



REFERENCES

- Avrameas, S., Termynck, T. and Guesdon, J.L. Coupling of enzymes to antibodies and antigens. Scand. J. Immunol. 8 (1978): 7-23.
- Bauminger, S. and Wilchek, M. The use of carbodiimides in the preparation of immunizing conjugates. Method in Emzymology. 70(1980): 151-159.
- Boorsma, D.M. and Kalsbeek, G.L. A comparative study of HRP conjugates prepared with a one - step and a two - step method. J. Histo and Cytochem. 23(1975): 200-207.
- _____ and Streefkerf, J.G. Periodate or glutaraldehyde for preparing peroxidase conjugates?. J. Immunol. Method. 30(1979): 245-244.
- Ellis, E.F., Koysooko, R. and Levy, G. Pharmacokinetics of theophylline in children with asthma. Pediatrics 58 (1976): 542-547.
- Erlanger, B.F. The Preparation of antigenic hapten - carrier conjugates : A survey. Methods in Enzymology. 70 (1980): 85-159.

- _____. Principles and methods for the preparation of drug protein conjugates for immunological studies. Pharmacology 25 (1973): 271-280.
- _____, et al. Steroid - protein conjugates I. Preparation and characterization of conjugates of bovine serum albumin with testosterone and with cortisone. J. Biol. Chem. 228 (1957): 713-727.
- Grab, F.L. and Reinstein, J. A. Determination of caffeine in plasma by gas chromatography. J. Pharm. Sci. 57 (1968): 1703 - 1706.
- Gushaw, J.B., Chang, J., and Gotcher, S. Homogeneous enzyme - immunoassay for theophylline in serum and plasma. Clinical Chemistry 28 (1982): 361-367.
- _____, Hu, M.W., Singh, P., Miller, L.G., and Schneider, R.S. Homogeneous enzyme - immunoassay for theophylline in serum. Clinical Chemistry 23 (1977): 1144.
- Habeeb, A.F.S.A. Determination of free amino groups in protein by trinitrobenzenesulfonic acid. Anal. Biochem. 14 (1966): 328-336.

- Hendeles, L., Weinberger, M., and Johnson, G. Monitoring serum theophylline levels. Clinical pharmacokinetics 3 (1978): 294-312.
- Hosoda, H., Kawamura, N. and Nambara, T. Effect of bridge heterologous combination on sensitivity in enzyme immunoassay for cortisol. Chem. Pharm. Bull. 29 (1981): 1969-1974.
- Hu, M.W., Singh, P., and Ullman, E.F. Use of (pivaloyloxy) methyl as a protecting group in the synthesis of antigenic theophylline (1,3- dimethylxanthine) derivatives. J. Organic. 45 (1980): 1711-1713.
- Kerr, M.A. and Thrope, R. Producing Antibodies. Immunochemistry Labfax. Oxford : Blackwell scientific Publication, 1994.
- Jacob, M.H., Senior, R.M., and Keyler, G. Clinical experience with theophylline relationships between dosage, serum concentrations and toxicity. J. Am. Med. Assoc. 235 (1976): 1983-1986.
- Jenne, J.w., Wyze, E., Rood, F.S., and MacDonald, F.M.

Pharmacokinetics of theophylline : application to adjustment of the clinical dose of aminophylline. Clin. Pharmacol. Ther. 13 (1972): 349-360.

Li, T.M., Benovic, J.L., and Burd, J.F. Serum theophylline determination by fluorescence polarization immunoassay utilizing an umbelliferone derivative as a fluorescent label. Anal. Biochem. 118 (1981): 102-107.

Litman, D.J. et al. An internally referenced test strip immunoassay for morphine. Clinical Chemistry 29 (1983): 1598-1603.

Loomis, K.F., and Frye, R.M. Evaluation of the Abbott Tdx for the stat measurement of phenobarbital, phenytoin, carbamazepine and theophylline. Am.J.Clin.Patho. 80(1983): 686-691.

Mannik, M. and Downey, W. Studies on the conjugation of HRP to Fab fragments. J. Immunol. Method. 3(1973): 233-242.

Mathews, S.T., Schneiwiss, F., and Cersosimo, R.J. A Clinical manual of adverse drug reaction. USA : Appleton Crofts, 1986.

