able amounts of hexosamine[6]. The precipitin lines do represent the lectin-glycoconjugate complexes. As unspecific reactions may occur in this Ouchterlony agar-gel technique, as discussed earlier by us[9], these were completely excluded in this investigation by control experiments. Moreover, lectins purified by us, or from commercial sources (Medac) were employed in this investigation. Accordingly, the interaction between the lectin and the galactan can be supposed to be specific.

It has been claimed that the Agaricus lectin has a very similar specificity to that of the peanut lectin, namely DGalβ1→3DGalNAc[10]. Experiments from this laboratory could, however, not confirm this observation[11,12]. Again, in the present experiments, the Agaricus lectin unlike the peanut one, did not react with the snail galactan. Whereas, therefore, the exact specificity of the Agaricus lectin has still to be defined, the reactions of the Arachis lectin with the galactan can only be interpreted as being due to a hexosamine-free DGalβ1→3DGal terminal disaccharide, because β1→4 linkages, which may also react with peanut[12], do not usually occur in snail galactans[13], which mainly have β1→6 or β1→3 galactosidic linkages[13,14].

1 Reprint requests to: G.U. Department of Immunobiology, Medical University Clinics of Cologne, Kerpenerstrasse 15, D-5000 Cologne 41.

2 G. Uhlenbruck, G. Steinhausen and N.A. Kareem, Z. Immun Forsch. *152*, 220 (1976).
3 G. Uhlenbruck, G. Steinhausen, G. Geserick and O. Prokop, Comp. Biochem. Physiol. B *59*, 285 (1978).
4 B.P. Chatterjee, S. Chatterjee, O.Prokop and G. Uhlenbruck, Biol. Zbl. *98*, 85 (1979).
5 G. Uhlenbruck, Naturwissenschaften *68*, 606 (1981).
6 R.O. Okotore, P.J. Klein, M. Ortman and G. Uhlenbruck, Comp. Biochem. Physiol. B *70B*, 469 (1981).
7 R. Lotan, E. Skutelsky, D. Danon and N. Sharon, J. biol. Chem. *250*, 8515 (1975).
8 A.M. Wu, E.A. Kabat, F.G. Gruezo and N.J. Allen, Archs Biochem. Biophys. *204*, 622 (1980).
9 G. Uhlenbruck, B.P. Chatterjee and U. Schuldes, Z. Naturforsch. *33C*, 442 (1978).
10 C.A. Presant and S. Kornfeld, J. biol. Chem. *247*, 6937 (1972).
11 P. Vaith and G. Uhlenbruck, Z. Immun Forsch. *154*, 1 (1978).
12 G.H. Farrar, G. Uhlenbruck and D. Karduck, Z. Physiol. Chem. *361*, 473 (1980).
13 H. Bretting, 3rd Lectin Meeting, Hamburg 1981.
14 G. Uhlenbruck, G. Steinhausen and B.A. Baldo, 'Galactane und Anti-Galactane'. Stippak, Aachen 1975.

Specific immunosuppression of IgE response to hapten DNP by DNP linked to monoclonal IgG_1 in rats[1]

D. Pan, W.Y. Lee[2] and M.-S. Shiao

Department of Physiological Chemistry, University of Wisconsin, and William S. Middleton Memorial Veterans Hospital, Lipid Metabolism Laboratory, Madison (Wisconsin 53705, USA), Department of Immunology, Faculty of Medicine, The University of Manitoba, Winnipeg (Manitoba, Canada), and Biological Research Institute, Academia Sinica, Taipei (Taiwan), 21 April 1981

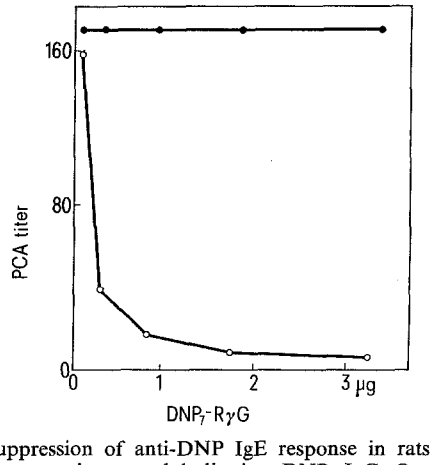
Summary. The induction of the anti-DNP IgE in rat was suppressed by pretreatment of rats with the tolerogen synthesized by coupling DNP to rat IgG, i.e.; DNP_{7-10}-IgG. It was found that DNP_{10}-IgG_1 was an effective tolerogen, whereas other DNP conjugates, i.e. DNP_9-IgM, DNP_9-IgA, DNP_{10}-IgE, DNP_{10}-IgG_{2c} and DNP_{10}-IgG_{2a} were ineffective.

