

BIBLIOGRAPHY

- Abernethy, D.R., Greenblatt, D.J., Divool, M., Ameer, B., Shader, R.I. 1983. Differential effect of cimetidine on drug oxidation (antipyrine and diazepam) vs. conjugation (acetaminophen and lorazepam): Prevention of acetaminophen toxicity by cimetidine. *J. Pharmacol. Exp. Ther.* 224 : 508-513.
- Adamson, G.M. and Harman, A.W. 1988. Comparison of the ductceptibility of hepatocytes from postnatal and adult mice to hepatotoxins. *Biochem. Pharmacol.* 37 : 4183-4190.
- Albano, E., Rundgren, M., Harvison, P.J., Nelson, S.D. and Moldeus, P. 1985. Mechanisms of *N*-acetyl-*p*-benzogninoneimine cytotoxicity. *Molecular Pharmacology.* 28 : 306-311.
- Al-Mustafa, Z.H., Al-Ali, A.K., Qaw, F.S. and Abdul-Cader, Z. 1997. Cimetidine enhances the hepatoprotective action of *N*-acetylcysteine in mice treated with toxic dosed of paracetamol. *Toxicology.* 121 : 223-228.
- Amimoto, T., Matsura, T., Koyama, S., Nakanishi, T., Yamada, K. and Kajitama, G. 1995. Acetaminophen-induced hepatic injury in mice: The role of lipid peroxidation and effects of pretreatment with coenzyme Q₁₀ and α -tocopherol. *Free Radic. Biol. Med.* 19 (2) : 169-176.
- Anderson, M.E. 1985. Determination of glutathione and glutathione disulfide

in biological samples. *Methods Enzymol.* 113 : 548-554.

Andreas, M.P. 1999. Major dietary and other antioxidants : Vitamin E: Tocopherols and Tocotrienols. In Andreas, M.P. (ed.), *Antioxidant Status, Diet, Nutrition, and Health*, pp. 189-210. New York : CRC Press.

Andrews, R.S., Bond, C.C., Burnett, J., Saunders, A. and Watson, K. 1976. Isolation and identification of paracetamol metabolites. *J. Int. Med. Res.* 4 : 34-39.

Arnaiz, S.L., Llesuy, S., Cutrin, J.C. and Boveris, A. 1995. Oxidative stress by acute acetaminophen administration in mouse liver. *Free Radic. Biol. Med.* 19 : 303-310.

Babior, B.M. 1978. Oxygen dependent microbial killing by phagocytes. *N Engl J. Med.* 298 : 659-668; 721-725.

Babu, B.H., Shylesh, B.S. and Padikkala, J. 2001. Antioxidant and hepatoprotective effect of *Acanthus ilicifolius*. *Fitoterapia.* 72 : 272-277.

Bagnall, W.E., Kellcher, J., Walker, B.E. and Losowsky, M.S. 1979. The gastrointestinal absorption of paracetamol in the rat. *J. Pharm. Pharmacol.* 31 : 157-160.

Bamroongruga, N. and Yaacob, O. 1990. Production of economic fruits in southern Thailand and northern Malaysia. *Prince of Songkhla University, Pattani Campus Publ*, p. 96.

- Barker, J.D., de Carle, D.J. and Anuras, S. 1977. Chronic excessive acetaminophen use and liver damage. *Ann. Intern. Med.* 87 : 299 - 301.
- Bartolone, J.B., Birge, R.B., Bulera, S.J., Bruno, M.K., Nishanian, E.V., Cohen, S.D. and Khairallah, E.A. 1992. Purification, antibody production, and partial amino acid sequence of the 58-kDa acetaminophen binding liver proteins. *Toxicol. Appl. Pharmacol.* 113 : 19-29.
- Beaulac-Baillargeon, L. and Rocheleau, S. 1994. Paracetamol pharmacokinetics during the first trimester of human pregnancy. *Eur. J. Clin. Pharmacol.* 46 : 451-454.
- Birge, R.B., Bartolone, J.B., Cohen, S.D., Khairallah, E.A. and Smolin, L.A. 1991. A comparison of proteins S-thiolated by glutathione to those arylated by acetaminophen. *Biochem. Pharmacol.* 42 : S197-207.
- Blios, M.S. 1958. Antioxidant determination by the use of stable free radical. *Nature.* 181 : 1199 – 2001.
- Bonini, M.G. and Augusto, O. 2001. Carbon dioxide stimulates the production of thiyl, sulfinyl and disulfide radical anion from thiol oxidation by peroxynitrite. *J. Biol. Chem.* 276 : 9749 – 9754.
- Bonkowsky, H.L., Mudge, G.H. and McMurtry, R.J. 1978. Chronic hepatic inflammation and fibrosis due to low dosed of paracetamol. *Lancet.* 1 : 1016-1018.

