means of three independent experiments. Statistical analysis was by ANOVA followed by Dunnett’s test. * $P < 0.05$

Each of the hydrolysates significantly ($P < 0.05$) reduced the release of IL-6 in Con-A stimulated cells at the 0.5% (w/v) concentration. The decrease in IL-6 release was highest in cells exposed to hydrolysates H1, H3, H4 and H6. The hydrolysates did not affect the release of IL-6 at the 0.05% (w/v) concentration (data not shown). There was no significant effect of the hydrolysates on the release of IL-2, IFN- γ or IL-10 in Con-A stimulated cells at either the 0.05% (w/v) or the 0.5% (w/v) concentration. In conclusion, the casein derived hydrolysates decreased the release of IL-6, a cytokine central to the pro-inflammatory response which may indicate a role for these hydrolysates as anti-inflammatory agents.

1. Phelan M, Aherne A, FitzGerald RJ, O’Brien NM. (2009). Casein-derived bioactive peptides: Biological effects, industrial uses, safety aspects and regulatory status. *Int Dairy J.* 19, 643–654.