THE IMMUNOGENICITY OF ZEA MAIZE GLUTEN IN RABBIT

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Abstract

Zea maize gluten (ZMG) was found to be weak lapin immunogen. Oil adjuvant (SFO) potentiate it's immunogenicity through the use of hyper-immunization protocol togather with SFO incorporation. ZMG-SFO stimulate both systemic as well as gut mucosal immune response, higher than that of ZMG alone in rabbits.

Introduction

The gluten (G) is a phytopeptide with an entero allergic mucosal and systemic immunogenicity (Janatuinen *et. al.*, 2000). Gluten has been described in serials like: wheat, barley, and /or oats (Stein *et al.*, 1994; Stites *et. al.*, 1994). Eating bread beakered from flavour of such serials may initiated mucosal allergic response terminated by the enterocyte damage (Wyngaarden and Smith, 1988; Moss *et. al.*, 1996). Meantime, zea maize gluten (ZMG) is not known to elicite such an entero allergy (Bell et. at., 1972; Stein et al., 1994). The immunogenicity of such gluten is rather unclear. Thus, the present work was aimed at the investigation of this theme.

Materials and Methods

I. Gluten Identification:

The colloid nature, color viscosity as well as biuret reaction were used to check the protein nature of the preparation. It was occure yellowish pest with pale greenish teng. Alkaline extraction by NaoH (0.6N) was used to refine the preparation Such crude preparation of gluten obtained ready made from Al-Hashimya starch factory.

II. Gluten Suspension:

One hundredth and two hundredth mg/ml gluten. Suspension were made as working proposed immunogen.

III. Rabbits:

six rabbits (*Oryctolagus cuniculus*) from local inbreed bought from regional markets. These rabbits were adapted to housing conditions in the departmental animal house. They were kept throughout immunization protocol *ad libitum* condition. These were grouped as group I with antigen alone and group II antigen and sunflower oil.

IV. Immunization Protocol :

A. Group I:

Received 100mg/ ml for kg as; 1 ml oral, ½ ml intramuscular and ½ ml subcutaneous; in two weeks a part followed by ten days leave, then test bled and bleed.

B. Group II:

Received 200 mg/ml for kg as one volum gluten and one volum sunflower oil emulsion form. One ml of 100mg oral without SFO and 1/2 ml (200mg/ml) with SFO intramuscular and 1/2 ml subcutaneous in two weeks apart followed by ten days leave the test bled and bleed. (Hassan, 2002)

C. Mucosal Immunoglobulins and Sera:

Blood samples were collected by cardiac puncture from all rabbits and sera separated. Rabbits were evicerated to collect gut parts for separation of mucosal immunoglobulins (Hassan, 2002).

V. Serology:

Zea maize gluten coated sheep erythrocytes were reacted with mucosal and serum immunoglobulins (Garvey et. al., 1977)

Results

Zea maize gluten (ZMG) fails to stimulate systemic humoral immune response in rabbits. While, it stimulates mucosal immune response at the appendix to a titer of 80. When it was combined in a volumetric rate of one to one sunflower oil (SFO). Zea maize gluten – sunflower oil combination (ZMG, SFO), it was inducing both systemic humoral immune response in serum to a titer of 240 and mucosal to a titer of 723 at ileum and 512 and appendix. Thus, ZMG was shown to be weak immunogen (WI). Such WI can be potentiated by SFO incorporation (Tables; 1, 2, 3)

Table (1) : Immunoglobulins concentration mean in zea maize gluten (ZMG) immunized rabbits (IR).

	(ZMGNR)* mg/ml	(ZMGIR)** mg/ml	(ZMGOIR)*** mg/ml
Systemic: serum	27.5	24.21	41.95
Mucosal:			
duodenum	0.92	4.25	3.14
jejunum	0.92	3.14	5.35
ileum	0.92	3.14	3.14
appendix	0.92	4.25	9.78

Abbreviation:

* : Zea maize gluten non-primed rabbits.

**: Zea maize gluten immunized rabbits.

***: Zea maize gluten oil immunized rabbits.

Table (2) : Titers of ZMG specific immunoglobulins in immunized rabbits.

	Titers haemagglutination		
	(ZMGNR)* mg/ml	(ZMGIR)** mg/ml	(ZMGOIR)*** mg/ml
Systemic: serum	0	0	240⊛
Mucosal:			
duodenum	0	0	0
jejunum	0	0	0
ileum	0	0	723
appendix	0	80	512

Abbreviation:

* : Zea maize gluten non-primed rabbits.