- Bonorden, W.R. and Pariza, M.W. 1994. Antioxidant nutrients and protection from free radical. In F.N. Kotsonis, M. Mackey and J. Hjelle (eds.), *Nutrition toxicology: Target organ toxicology series*, pp. 19-48. New York. Ravan Press.
- Boobis, A.R., Tee, L.B.G., Hampden, C.E. and Davies, D.S. 1986. Freshly isolated hepatocytes as a model for studying the toxicity of paracetamol. *Food Chem. Toxicol.* 24 : 731-736.
- Briant, R.H., Dorrington, R.E., Cleal, J. and Williams, F.M. 1976. The rate of acetaminophen metabolism in the elderly and the young. *J. Am. Geriatr. Soc.* 24 : 359-361.
- Brigelius-Flohe, R. 1999. Tissue specific functions of individual glutathione peroxidase. *Free. Radic. Biol. Med.* 27 : 951-953.
- Buckpitt, A.R., Rollins, D.E. and Mitchell, J.R. 1979. Varying effects of sulfhydryl nucleophiles on paracetamol oxidation and sulfhydryl adduct formation. *Biochem. Pharmacol.* 28 : 2941-2946.
- Chen, W., Koenigs, L.L., Thompson, S.J., Peter, R.M., Rettie, A.E., Trager, W.F. and Nelson, S.D. 1998. Oxidation of acetaminophen to its toxic quinoneimine and nontoxic catechol metabolites by baculovirus-expressed and purified human cytochromes 2E1 and 2A6. *Chem. Res. Toxicol.* 11 : 295-301.
- Chenoweth, M. and Hake, C. 1962. The smaller halogenated aliphatic

hydrocarbons. *Ann. Rev. Pharmacol.* 2 : 363-398.

Clements, J.A., Heading, R.C., Nimmo, W.S. and Prescott, L.F. 1978. Kinetics of acetaminophen absorption and gastric emptying in man. *Clin. Pharmacol. Ther.* 24 : 420-431.

Clissold, S.P. 1986. Paracetamol and phenacetin. *Drug.* 32 : 46-59.

Cohen, G. and Hochstein, P. 1963. Glutathione peroxidase: the primary agent for the elimination of hydrogen peroxide in erythrocytes. *Biochemistry.* 2 : 9402-9408.

Coles, B. and Ketterer, B. 1990. The role of glutathione and glutathione transferase in chemical carcinogenesis. *Crit. Rev. Biochem. Mol. Biol.* 25 : 47-70.

Combs, J.R. and Gerald, F. 1998. *The vitamin : fundamental aspects in nutrition and health* (2nd ed). Academic Press, INC.

Dahlin, D.C., Miwa, G.T., Lu, A.Y.H. and Nelson, S.D. 1984. *N*-acetyl-*p*-benzoquinoneimine: a cytochrome P450-dependent oxidation product of acetaminophen. *Proc. Nation. Acad. Sci.* 81 : 1327-1331.

Dahm, L.J. and Jones, D.P. 1996. Mechanisms of chemically induced liver disease. In D.Zakim and T.D. Boyer (eds.), *Hepatology: a textbook of liver disease* (3rded.), W.B. pp. 876-1005. USA. Saunders Company

- Draper, H.H. and Hadley, M. 1990. Malondialdehyde determination as index of lipid peroxidation. *Methods Enzymol.* 186 : 421-431.
- David, C. and Edward, F. 1994. Autacoids and their antagonists, non-narcotic analgesic-antipyretics, and nonsteroidal anti-inflammatory drugs. In S. Leon (ed), *Comprehensive Pharmacy Review* (2nd ed), pp. 253-254. London : Harwal Publishing.
- Davis, D.C., Potter, W.Z., Jollow, D.J. and Mitchell, J.R. 1974. Species differences in hepatic glutathione depletion covalent binding and hepatic necrosis after acetaminophen. *Life Sci.* 14 : 2099-2109.
- Debey, H.J., Mackenzie, J.B. and Mackenzie, C.G. 1958. The replacement by thiazolidine carboxylic of exogenous cystine and cysteine. *J. Nutril.* 66 : 607-619.
- DeVries, J., Jansen, J.D., Kroese, E.D., Van Bree, L. and Van Ginneken, C.A. 1981. Protection against paracetamol-induced glutathione depletion following a paracetamol-acetylsalicylic acid mixture of benorilate in phenobarbital treated rats. *Toxicol. Lett.* 9 : 345-347.
- Divoll, M., Abernethy, D.R., Ameer, B. and Greenblatt, D.J. 1982. Acetaminophen kinetics in the elderly. *Clin. Pharmacol. Ther.* 31 : 151-156.
- Douglas, A.P., Savage, R.L. and Rawlins, M.D. 1978. Paracetamol (acetaminophen) kinetics in patients with Gilbert' s syndrome. *Eur. J. Clin. Pharmacol.* 13 : 209-212.

- Eaton, D.L. and Bammler, T.K. 1999. Concise review of the glutathione-s-transferase and their significance to toxicology. *Toxicol. Sci.* 49 : 156-164.
- Flaks, A. and Flaks, B. 1983. Induction of liver cell tumours in 1F mice by paracetamol. *Carcinogenesis*. 4 : 363-368.
- Forrest, J.A.H., Adriaenssens, P.I., Finlayson, N.D.C. and Prescott, L.F. 1979. Paracetamol metabolism in chronic liver disease. *Eur. J. Clin. Pharmacol.* 15 : 427-431.
- Galinsky, R.E. and Levy, G. 1981. Dose and time-dependent elimination of acetaminophen in rats : pharmacokinetics implications of cosubstrate depletion. *J. Pharmacol. Exp. Ther.* 219 : 14-20.
- Gazzard, B.G., Hughes, R.D., Widdop, B., Goulding, R., Davis, M. and Williams, R. 1977. Early prediction of the outcome of a paracetamol overdose based on an analysis of 163 patients. *Postgrad. Med. J.* 53 : 243-247.
- Gianna, M.B. and Helmut, S. 1978. Reduced and oxidized glutathione efflux from liver. *FEBS Letters*. 86 : 89-91.
- Gibson, J.D., Pumford, N.R., Samokyszyn, V.M. and Hinson, J.A. 1996. Mechanism of acetaminophen induced hepatotoxicity : covalent binding versus oxidative stress. *Chem. Res. Toxicol.* 9 : 580-585.
- Gmelin, R., Suslio, R. and Fenwick, G.R. 1981. Cyclic polysulphides from

Parkia speciosa. *Phytochemistry*. 20: 2521 – 2523.