- McDonald, J.M., and Landerson, J.H. Theophylline toxicity. Clinical Chemistry. 24 (1978): 1603-1608.
- Merriman, R.L., Swanson, A., Anders, M.W., and Sladek, N.E. Microdetermination of caffeine in blood by gas chromatography - mass spectrometry. J. Chromatogr. 146 (1978): 85-90.
- Nakane, P.K. and Kawasi, A. Peroxidase labeled antibody a new method of conjugation. J. Histo. and Cytochem. (1974): 1084-1091.
- Neese, A.L., and Soyka, L.F. Development of a RIA for theophylline : Application to studies in premature infants. Clin. Pharmacol. and Therapeu. 21 (1977): 633-641.
- Nygren, H. and Hansson, H.A. Conjugation of HRP to Staphylococcal protein A with benzoquinone, glutaraldehyde, or periodate as cross - linking reagents. J. Histo. and Cytochem. 29(1981): 266-270.
- Okuyama, T. and Satake, K. On the preparation and properties of 2,4,6,- trinitrophenyl - amino acid and peptidase. J. Biochem. 47 (1960): 454-466.

- Paul, K.G. and Stigbrand, T. Four isoperoxidase from horse radish root. Acta. Chemica. Scandinavica. 24 (1970): 3607-3677.
- Piafsky, K.M., and Ogilvie, R.I. Dosage of theophylline in bronchial asthma. N.Eng.J.Med. 292 (1975): 1218-1222.
- Porstmann, T., and Kiessig, S. T. Enzyme immunoassay techniques. J. Immunolog. Method. 150 (1992): 5-21.
- Reynold, J. E. F. Martindale: The extra pharmacopoeia. 29 th ed. London : Pharmaceutic Press , 1989.
- Routh , J. I. , Shane , N.A. , Arredondo , E.G. and Paul, W.D. Determination of caffeine in serum and urine. Clinical Chemistry 15(1969): 661 - 668.
- Rowe, D.J.F., Watson, I.D., Williams, J. and Berry, D.J. The clinical use and measurement of theophylline. Ann.Clin.Biochem. 25 (1988): 4-26.
- Royer, B. P. In : Methods in Enzymology 135 (1987): 141.
- Satake, K., Okuyama, T., Ohashi, M., and shinoda, T. The spectrophotometric determination of amine , amino acid and

peptide with 2,4,6 - trinitrophenyl -1- sulfonic acid. J. Biochem. 47 (1960): 654-660.

Sadee ,W. and Beelem , G. C. M. Drug Level Monitoring : Analytical Technique , Metaboliem and Pharmacokinetics. USA. : John Wiley & Sons , 1980.

Scharpe, S.L., Cooreman, W.M., Blomme, W.J. and Laekeman, G.M. Quantitative enzyme immunoassay : Curren Status. Clinical Chemistry 22(1976): 733-738.

Shannon, D.C., Gotay, F., Stein, I.M., Rogers, M.C., Todres, I.D., and Moylan, F.M.B. Prevention of apnea and bradycardia in low birth - weight infants. Pediatrics 55 (1975): 589-594.

Shannon, L.M., Kay, E. and Lew, J.Y. Peroxidase from Horseradish roots. J. Biol. Chem. 241(1966): 2166-2172.

Standerfer , J. C. and Saunders , G. C. Enzyme immunoassay for gentamicin. Clinical Chemistry 24 (1978) : 1903 -1907.