**: Zea maize gluten immunized rabbits.

***: Zea maize gluten oil immunized rabbits.

⊛: mean of readings in different primed animals.

Table (3):Immunoglobulins concentration (C) and ZMG titers (T) of specific immunoglobulins in immunized rabbits.

Nature of immune response	(ZMGNR)* mg/ml		(ZMGIR)** mg/ml		(ZMGOIR)*** mg/ml	
	C	T	C	T	C	T
Systemic: serum	27.5	0	24.21	0	41.95	240
Mucosal:						
Duodenum	0.92	0	4.25	0	3.14	
jejunum	0.92	0	3.14	0	5.35	0
ileum	0.92	0	3.14	0	3.14	723
appendix	0.92	0	4.25	80	9.78	512

Abbreviation:

*: Zea maize gluten non-primed rabbits.

**: Zea maize gluten immunized rabbits.

***: Zea maize gluten oil immunized rabbits.

Discussion

The multi-site injection with an oral dosage protocol in two weeks a part followed by ten days leave, then test bled presents the results tabulated in tables 1-3. ZMG was shown and be weak immunogen. Its immunogenicity could be potentiated by sunflower oil incorporation. Wheat gluten (WG) was good immunogen both for systemic and mucosal humoral immune responses (Hassan, 2002). Analogues to this situation, it is possible diet oils may have promotive effect to gluten sensitivity enteropathy (Shoenherr and Jewell, 1997). SFO is found to be of systemic and mucosal immunoadjuvanicity just as that for WG (Shnana, to be published). ZMG seemed to be of nulified interensic adjuvanicity (lövgren–Bengtsson, 1998).

Human consumption of Zea maize mile or zea maize derivation in beakry may be recommend with fat reduced or fat free preparations as this issue mights reflects. Thus, ZMG is an acidic protein with weak immunogenicity. A character that could be potentiated by sunflower oil incorporation.

References

- Bell, G. H; J. N. Davidson and D. E. Smith. 1972. Textbook of Physiology and Biochemistry. 8th edn., pp. 179 – 180. C. Tindling and Co. Ltd., London
- Garvey, J. S.; N. E. Cremer and D. H. Sussdrof. 1977. Methods in Immunology. 3th edn., pp. 253-267. Addison-Wesley Publishing Company, Inc., Reading.
- Hassan, A. J. 2002. Comparative study on some aspects of the immune system of collard dove (*Streptopelia decaocta*) and rabbit (*Oryctolagus cuniculus*). Ph. D. thesis. College of science. Babylon University.
- Janatuinen, E. K.; T. A. Kemppainen; P. H. Pikkarainen; K. H. Holm; V. M. Kosma; M. Maki and R. J. Julkumen. 2000. Lack of cellular and humoral immunological responses to oates in adults with coeliac disease. Gut, 46: 327-331.
- Lövgren-Bengtsson, K. 1998. Preparation and use of adjuvants. In faüfman SHE and kabelitz. Ded. Immunology of Infection. Methods in Microbiology. 25. Academic Press.

- Moss, S. F.; H. Attia; J. V. Scholes; J. R. F. Walters and P. R. Holt. 1996. Increased small intestinal apoptosis in coeliac disease. Gut, 39: 811-817.
- Schoenherr, W. D. and E. Jewell. 1997. Nutritional and modification of inflammatory diseases. Seminars in Veterinary Medicine and Surgery. 12 (3): 212-222.
- Stein, J. H.; J. J. Hutton; R. A. Orourke; M. A. Sammules; J. S. Trier; P. O. Kohler; H. Y. Reynolds; M. A. Sande and N. J. Zvaifler, 1994. Internal medicine. 4th edn., pp. 449-451. Mosby-Year Book, Inc.
- Stites, D. P.; A. I. Terr and T. G. Parslow, 1994. Basic and Clinical Immunology. pp. 457-459. Prentice-Hall International Inc., London.
- Wyngaarden, J. B. and L. H. Smith. 1988. Cecil textbook of medicine. 8th edn., pp. 742-743. W. B. Saunders Company. Philadelphia, USA.

خاصية استمناع كلوتين الذرة الصفراء في الارنب

الخلاصة:

وجد بان كلوتين الذرة الصفراء ممنع ضعيف للارنب. وعند تضمين زيت زهرة الشمس معه تبين بان الزيت قد قوى قابليته الممنعه للارنب وانه قد نبّه لاستجابة خلطية جهازية وخلطية مخاطية في المعي متخصصة بكلوتين الذرة الصفراء اعلى منه في حالة الكلوتين لوحده في الارنب.