Goeptar, A.R., Scheerens, H. and Vermeulen, N.P.E. 1995. Oxygen and xenobiotic reductase activities of cytochrome P450. *Crit. Rev. Toxicol.* 25 : 25-65.

Golden, D.P., Mosby, E.L., Smith, D.J. and Markercher, P. 1981. Acetaminophen toxicity. Report of two cases. *Oral Surg. Oral Med. Oral Pathol.* 51 : 385-389.

Gramatte, T. and Richter, K. 1993. Paracetamol absorption from different sites in the human small intestine. *Br. J. Clin. Pharmacol.* 37 : 608-611.

Grune, T., Sommerburg, O., Siems, W.G. 2000. Oxidative stress in anemia. *Clinical Nephrology*. 53 (Suppl 1) : S18-22.

Guoyao, W.U., Yun, Z.F., Sheng, Y., Joanne, R.L. and Nancy, D.T. 2004. Glutathione metabolism and its implications for health. *J. Nutr.* 134 : 489-492.

Gutteridge, J.M.C. 1986. Iron promoters of the Fenton reaction and lipid peroxidation can be released from hemoglobin by peroxides. *FEBS Lett.* 201 (2) : 291-295.

Gutteridge, J.M.C. 1995. Lipid peroxidation and antioxidants as biomarkers of tissue damage. *Clin. Chem.* 41 (12) : 1819-1828.

- Gutteridge, J.M.C., Rowley, D.A., and Halliwell, B. 1982. Superoxide dependent formation of hydroxyl radicals and lipid peroxidation in the presence of iron salts. *Biochem. J.* 206 : 605-609.
- Halliwell, B. and Gutteridge, J.M.C. 1992. Biologically relevant metal ion dependent hydroxyl radical generation an update. *FEBS Lett.* 307 : 108-112.
- Halliwell, B. and Gutteridge, J.M.C. 1998a. Oxidative stress : adaptation, damage, repair and death. In B. Halliwell and J.M.C. Gutteridge (eds.), *Free radicals in biology and medicine* (3rd ed.), pp. 246-350. New York : Oxford University.
- Halliwell, B. and Gutteridge, J.M.C. 1998b. Antioxidant defence. In B. Halliwell and J.M.C. Gutteridge (eds.), *Free Radicals in Biology and Medicine* (3rd ed.), pp.105-245. New York : Oxford University.
- Hamlyn, A.N., Douglas, A.P. and James, O. 1978. The spectrum of paracetamol (acetaminophen) overdose: Clinical and epidemiological studies. *Postgrad. Med. J.* 54 : 400-404.
- Handa, S., Sharma, A. and Chakraborti, K. 1986. Natural products and plants as liver protecting drugs. *Fitoterapia.* 57 : 307-351.
- Hatano, T., Edamatsu, R., Hiramatsu, M., Mori, A., Dugita, Y., Yasuhara, T., Yoshida, T. and Okuda, T. 1989. Effect of the interaction of tannin with co-existing substance VI. Effect of tannins and related polyphenols on

superoxide anion radical, and on 1,1 diphenyl-2-picrylhydrazyl radical.
Chem. Pharm. Bull. 37 : 2016-2021.

Hazai, E., Vereczkey, L. and Monostory, K. 2002. Reduction of toxic metabolite formation of acetaminophen. *Biochem. Biophys. Res. Commun.* 291 : 1089–1094.

Hazelton, G.A., Hjelle, J.J. and Klaassen, C.D. 1986a. Effects of cysteine pro-drugs on acetaminophen-induced hepatotoxicity. *J. Pharmacol. Exp. Ther.* 237 : 341-349.

Hazelton, G.A., Hjelle, J.J. and Klaassen, C.D. 1986b. Effects of butylated hydroxyanisole on acetaminophen hepatotoxicity and glucuronidation in vivo. *Toxicol. Appl. Pharmacol.* 83 : 474-485.

Henderson, C.J., Wolf, C.R., Kitteringham, N., Powell, H., Otto, D. and Park, B.K. 2000. Increased resistance to acetaminophen hepatotoxicity in mice lacking glutathione S-transferase Pi. *Proc Natl Acad Sci U.S.A.* 97. (23) : 12741-12745.

Henne-Bruns, D., Artwohl, J., Broelsch, C. and Kremer, B. 1988. Acetaminophen-induced acute hepatic failure in pigs: Controversical results to other animal models. *Res. Exp. Med. (Berl).* 188 : 463-472.

Herman, R.H. 1979. Nutritional influence on cellular antioxidant defense systems. *Am. J. Clin. Nutr.* 32 : 1066-1081.