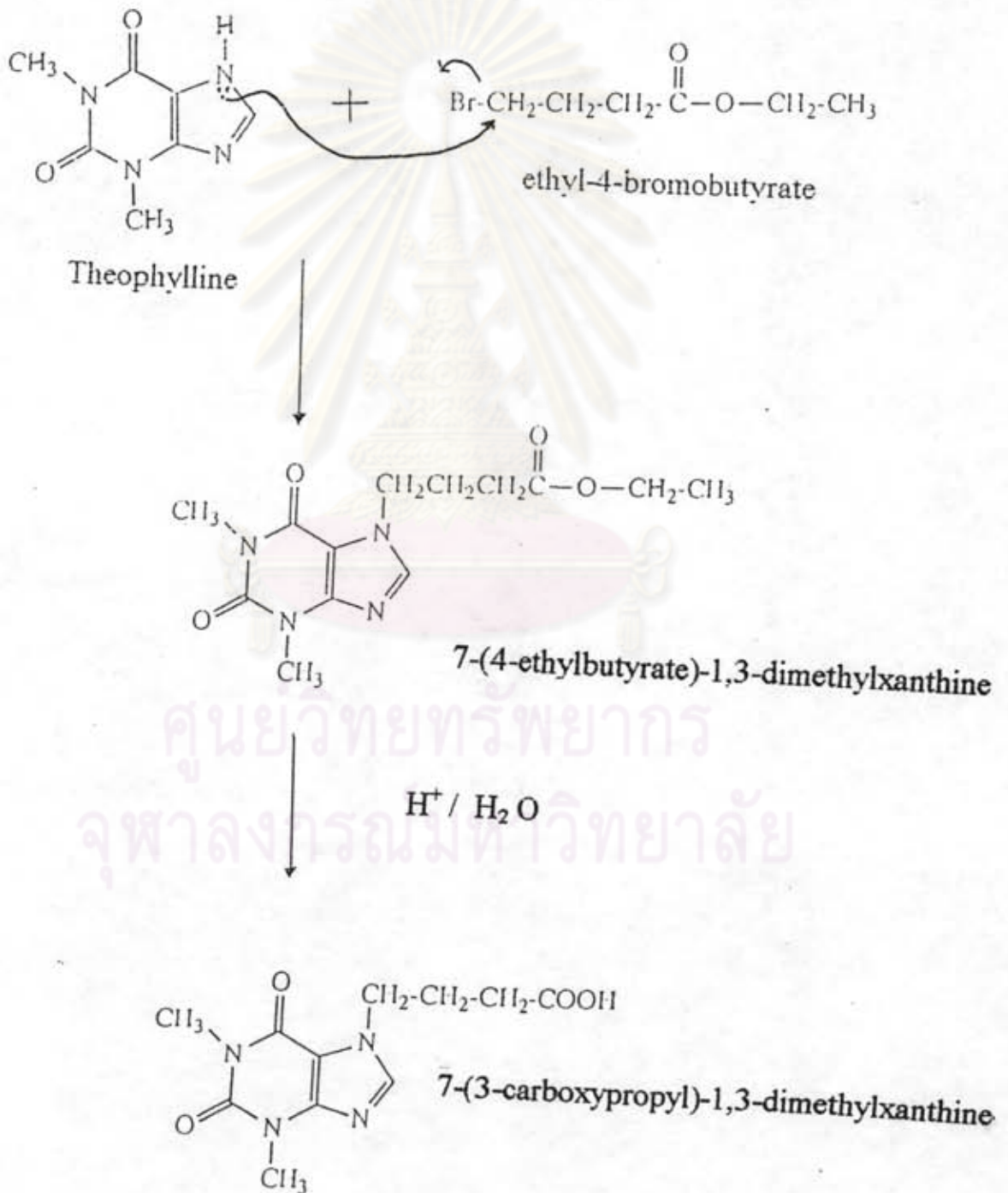
Tijssen, P. Practice and theory of enzyme - immunoassays. (Burdon, R.H.ed.) , vol. 15 Elsevier ; Netherlands (1985).

- Tijssen, P., and Kurstak, E. Highly efficient and simple methods for the preparation peroxidase and active peroxidase - antibody conjugates for enzyme - immunoassays. Anal. Biochem. 136 (1984): 451-457.
- Turkes, A., Dyas, J., Read, G.F., and Riad - Fahmy, D. Enzyme immunoassay for specific determination of the synthetic estrogen, ethinyl estradiol in plasm. Clinical Chemistry 27 (1981): 901-905.
- Van Weeman, B.K. and Schuurs, H.W.M. The influence of heterologous combinations of antiserum and enzyme - labeled estrogen on the characteristics of estrogen enzyme immunoassays. Immunochemistry 12(1975): 667-670.
- Weinberger, M.M., and Bronsky, E.A. Evaluation of oral bronchodilator therapy in asthmatic children. J. Pediatric. 84 (1974): 421-427.
- Wilchek, M. and Bauminger, S. In : Method in enzymology vol. 70 (1980): 151-159.
- Wilson, J. D. et al. Harrison's principle of internal medicine 12 th ed. vol. 1, 2. USA : McGraw - Hill, 1991.