It is generally believed that IgE as the main carrier of reaginic activity exerts its physiological function in vivo, resulting in the atopic disorders in man[3]. The immunosuppression of the production of IgE in vivo has been the subject of intensive investigation in immunotherapy. The study of the induction and function of reaginic antibody in animal systems is therefore considered as a major step towards understanding the fundamental biological role of human reaginic antibody. In numerous recent communications reported from our group we have shown that reaginic antibody responses to both hapten DNP and its carrier OA (ovalbumin) could be induced in mice, rats, guinea-pig and dogs[4-10] by a single i.p. injection of 1 µg of DNP_3-OA conjugate, and the formation of anti-DNP reaginic antibody could be successfully suppressed by treatment of mice or dogs with a conjugate of the hapten to isologous DNP-IgG. The characteristic feature of the immunosuppression of the IgE response of this system has been envisioned to have a great potential clinical significance in the treatment of allergic diseases in man[4,5]. In the present study, a similar system of the induction of reaginic antibodies in response

Table 1. Effect of different DNP_x-OA conjugates on the formation of IgE

Antigen (DNP-OA)*	PCA** titer DNP	OA
$DNP_{0.5}$-OA	0	0
$DNP_{2.8}$-OA	150	140
$DNP_{3.8}$-OA	160	140
DNP_{20}-OA	10	5

* Animals were immunized (o.p.) with 1 µg of DNP-OA in the presence of 1 mg $Al(OH)_3$ and 10^{10} *B. Pertussis.* ** Serum obtained from day 14 was used for measuring the IgE response by means of passive cutaneous anaphylaxis (PCA) assays in random outbred hooded rats. Animals were etherized for bleeding and for PCA assays.



Immunosuppression of anti-DNP IgE response in rats by DNP linked rat gamma immunoglobulin, i.e.; DNP_7-IgG. O——O, anti-DNP IgE response; ●——●, anti-OA IgE response. Serum obtained from day 14 was used for PCA assay.

to both DNP and OA was demonstrated in inbred Chester Beatty hooded rats by administration (i.p.) of 1 μg of DNP_3-OA antigen together with 1 mg $Al(OH)_3$ and 10^{10} *B. pertussis*. It was found that neither $DNP_{0.5}$-OA nor DNP_{20}-OA induce the synthesis of anti-DNP and anti-OA IgE response antibodies; whereas $DNP_{2.8}$-OA and $DNP_{3.8}$-OA were found to be the most effective antigens. The failure of the induction of the formation of IgE response by $DNP_{0.5}$-OA might be due to the lightly modified carrier and low dose of antigen used. On the other hand, when highly substituted conjugated DNP_{20}-OA was employed as antigen for immunization, the failure of the induction of anti-DNP and anti-OA IgE antibodies could be due to the severe modification of the antigenic determinants of the carrier molecule (OA). For better understanding of the nature of the specific immunosuppression of DNP by DNP linked to different rat monoclonal immunoglobulins experiments of pretreatment of rats with different DNP conjugates, i.e; DNP_{10}-IgG_1, DNP_{10}-IgG_{2c}, DNP_{10}-IgG_{2a}, DNP_{10}-IgE, DNP_9-IgA and DNP_9-IgM were conducted. As can be seen from tables 1 and 2, the immunosuppression of anti-DNP IgE response by DNP-IgG was monoclonal immunoglobulin specific. DNP_{10}-IgG_1 was found to be the most effective tolerogen, whereas other DNP conjugates were not effective under the same testing conditions; the immunosuppression was DNP hapten specific, and the anti-OA carrier IgE formation was not affected. Moreover, the pretreatment of rats with administration of 1 mg of DNP-IgG as the tolerogen brought about a complete suppression of anti-DNP IgE response but not OA, and also neither anti-DNP nor anti-OA hemagglutinating antibodies were affected under this treatment. Thus, the essential information presented here is that the administration of hapten linked to a specific monoclonal immunoglobulin brings about the suppression of the induction of the anti-DNP hapten specific response in the rats. In this regard, it is therefore suggested that the immunosuppression model of this study may shed some light on the development of an immunotherapy for some allergic diseases in man by means of coupling a hapten (e.g. penicillin) to human specific monoclonal immunoglobulin, which can be produced in large quantities by using the hybridoma technique.

Table 2. Specificity of immunosuppression of DNP_{10}-IgG_1

DNP-conjugates	Dose mg	PCA titer* DNP	OA
DNP_{10}-IgG_1	0.000	160	120
	0.025	160	120
	0.320	20	120
	0.800	15	120
DNP_{10}-IgG_{2a}	0.000	160	115
	0.092	160	115
	0.277	160	115
	0.500	160	115
DNP_{10}-IgG_{2c}	0.000	160	120
	0.100	160	120
	0.500	160	120
DNP_9-IgA	0.000	150	180
	0.200	150	180
	0.600	150	180
DNP_{10}-IgE	0.000	120	210
	0.500	120	210
	0.900	120	210
DNP_9-IgM	0.000	160	100
	0.500	160	100
	1.000	160	100

* Serum obtained from day 14 was used for measuring the IgE responses.

1 This work was partly supported by a research grant from the Medical Council of Canada to W.Y.L.
2 Present address: Immunology Laboratory, Department of Laboratories, Foothills Hospital, Calgary, Alberta, Canada.
3 K. Ishizaka and T. Ishizaka, J. Immun. *99*, 1187 (1967).
4 W.Y. Lee and A.H. Sehon, J. Immun. *114*, 829 (1975).
5 W.Y. Lee and A.H. Sehon, J. Immun. *117*, 927 (1976).
6 W. Kepron, J.M. James, A.H. Sehon and K.S. Tse, J. Allergy clin. Immun. *59*, 64 (1977).
7 D. Pan, W.Y. Lee, A.H. Sehon and H. Bazin, Fedn Proc. *35*, 433 (1976).
8 D. Pan, W.Y. Lee and Ming-Shi Shiao, Archs int. Physiol. Biochem. *88*, 515 (1980).
9 D. Pan, W.Y. Lee and Ming-Shi Shiao, submitted.
10 D. Pan, W.Y. Lee and Ming-Shi Shiao, submitted.

Hormonal regulation of a new female-specific serum protein (FP) of the laboratory rat

R. Schade and W. Bürger

Institut für Pharmakologie und Toxikologie, Abteilung Toxikologie, Humboldt-Universität zu Berlin, Bereich Medizin (Charité), Clara-Zetkin-Strasse 94, DDR-108 Berlin (German Democratic Republic), and Abteilung Klinische Immunologie, Humboldt-Universität zu Berlin, Bereich Medizin (Charité), Ziegelstrasse, DDR-108 Berlin (German Democratic Republic),
23 December 1980

Summary. This paper reports evidence for a hormonal regulation of a new rat serum protein (female specific protein, FP) which is only demonstrable in female rats. Male and female rats were treated with testosterone and estrogen. The FP was assayed with immunological methods. The following results were obtained: 1. In testosterone-treated females the serum level of FP is reduced significantly. 2. In estrogenized males the FP was distinctly demonstrable but not in the control males.

Quantitative and qualitative sex-specific differences have been observed in some human plasma proteins and likewise for plasma proteins of different animal species[1]. Apart from merely quantitative differences there are proteins which are demonstrable only in pregnant women (PAPP's = pregnancy associated specific plasma proteins[2]). Such proteins also appear in the serum of rats and mice[3,4]. Besides that, proteins have been discovered which are limited to the female or the male sex under normal conditions. Such sex-specific proteins have been identified in the Syrian hamster[5], in the rat[6] and in the mouse[7].

In a previous paper[8] we described a female-specific rat serum protein which was detected during experiments with specific absorbed antisera. By means of these antisera a