- Hinchman, C.A and Ballatori, N. 1994. Glutathione conjugation and conversion to mercapturic acids can occur as an intrahepatic process. *J Toxicol Environ Health.* 41 : 387–409.
- Hinchman, C.A., Matsumoto, H., Simmons, T.W. and Ballatori, N. 1991. Intrahepatic conversion of a glutathione conjugate to its mercapturic acid: Metabolism of 1-chloro-2,4-dinitrobenzene in isolated perfused rat and guinea pig livers. *J Biol Chem.* 266 : 22179–22185.
- Hinson, J.A., Pohl, L.R., Monks, T.J. and Gillette, J.R. 1981. Acetaminophen-induced hepatotoxicity. *Life Sci.* 29 (2) : 107-116.
- Hirate, J., Zhu, C.Y., Horikoshi, I. and Bhargave, V.O. 1990. First-pass metabolism of acetaminophen in rats after low and high doses. *Biopharm. Drug Dispos.* 11 : 245-252.
- Hoffmann, K.J., Streeter, A.J., Axworthy, D.B and Baillie, T.A. 1985. Structural characterization of the major covalent adduct formed *in vitro* between acetaminophen and bovine serum albumin. *Chemico-Biological Interactions.* 53 : 155-172.
- Jaeschke, H., Knight, T.R. and Bajt, M.L. 2003. The role of oxidant stress and reactive nitrogen species in acetaminophen hepatotoxicity. *Toxicol. Lett.* 144 : 279-288.
- Jakoby, W.B. 1978. The glutathione S-transferases: A group of multifunctional detoxification proteins. *Adv. Enzymol.* 46 : 383-414.

- Jamaluddin, F., Mohamed, S. and Lajis, M.N. 1995. Hypoglycemic effect of Stigmast-4-en-3-one, from *P. speciosa* empty pod. *Food Chem.* 54 : 9– 13.
- Jollow, D.J., Thorgeirsson, S.S., Potter, W.Z., Hashimoto, M. and Mitchell, J.R. 1974. Acetaminophen-induced hepatic necrosis. VI. Metabolic disposition of toxic and nontoxic doses of acetaminophen. *Pharmacology.* 12 : 251- 271.
- Josting, D., Winnie, D., and Bock, K.W. 1976. Glucuronidation of paracetamol, morphine and l-naphthol in the rat intestinal loop. *Biochem. Pharmacol.* 25 : 613-616.
- Kamiyama, T., Sato, C., Liu, J., Tajiri, K., Mijakawa, H. and Marumo, F. 1993. Role of lipid peroxidation in acetaminophen-induced hepatotoxicity: comparison with carbon tetrachloride. *Toxicol. Lett.* 66 : 7-12.
- Kher, K. and Maker, S. 1987. Acute renal failure due to acetaminophen ingestion without concurrent hepatotoxicity. *Am. J. Med.* 82 : 1280-1281.
- Kim, Y.C. and Lee, S.L. 1998. Temporal variation on hepatotoxicity and metabolism of acetaminophen in mice. *Toxicology.* 128 : 53-61.
- Kitamura, Y., Kamisaki, Y. and Itoh, T. 1989. Hepatoprotective effects of cystathionine against acetaminophen-induced necrosis. *J. Pharmacol. Exp. Ther.* 250 : 667-671.

- Klutch, A., Levin, W., Chang, R.L., Vane, F. and Conney, A.H. 1978. Formation of a thiomethyl metabolite of phenacetin and acetaminophen in dogs and man. *Clin. Pharmacol. Ther.* 24 : 289-293.
- Kourounakis, A.P., Reka, E.A. and Kourounakis, P.N. 1997. Antioxidant activity of Guaiazulene and Protection against paracetamol hepatotoxicity in rats. *J. Pharm. Pharmacol.* 49 : 938-942.
- Kram, D.J. and Keller, K.A. 2001. Principles, applications and data interpretation. In Kram, D.J. and Keller, K.A. (eds), *Toxicology testing handbook*, pp. 325-332. New York.
- Krinsky, N.I. 1979. Carotenoid protection against oxidation. *Pure. Appl. Chem.* 51 : 645-660.
- Kriitharides, L., Fassett, R. and Singh, B. 1988. Paracetamol-associated coma, metabolic acidosis, renal and hepatic failure. *Intensive Care Med.* 14 : 439-440.
- Kyle, M.E., Sakaida, I., Serroni, A. and Farber, J.L. 1990. Metabolism of acetaminophen by cultured rat hepatocytes: Depletion of protein thiol groups without any loss of viability. *Biochem. Pharmacol.* 40 : 1211-1218.
- Lau, K., He, Z.D., Dong, H., Fung, K.P. and But, P.P.H. 2002. Anti-oxidative, Anti-inflammatory and hepatoprotective effect of *Ligustrum robustum*. *Journal of Ethnopharmacology.* 83 : 63-71.

- Lauterburg, B.H., Adams, J.D. and Mitchell, J.R. 1984. Hepatic glutathione homeostasis in the rat: Efflux accounts for glutathione turnover. *Hepatology*. 4 : 586-590.
- Lauterburg, B.H., Corcoran, G.B. and Mitchell, J.R. 1983. Mechanism of action of *N*-acetylcysteine in the protection against the hepatotoxicity of acetaminophen in rats *in vivo*. *J. Clin. Invest.* 71 : 980-991.
- Lee, S.S.T., Buters, J.T.M., Pineau, T., Fernandez-Salguer, P. and Gonzalez, F.J. 1996. Role of CYP2E1 in the hepatotoxicity of acetaminophen. *J. Biol. Chem.* 271 : 12063-12067.
- Levy, G. and Yamada, H. 1971. Drug biotransformation interactions in man III : acetaminophen and salicylamide. *J. Pharm. Sci.* 60 (2) : 215-221.
- Lim, S.P., Andrews, F.J. and O'Brien, P.E. 1994. Misoprostol protection against acetaminophen induced hepatotoxicity in the rat. *Dig. Dis. Sci.* 39 : 1249-1256.
- Lockitch, G. 1989. Selenium: clinical significance and analytical concepts. *Crit. Rev. Clin. Lab. Sci.* 27 : 483-541.
- Loeckie, L., Zwart, D.E., John, H.N.M., Jan, N.M.C., and Nico, P.E.V. 1999. Biomarker of free radical damage applications in experimental animals and in humans. *Free Radic. Biol. Med.* 26 : 202-226.
- Lowenthal, D.T., Oie, S., Van Stone, J.C., Briggs, W.A. and Levy, G. 1976.

- Pharmacokinetics of acetaminophen elimination by anephric patients. *J. Pharmacol. Exp. Ther.* 196 : 570-578.
- Manda, K. and Bhatia, A.L. 2003. Role of β -carotene against acetaminophen-induced hepatotoxicity in mice. *Nutrition Research.* 23 : 1097-1103.
- Manyike, P.T., Kharasch, E.D., Kalhorn, T.F. and Slattery, J.T. 2000. Contribution of CYP2E1 and CYP3A4 to acetaminophen reactive metabolite formation. *Clin. Pharmacol Ther.* 67 : 275–282.
- Marshall, P.J., Kulmacz, R.J. and Lands, W.E.M. 1987. Constraints on prostaglandin biosynthesis in tissues. *J. Biol. Chem.* 262 : 3510-3517.
- Maziasz, T.J., Liu, J., Madhu, C. and Klaassen, C.D. 1991. The differential Effects of hepatotoxicants on the sulfation pathway in rats. *Toxicology and Applied Pharmacology.* 110 (3) : 365-373.
- McCord, J.M. 1974. Free radicals and inflammation : Protection of synovial fluid by superoxide dismutase. *Science.* 185 : 529-531.
- McJunkin, R.P., Barwick, K.W., Little, W.C. and Winfield, J.B. 1976. Fatal massive hepatic necrosis following acetaminophen overdose. *JAMA.* 236 : 1874-1875.
- Meister, A. 1992. On the antioxidant effects of ascorbic acid and glutathione. *Biochem. Pharmacol.* 44 : 1905-1915.
- Miesel, R. and Zuber, M. 1993. Copper-dependent antioxidant defenses in

inflammatory and autoimmune rheumatic diseases. *Inflammation*. 17 : 283-294.

Miners, J.O., Drew, R. and Birkett, O.J. 1984. Mechanism of action of paracetamol protective agents in mice in vivo. *Biochem. Pharmacol.* 33 : 2995-3000.

Miners, J.O., Penhall, R., Robson, R.A. and Birkett, D.J. 1988. Comparison of paracetamol metabolism in young adult and elderly males. *Eur. J. Clin. Pharmacol.* 35 : 157-160.

Mitchell, J.R., Jollow, D.J., Potter, W.Z., Davis, D.C., Gillette, J.R., Brodie, B.B. 1973a. Acetaminophen induced hepatic necrosis. I. Role of drug metabolism. *J. Pharmacol. Exp. Ther.* 187 : 185-194.

Mitchell, J.R., Jollow, D.J., Potter, W.Z., Gillette, J.R. and Brodie, B.B. 1973b. Acetaminophen induced hepatic necrosis. IV. Protective role of glutathione. *J. Pharmacol. Exp. Ther.* 187 : 211-217.

Mitchell, J.R., McMurtry, R.J., Statham, C.N. and Nelson, S.D. 1977. Molecular basis for several drug-induced nephropathies. *Am. J. Med.* 62 : 518-526.

Mitra, A,m Kulkarni, A.P. Ravikumar, V.C. and Bourcier, D.R. 1991. Effect of ascorbic acid esters on hepatic glutathione levels in mice treated with a hepatotoxic dose of acetaminophen. *J. Biochem. Toxicol.* 6 : 93-100.

- Morris, M.E. and Levy, G. 1984. Renal clearance and serum protein binding of acetaminophen and its major conjugates in humans. *J. Pharm. Sci.* 73 : 1038-1041.
- Mycek, M.J., Harvery, R.A. and Champe, P.C. 1997. *Pharmacology* (2nd ed), pp. 412-413. New York : Lippincott-Raven Company.
- Nagasawa, H.T., Goon, D.J.W. and Zera, R.T. 1984. Prodrugs of L-cysteine as liver protective agents: 2(RS)-methylthiazolidine-4(R)-carboxylic acid, a latent cysteine. *Journal of Medicinal Chemistry.* 25 (5) : 489-491.
- Nagasawa, H.T., Goon, D.J.W., Muldoon, W.P. and Zera, R.T. 1984. 2-Substituted thiazolidine-4 (R)-carboxylic acids as prodrugs of L-cysteine: Protection of mice against acetaminophen hepatotoxicity. *J. Med. Chem.* 27 : 591-596.
- Nakae, D., Yamamoto, K., Yoshiji, H., Kinugasa, T., Maryyama, H., Farber, J.L. and Konishi, Y. 1990. Liposome-encapsulated superoxide dismutase prevent liver necrosis induced by acetaminophen. *Am. J. Pathol.* 136 : 787-795
- Nicholls, D.G. and Budd, S.L. 2000. Mitochondria and neuronal survival. *Physiol. Rev.* 80 : 315-360.
- Noguchi, N. and Niki, E. 1999. Chemistry of Active Oxygen Species and Antioxidants. In Andreas, M.P. (ed.), *Antioxidant Status, Diet, Nutrition, and Health*, pp. 3-20. New York : CRC Press.

- Noriega, G.O., Ossola, J.O. and Tomara, M.L. 2000. Effect of acetaminophen on heme metabolism in rat liver. *The International Journal of Biochemistry and Cell Biology*. 32 : 983-991.
- Ohkawa, H., Ohishi, N and Yagi, K. 1979. Assay for lipid peroxidation in animal tissues by thiobarbituric acid reaction. *Analytical Biochemistry*. 95 : 351-358.
- Oshima, H., Friesen, M., O'Neill, I.K. and Bartsch, H. 1983. Presence in human urine of a new *N*-nitroso compound, *N*-nitrosothiazolidine-4-carboxylic acid. *Cancer Lett.* 20 : 183-90.
- Packer, J.E., Slater, T.F. and Willson, R.L. 1979. Direct observation of a free radical interaction between vitamin E and vitamin C. *Nature*. 278 : 737-738.
- Patten, C.H., Thomas, P.E., Guy, R.L., Lee, M., Gonzalez, F.J., Guengerich, F.P. and Yang, C.S. 1993. Cytochrome P450 enzymes involved in acetaminophen activation by rat and human liver microsomes and their kinetics. *Chem. Res. Toxicol.* 6 : 511-518.
- Paya, M., Halliwell, B., Hout, J.R.S. 1992. Peroxyl radical scavenging by a series of coumarins. *Free Rad. Res. Commun.* 17 : 293-298.
- Perrot, N., Nalpas, B., Yang, C.S. and Beaune, P.H. 1989. Modulation of cytochrome P450 isozymes in human liver, by ethanol and drug intake. *Eur. J. Clin. Invest.* 19 : 549-555.

- Perucca, E. and Richens, A. 1979. Paracetamol disposition in normal subjects and in patients treated with antiepileptic drugs. *Br. J. Clin. Pharmacol.* 7: 201-206.
- Peter, J.Z. and Edward, P.K. 1999. Treatment of acetaminophen overdose. *Am. J. Health. Syst. Pharm.* 56 (1) : 1081-1090.
- Peterson, R.G. and Rumack, B.H. 1978. Pharmacokinetics of acetaminophen in children. *Pediatrics.* 62 (suppl 1) : 877-879.
- Potter, W.Z., Davis, D.C., Mitchell, J.R., Jollow, D.J., Gillette, J.R. and Brodie, B.B. 1973. Acetaminophen-induced hepatic necrosis. III. Cytochrome P-450-mediated covalent binding in vitro. *J. Pharmacol. Exp. Ther.* 187 : 203-210.
- Potter, W.Z., Thorgeirsson, S.S., Jollow, D.J. and Mitchell, J.R. 1974. Acetaminophen-induced hepatic necrosis V. Correlation of hepatic necrosis, covalent binding and glutathione depletion in hamsters. *Pharmacology.* 12 : 129-143.
- Prasatthong, V. and Noipa, K. and Jidsurong, A. 2001. Antioxidative activities of crude extracts from local vegetables in Thailand. Faculty of Medicine, Prince of Songkla University. (Unpublished)
- Prescott, L.F. 1980. Kinetics and metabolism of paracetamol and phenacetin. *Br. J. Clin. Pharmacol.* 10 : 291s-298s.

- Prescott, L.F. and Critchely, J.A. 1983. The treatment of acetaminophen poisoning. *Annu. Rev. Pharmacol. Toxicol.* 23 : 87-101.
- Prescott, L.F., Illingworth, R.N., Critchley, J.A.J.H. Stewart, M.J., Adam, R.D. and Proudfoot, A.T. 1979. Intravenous *N*-acetylcysteine: The treatment of choice for paracetamol poisoning. *Br. Med. J.* 2 : 1097-1100.
- Prescott, L.F., Wright, N. Roscoe, P. and Brown, S.S. 1971. Plasma paracetamol half-life and hepatic necrosis in patients with paracetamol overdose. *Lancet.* 1 : 519-522.
- Ratner, S. and Clarke, H.T. 1937. The action of formaldehyde upon cysteine. *J. Am. Chem. Soc.* 59 : 200-209.
- Raucy, J.L., Lasker, J.M., Lieber, C.S. and Black, M. 1989. Acetaminophen activation by human liver cytochromes P450 2E1 and P450 1A2. *Arch. Biochem. Biophys.* 217 : 270-283.
- Rawlins, M.D., Henderson, D.B. and Hijab, A.R. 1977. Pharmacokinetics of paracetamol (acetaminophen) after intravenous and oral administration. *Eur. J. Clin. Pharmacol.* 11 : 283-286.
- Reed, D.J. and Fariss, M.W. 1984. Glutathione depletion and susceptibility. *Pharmacol. Rev.* 36 (2) : 25s-33s.
- Richman, P.G. and Meister, A. 1975. Regulation of γ -glutamylcysteine synthetase by nonallosteric feedback inhibition by glutathione. *J.*

Biol. Chem. 250 : 1422-1426.

Roberfroid, M. and Colderon, P.B. 1995. Definition properties and reactions of radicals. In M. Roberfroid and P.B. Colderon (eds.), *Free radicals and oxidation phenomena in Biological system*, pp. 11-32. New York :University of Catholique de Louvain Brussels.

Roberts, J.C., Nagasawa, H.T., Zera, R.T. Fricke, R.F. and Goon, D.J.W. 1987. Prodrugs of L-cysteine as protective agents against acetaminophen-induced hepatotoxicity. 2-(Polyhydroxyalkyl)-and-2-(polyacetoxyalkyl) thiazolidine-(R)-carboxylic acids. *J. Med. Chem.* 30 : 1891-1896.

Roberts, L.J. and Morrow, J.D. 2001. Analgesic antipyretics and antiinflammatory agent and drugs employed in the treatment gout. In L.S. Goodman and A.G. Gilman (eds.), *Pharmacological Basis of Therapeutics* (10th ed.), pp.703 –705 New York : Macmillan Publishing.

Rotruck, J.K., Pole, A.L., Ganther, H.E., Horkstra, W.G. 1973. selenium: biochemical role as a component of glutathione peroxidase. *Science.* 179 : 588-590.

Rumore, M.M. and Blaiklock, R.G. 1992. Influence of age-dependent pharmacokinetics and metabolism on acetaminophen hepatotoxicity. *J. Pharm. Sci.* 81 (3) : 203-207.

Sallie, R., Tredger, J. and William, R. 1991. Drugs and the liver. *Biopharmaceutics and Drug Disposition.* 12 : 151-259.

- Sarich T., Kalhorn T., Magee, S., Al-Sayegh, F., Adams, S., Slattery, J., Goldstein, J., Nelson, S. and Wright, J. 1997. The effect of omeprazole pretreatment on acetaminophen metabolism in rapid and slow metabolizers of S-mephenytoin. *Clin Pharmacol Ther.* 62 : 21–28.
- Schmidt, L.E., Dalhoff, K. and poulsen, H.E. 2002. Acute vs chronic alcohol consumption in acetaminophen-induced hepatotoxicity. *Hepatology.* 35 : 867-882.
- Schubert, M.P. 1936. Compounds of thiol acid with aldehydes. *J. Biol. Chem.* 114 : 341-350.
- Shen, W., Yanazaki, H., Mimura, M., Inui, Y. and Guengerich, F.P. 1992. Acetaminophen-induced cytotoxicity in cultured mouse hepatocytes: effects of Ca²⁺ endonuclease, DNA repair, and glutathione depletion inhibitors on DNA fragmentation and cell death. *Toxicol Appl. Pharmacol.* 112 : 32-40.
- Smith, C.V. and Mitchell. J.R. 1985. Acetaminophen toxicity in vivo is not accompanied by oxidant stress. *Biochem. Biophys. Res. Commun.* 133 : 329-336.
- Smitinand, T. 1980. *Thai Plant Names (Botanical names-vernacular names)*. p 253. Thailand : Royal Forestry Department.
- Srinivasan, C., Williams, W.M., Ray, M.B. and Chen, T.S. 2001. Prevention of acetaminophen-induced liver toxicity by 2(R,S)-n-propylthiazolidine

4-(*R*)-carboxylic acid in mice. *Biochem. Pharmacol.* 61 : 245-252.

Stern, S.T., Bruno, M.K., Hennig, G.E., Horton, R.A., Roberts, J.C. and Cohen, S.D. 2005a. Contribution of acetaminophen-cysteine to acetaminophen nephrotoxicity II. Possible involvement of the γ -glutamyl cycle. *Toxic. Appl. Pharmacol.* 202 : 160-171.

Stern, S.T., Bruno, M.K., Horton, R.A., Hill, D.W., Roberts, J.C. and Cohen, S.D. 2005b. Contribution of acetaminophen-cysteine to acetaminophen nephrotoxicity II. Possible involvement of the γ -glutamyl cycle. *Toxic. Appl. Pharmacol.* 202 : 160-171.

Stevenson, D.D. and Lewis, R.A. 1987. Proposed mechanisms of aspirin sensitivity reactions. *J. Allergy Clin. Immunol.* 80 : 788-790.

Strange, R.C., Jones, P.W. and Fryer, A.A. 2000. Glutathione-s-transferase: genetics and role in toxicology. *Toxicol Lett.* 112 -113 : 357-363.

Susilo, R. and Gmelin, R. 1982. Precursor of cyclic polysulphides in seeds of *Parkia speciosa*. *Z. Naturforsch.* 37 : 584-586.

Suvachittanont, W. and Jaranchavanapet, P. 2000. Mitogenic effect of *Parkia speciosa* seed lectin of human lymphocytes. *Planta Medica.* 66 : 699-704.

Suvachittanont, W. and Peutpaiboon, A. 1992. Lectin from *Parkia speciosa* seeds. *Phytochemistry.* 31 : 4065 - 4070.

- Suvachittanont, W. and Pothiruckit, P. 1988. Proteins in *Parkia speciosa* seeds. *Songklanagarind Medical Journal*. 6 (Suppl.3) : 23-30.
- Suvachittanont, W., Iamsupanimit, K., Singhaveerasamorn, W. and Rattanapanya, A. 1996. Preliminary studies of some biological compounds from *Parkia speciosa* seeds. p. 71. Bangkok : Funny Press.
- Suvachittanont, W., Kurashima, Y., Esumi H, and Tsuda, M. 1996. Formation of thiazolidine-4-carboxylic acid (thioprolin), an effective nitrite-trapping agent in human body, in *Parkia speciosa* seeds and other edible leguminous seeds in Thailand. *Food Chem*. 55 : 359 – 363.
- Tahira, T., Ohgaki, H., Wakabayashi, K., Nagao, M. and Suginura, T. 1988. Inhibitory effect of thioprolin on carcinogenesis induced by *N*-benzyl methylamine and nitrite. *Food Chem. Toxicol*. 26 : 511-16.
- Tatsuya, A., Tatsuya, M., Shin, Y.K., Toshio, N., Kazuo, Y. and Goro, K.Y. 1995. Acetaminophen-induced hepatic injury in mice: The role of lipid peroxidation and effects of pretreatment with coenzyme Q₁₀ and α -tocopherol. *Free Radical Biology and Medicine*. 19 (2) : 169-176.
- Thelen, M. and Wendel, A. 1983. Drug-induced lipid peroxidation in mice V. Ethane production and glutathione release in the isolated liver upon perfusion with acetaminophen. *Biochem. Pharmacol*. 32 : 1701-1706.
- Thummel, K.E., Lee, C.A., Kunze, K.L., Nelson, S.D. and Slattery, J.T. 1993. Oxidation of acetaminophen to *N*-acetyl-*p*-aminobenzoguinoneimine

by human CYP3A4. *Biochem Pharmacol.* 45 : 1563-1569.

- Tonge, R.P., Kelly, E.J., Bruschi, S.A., Kalhorn, T., Eaton, D.L., Nebert, D.W. and Nelson, S.D. 1998. Role of CYP1A2 in the hepatotoxicity of acetaminophen: investigations using CYP1A2 null mice. *Toxicol. Appl. Pharmacol.* 153 : 102-108.
- Tsuda, M. and Kurashina, Y. 1991. Nitrite-trapping capacity of thioproline in the human body. IARC Scientific Publication No.105. *International Agency for Research on Cancer.* Lyon. p. 123-128.
- Vermeulen, N.P.E., Baldew, G.S., Los, G., McVie, J.G. and DeGoeij, J.J. 1992. Molecular aspects of paracetamol induced hepatotoxicity and its mechanism based prevention. *Drug Metabolism Reviews.* 21 : 367-407.
- Vries, J.D. 1981. Hepatotoxic metabolic activation of paracetamol and its derivatives phenacetin and benorilate : oxygenation or electron transfer. *Biochem Pharmacol.* 30 : 399-402.
- Wendel, A., Jaeschke, H. and Gloger, M. 1982. Drug-induced lipid peroxidation in mice II. Protection against paracetamol-induced liver necrosis by intravenous liposomally entrapped glutathione. *Biochemical Pharmacology.* 31 : 3601-3605.
- Whitcomb, D.C. and Block, G.D. 1994. Association of acetaminophen hepatotoxicity with fasting and ethanol use. *JAMA.* 272 : 1845-1850.

- Wiger, R., Honglso, J.K., Evenson, D.P., De Angelis, P., Schwarze, P.E. and Holme, J.A. 1995. Effects of acetaminophen and hydroxyurea on spermatogenesis and sperm chromatin structure in laboratory mice. *Reprod. Toxicol.* 9 : 21-33.
- William, W., Puja, K. and Daniel, E.F. 2001. Nonsteroidal anti-inflammatory drugs, disease-modifying antirheumatic drugs, nonopioid analgesics and drugs used in gout. In B.G. Katzung (ed), *Basic and Clinical Pharmacology* (9th ed), pp. 595-596. Sanfrancisco : Lang Medical Publications.
- Wlodek, L. and Rommelspacher, H. 1997. 2-Methyl-thiazolidine-2,4-dicarboxylic acid as prodrug of L-cysteine. Protection against paracetamol hepatotoxicity in mice. *Fundam. Clin. Pharmacol.* 11 : 454-459.
- Younes, M., Cornelius, S. and Siegers, C.P. 1986. Ferrous ion supported in vivo lipid peroxidation induced by paracetamol-its relation to hepatotoxicity. *Res. Commun. Chem. Pathol. Pharmacol.* 51 : 89-99.
- Young, I.S. and McEneny, J. 2001. Lipoprotein Oxidation and Atherosclerosis. *Biochemical Society Transactions.* 29 : 358-362.
- Young, I.S. and Woodsides, J.V. 2001. Antioxidants in health and disease. *J. Clin Pathol.* 54 : 176-186.
- Yu, B.P. 1994. Cellular defenses against damage from reactive oxygen species. *Physiol. Rev.* 74 (1) : 139-162.

- Zaher, H., Buters, J.T.M., Ward, J.M., Bruno, M.K., Lucas, A.M., Stern, S.T., Cohen, S.D. and Gonzalez, F.J. 1998. Protection against acetaminophen toxicity in CYP1A2 and CYP2E1 double-null mice. *Toxicol. Appl. Pharmacol.* 152 : 193-199.
- Zhang, Y., Marcillat, O. and Giulivi, C. 1990. The oxidative inactivation of mitochondrial electron transport chain components and ATPase. *J. Biol. Chem.* 265 : 16330-13336.
- Zhao, C. and Shichi, H. 1998. Prevention of acetaminophen-induced cataract by a combination of diallyl disulfide and *N*-acetylcysteine. *J. Ocul. Pharmacol. Ther.* 14 : 345-355.