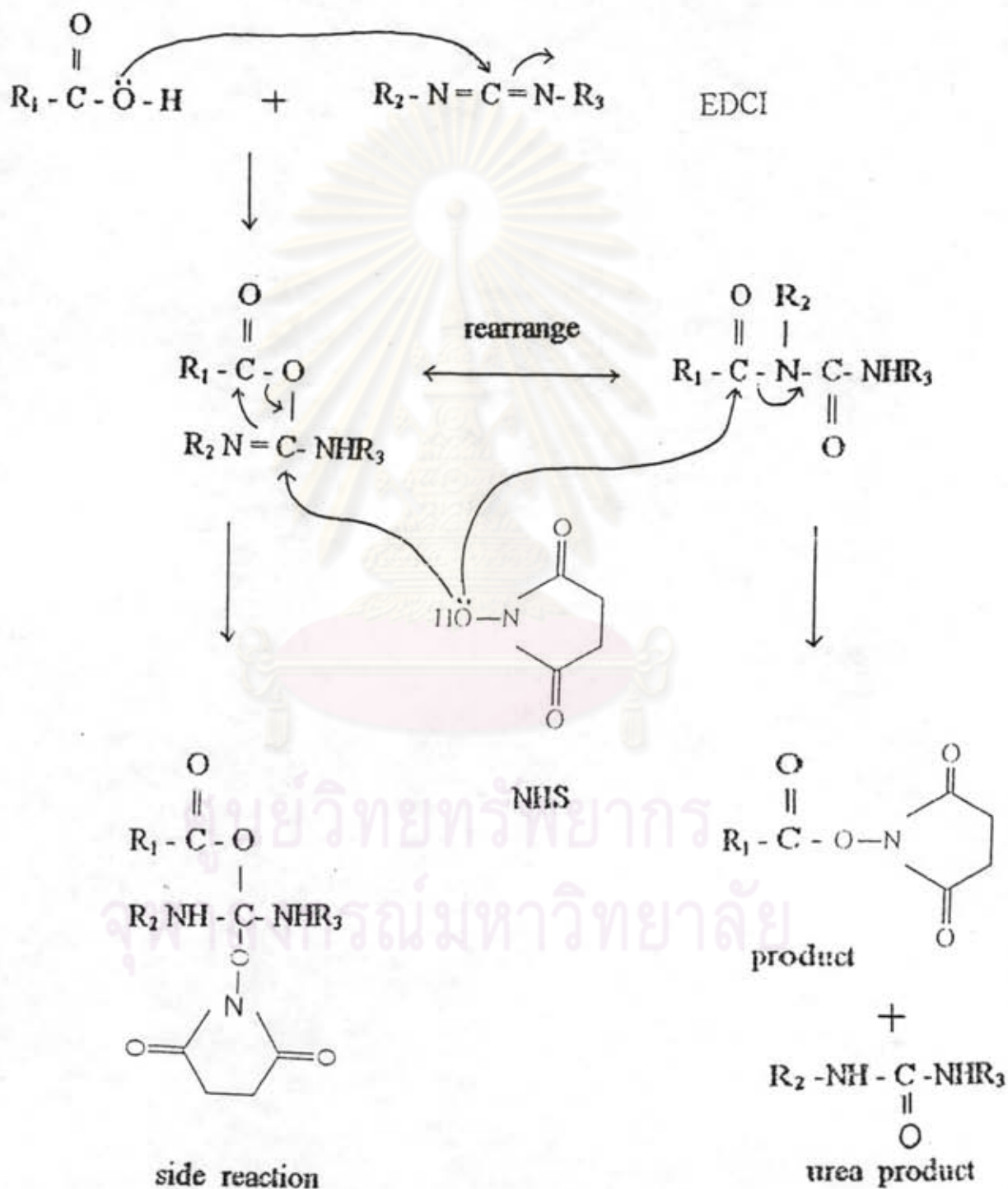
- Wilson, M.B. and Nakane, P.K. Recent developments in the periodate method of conjugating HRP to antibodies. Immunofluorescence and Related staining Techniques. (1978) : 215-224.
- Wisdom, G.B. Review : Enzyme Immunoassays. Clinical Chemistry 22(1976): 1243-1255.
- Wyatt, R., Hendeles, L., and Weinberger, M. Guide to oral theophylline therapy for the treatment of chronic asthma. Am.J.Dis.Child. 132 (1978): 876-880.
- Yoshitake, S. et al. Mild and efficient conjugation of rabbit Fab and HRP using a maleimide compound and its use for enzyme immunoassays. J. Biochem. 92(1982): 1413-1424.
- Zuk, R.F. et al. Enzyme - Immunochromatography : A quantitative immunoassay requiring no instrumentation. Clinical Chemistry 31 (1985): 1144-1150.
- Zwillich, C.W., Sutton, F., Neff, T.A., Cohn, W.M., Mathay, R.A., and Weinberger, M.M. Theophylline induced seizures in adults : correlation with serum concentrations. Ann. Intern. Med. 82 (1975): 784-787.

APPENDICES

Appendix A Reaction mechanism of 7-(3- carboxypropyl)- -1,3- dimethylxanthine



Appendix B Reaction mechanism of NHS ester of
7-(3- carboxypropyl)-1,3- dimethylxanthine





Appendix C The absorbance and The % Binding of antibody at the different dilution antibody

dilution of antibody	Antibody A		Antibody B	
	absorbance 492nm.	% Binding	absorbance 492nm.	% Binding
1 : 100	1.43	100	2.22	100
1 : 1,000	1.39	97.3	2.20	99.2
1 : 10,000	0.76	53.4	1.91	86.0
1 : 100,000	0.29	20.2	0.46	20.7
1 : 1,000,000	0.26	18.3	0.24	10.7



VITA

MISS TAPANEE HONGRATANAWORAKIT WAS BORN ON OCTOBER 23 , 1967 IN TRANG , THAILAND , GRADUATED WITH A BACHELOR OF SCIENCE IN PHARMACY FROM CHULALONGKORN UNIVERSITY IN 1990.



ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย