

## REFERENCES

- American Society for Testing and Materials : Standard practice for conducting toxicity tests with fishes, macroinvertebrates, and amphibians. ASTM 729-780. Philadelphia : ASTM.
- Ahmad, M., Salahuddin, Mathew, S.B.N., Kumar, S., Seth. T.D., Hasen, M.Z. and Mahdi, S.Q. 1980. Effect of extent of myocardial damage on the behavior of myocardial zinc in albino rats. Adv. in Myocardiol. 2:171-176.
- Akah, P.A., Offiah, V.N. and Onuogu, E. 1992. Hepatotoxic effect of *Azadirachta indica* leaf extract in rabbits. Fitoterapia. 63(4):311- 319.
- Alkahem, H.F. 1994. The toxicity of nickle and the effects of sublethal levels on haematological parameters and behaviour of the fish, *Oreochromis niloticus*. J.Univ.Kuwait.(Sci.). 21:242-251.
- Allen, P. 1994. Changes in the haematological profile of the cichlid *Oreochromis aureus* (Steindachner) during acute inorganic mercury intoxication. Comp.Biochem.Physiol. 108C:117-121.
- Atal, K.C. and Kapur, M.B. 1982. Cultivation & Utilization of Medicinal Plants. Jammu-Tawi:Regional Research Laboratory.
- Bainy, A.C.D., Saito, E. and Carvalho, P.S.M. 1996. Oxidative stress in gill, erythrocytes, liver and kidney of Nile tilapia (*Oreochromis niloticus*) from a polluted site. Aquat Toxicol. 34:151-162.
- Bakhiet, A.O. and Adam, S.E. 1995. Therapeutic utility, constituents and toxicity of some medicinal plants : A review. Vet.Hum Toxicol. 37(3):255-258.
- Balint, T. Szegletes, T., Szegletes, Zs., Halasy, K. and Nemcsok, J. 1995. Biochemical and subcellular changes in carp exposed to the organophosphorus methidathion and the pyrethroid deltamethrin. Aquat Toxicol. 33:279-295.
- Balis, J.U., Paterson, J.F., Shelley, S.A., Larson, C.H., Fareed, J. and Gerber, L.I. 1979. Glucocorticoid and antibiotic effects on hepatic microcirculation and associated host responses in lethal gram-negative bacteremia. Lab Invest. 40:55-65.
- Barnby, M.A. and Klocke, J.A. 1990. Effects of azadirachtin on levels of ecdysteroids and prothoracicotropic hormone-like activity in *Heliothis virescens* (Fabr.) larvae. J.Insect Physiol. 36(2):125-131.
- Bielinska, I. 1987. Dielectric, haematological and biochemical studies of detergent toxicity in fish blood. Phys.Med.Biol. 32(5):623-635.

- Blaxhall, P.C. and Daisley, K.W. 1973. Routine haematological methods for use with fish blood. J.Fish Biol. 5:771-781.
- Bleau, H., Daniel, C., Chevalier, G., van Tra, H. and Hontela, A. 1996. Effects of acute exposure to mercury chloride and methylmercury on plasma cortisol, T<sub>3</sub>, T<sub>4</sub>, glucose and liver glycogen in rainbow trout (*Oncorhynchus mykiss*). Aquat Toxicol. 34:221-235.
- Buckley, J.A. 1977. Heinz Body hemolytic Anamia in Coho Salmon (*Oncorhynchus kisutch*) exposed to chlorinated wastewater. J.Fish. Res. Bd Can. 34(2):215-224.
- Buttar, H.S., Nera, E.A. and Downie, R.H. 1976. Serum enzyme activities and hepatic triglyceride levels in acute and subacute acetaminophen-treated rats. Toxicol. 6:9-20.
- Chattopadhyay, R.R. 1997. Effect of *Azadirachta indica* hydroalcoholic leaf extract on the cardiovascular system. Gen.Pharmac. 28(3):449-451.
- Chliamovitch, P.Y. and Kuhn, C. 1977. Behavioural, haematological and histological studies on acute toxicity of bis(tri-*n*-butyltin) oxide on *Salmo gaidneri* Richardson and *Tilapia rendalli* Boulenger. J.Fish Biol. 10:575-585.
- Chritensen, G.M., Fiandt, J.T. and Poeschl, B.A. 1978. Cells, proteins, and certain physical-chemical properties of brook trout (*Salvelinus fontinalis*) blood. J.Fish Biol. 12:51-60.
- Cohen, E., Quistad, G.B. and Casida, J.E. 1996. Cytotoxicity of nimbolide, epoxyazadiradione and other limonoids from neem insecticide. Life Sci. 58(13):1075-1081.
- Connolly, J.D., Handa, K.L. and McCrindle, R. 1968. Furture constituents of nim oil : The constitution of meldenin. Tetrahedron Lett. 437-440.
- Cook, J.A., Wise, W.C. and Callihan, C.S. 1979. Resistance of essential fatty acid-deficient rats of endotoxic shock. Circ. shock. 6:333-342.
- Courtois, L.A. 1976. Hematology of juvenile striped bass, *Morone saxatilis* (Walbaum), acclimated to different environmental conditions. Comp.Biochem.Physiol. 54A:221-223.
- Cyriac, P.J., Antony, A. and Nambisan, P.N.K. 1989. Hemoglobin and hematocrit values in the fish *Oreochromis mossambicus* (Peters) after short term exposure to copper and mercury. Bull.EnvIRON.Contam.Toxicol. 43:315-320.

- Devakumar, C. and Mukerjee, S.K. 1985. 4-Epinimbin, a New Miacin from *Azadirachta indica* A.Juss. Indian J. of Chem. 24B:1105-1106.
- Dikshith, T.S.S., Datta, K.K., Kushwah, H.S. and Raizada, R.B. 1978. Histopathological and biochemical changes in guinea pigs after repeated dermal exposure to benzene hexachloride. Toxicol. 10:55-66.
- Dixit, V.P., Sinha, R. and Tank, R. 1986. Effect of neem seed oil on the blood glucose concentration of normal and alloxan diabetic rats. J. Ethnopharmacol. 17:95-98.
- Doggett, T.A., Wrathmell, A.B. and Harris, J.E. 1987. A cytochemical and light microscopical study of the peripheral blood leucocytes of *Oreochromis mossambicus*, Cichlidae. J.Fish Biol. 31:147-153.
- Dutta, H.M., Dogra, J.V.V., Singh, N.K., Roy, P.K., Nasar, S.S.T., Adhikari, S., Munshi, J.S.D. and Richmonds, C. 1992. Malathion induced changes in the serum proteins and hematological parameters of an Indian catfish *Heteropneustes fossilis* (Bloch). Bull. Environ. Contam. Toxicol. 49:91-97.
- Ecobichon, D.J. 1992. The basis of Toxicity Testing. Boca Raton : CRC Press . pp.35-82.
- Ellis, A.E. 1977. The leucocytes of fish : A review. J.Fish.Biol. 11:453-491.
- Ellis, A.E., Munro, A.L.S. and Roberts, R.J. 1976. Defence mechanisms in fish. I. A study of the phagocytic system and the fate of intraperitoneally injected particulate material in the plaice (*Pleuronectes platessa*). J.Fish.Biol. 8:67-78.
- Ezzat, A.A., Shabana, M.B. and Farghaly, A.M. 1974. Studies on blood characteristics of *Tilapia zillii* (Gervais) : I Blood cells. J.Fish Biol. 6:1-12.
- Ferguson, H.W. 1976. The ultrastructure of plaice (*Pleuronectes platessa*) leucocytes. J.Fish Biol. 8:139-142.
- Finney, D.J. 1971. Probit analysis. London : Cambridge Univ.Press.
- Fourie, F.Le R. and van Vuren, J.H.J. 1976. A seasonal study on the hemoglobins of carp (*Cyprinus carpio*) and yellowfish (*Barbus holubi*) in South Africa. Comp.Biochem.Physiol. 55B:523-525.
- Fujimaki, Y. and Isoda, M. 1990. Fine-structural study of leucocytes in the goldfish, *Carassius auratus*. J.Fish Biol. 36:821-831.
- Gandhi, M., Lal, R., Sankarannarayanan, A., Banerjee, K.C. and Sharma, L.P. 1988. Acute toxicity study of the oil from *Azadirachta indica* seed (Neem oil). J.Ethnopharmacol. 23:39-51.

- Gangopadhyay, P., Maitra, D.N. and Pyne, A.K. 1979. Studies on the blood constituents with the use of neem seed expeller cake (*Azadirachta indica*) in lactating Murrah buffaloes. Indian Vet.J. 56:979-980.
- Garg, H.S. and Bhakuni, D.S. 1984. Salannolide, a meliacin from *Azadirachta indica*. Phytochemistry. 23:2383-2385.
- Garg, H.S. and Bhakuni, D.S. 1985. 2,3-Dehydrosalannol, a tetranortriterpenoid from *Azadirachta indica* leaves. Phytochemistry. 24:866-867.
- Gill, T.S. and Pant, J.C. 1985. Erythrocytic and leukocytic responses to cadmium poisoning in a freshwater fish, *Puntius conchoni* Ham. Environ Res. 36:327-337.
- Govindachari, T.R. and Gopalakrishnan, G. 1997. 13,14-Desepoxyazadirachtin-A, a tetranortriterpenoid from *Azadirachta indica*. Phytochemistry. 45:397-399.
- Gunasekera, R.M, Shim, K.F. and Lam, T.J. 1996. Influence of protein content of broodstock diets on larval quality and performance in Nile tilapia, *Oreochromis niloticus* (L.). Aquaculture. 146:245-259.
- Harris, M., Henderson, R., McCrindle, R., Overton, K.H. and Turner, D.W. 1968. Tetranortriterpenoids-VIII The constitution and stereochemistry of nimbin. Tetrahedron. 24:1517-1523.
- Heaton, S.N., Bursian, S.J., Giesy, J.P., Tillitt, D.E., Render, J.A., Jones, P.D., Verbrugge, D.A., Kubiak, T.J. and Aulerich, R.J. 1995. Dietary exposure of mink to carp from Saginaw Bay, Michigan:2 Hematology and liver pathology. Arch.Environ.Contam.Toxicol. 29:411-417.
- Henderson, R., McCrindle, R., Melera, A. and Overton, K.H. 1968. Tetranortriterpenoids-IX the constitution and stereochemistry of salannin. Tetrahedron. 24:1525-1528.
- Hesser, E.F. 1960. Methods for routine fish hematology. Progr. Fish-Cult. 22:164-171.
- Hirazawa, K., Oka, M., Ogura, Y., Miyahara, M., Hazana, S. and Suzuki, T. 1997. New technique for inducing reversible obstructive jaundice in the rat. Eur.Surg.Res. 29:195-201.
- Houston, A.H. and Murad, A. 1992. Erythrocyte dynamics in goldfish, *Carassius auratus* L. : Temperature effects. Physiol.Zool. 65(1):55-76. 1992.
- Humason, G.L. 1979. Animal tissue techniques. San Francisco : W.H. Freeman and Company. pp.230-248.

- Ibrahim, I.A., Khalid, S.A., Omer, S.A. and Adam, S.E.I. 1992. On the toxicology of *Azadirachta indica* leaves. J. Ethnopharmacol. 35:267-273.
- Isman, M.B., Koul, O., Luczynski, A. and Kaminski, J. 1990. Insecticidal and antifeedant bioactivities of neem oils and their relationship to azadirachtin content. J.Agric.Food.Chem. 38:1406-1411.
- Jacobson, M. 1989. Focus on Phytochemical Pesticides:Vol 1: The Neem Tree. Florida:CRC Press.
- Jeney, Z., Valtonen, E.T., Jeney, G. and Jokinen, E.I. 1996. Effects of pulp and paper mill effluent (BKME) on physiology and biochemistry of the roach (*Rutilus rutilus* L.). Arch.Environ.Contam.Toxicol. 30:523-529.
- Jotwani, M.G. and Srivastava, K.P. 1981. Neem : insecticide of the future-II-Protection against field pests. Pesticides. 15(11):40-47.
- Janart, K. 1997. Histopathology of tilapia *Oreochromis niloticus* liver after long-term exposure to neem *Azadirachta indica* seed extract. Master thesis. Chulalongkorn University.
- Katz, M. 1950. Some interesting cells in the blood of a diseases silver salmon fingerling. Copeia. 4:295-298.
- Khattak, S.G., Gilani, S.N. and Ikram, M. 1985. Antipyretic studies on some indigenous Pakistani medicinal plants. J.Ethnopharmacol. 14:45-51.
- Klenk, A., Bokel, M. and Kraus, W. 1986. 3-Tigloy-azadirachtol, an insect growth regulating constituent of *Azadirachta indica*. J.Chem.Soc.Chem. Commun. 523-524.
- Knight, R.A. 1978. Experimental cross infections of *Fasciola hepatica* in lambs and calves. J.Parasitol. 64(4):601-605.
- Kraus, W., Bokel, M., Klenk, A. and Pohnl, H. 1985. The structure of azadirachtin and 22,23-dihydro-23- $\beta$ -methoxyazadirachtin. Tetrahedron Lett. 6435-6438.
- Kraus, W. and Cramer, R. 1978. 17-epi-azadiradion and 17- $\beta$ -hydroxy-azadiradion, zwei neue Inhaltsstoffe aus *Azadirachta indica* A. Juss. Tetrahedron Lett. 2395-2398.
- Kraus, W. and Cramer, R. 1981a. Neue Tetranortriterpenoide mit insektenfrasshemmender Wirkung aus Neem-Oel. Liebigs Annale der Chemie. 181-189.
- Kraus, W. and Cramer, R. 1981b. Pentanortriterpenoide aus *Azadirachta indica* A.Juss. (Meliaceae). Chemische Berichte. 114:2375-2381.

- Kraus, W., Cramer, R. and Sawitzky, G. 1981. Tetranortriterpenoids from the seeds of *Azadirachta indica*. Phytochemistry. 20:117- 120.
- Kumar, V., Cotran, R.S. and Robbins, S.L. 1992. Basic Pathol. Philadelphia:W.B.Saunders Company, 523-569 pp.
- Lai, S.M., Lim, K.W. and Cheng, H.K. 1990. Margosa oil poisoning as a cause of toxic encephalopathy. Singapore Med.J. 31:463-465.
- Larsen, H.N. and Snieszko, S.F. 1961. Modification of the microhematocrit technique with trout blood. Trans. Amer.Fish.Soc. 90(2): 139-142.
- Lavie, D. and Jain, M.K. 1967. Tetranortriterpenoids from *Melia azadirachta* L. Chem.Comm. 278-280.
- Lieb, J.R., Slane, G.M. and Wiber, C.G. 1953. Haematological studies of Alaska fish. Trans.Am.Microsc.Soc. 72:37-47.
- Little, D.C., Surintaraseree, P. and Innes-Taylor, N. 1996. Fish culture in rainfed rice fields of Northeast Thailand. Aquaculture. 140:295-321.
- Lowe-McConnell, R.H. 1959. Breeding behaviour patterns and ecological differences between *Tilapia* species and their significance for evolution within the genus *Tilapia* (Pisces : Cichlidae). Proc.Zool.Soc.London. 132:1-30.
- McCarthy, D.H., Stevenson, J.P. and Roberts, M.S. 1973. Some blood parameters of the rainbow trout (*Salmo gairdneri* Richardson): I The Kamloops variety. J.Fish Biol. 5:1-8.
- McCorkle, M.F., Chambers, E.J. and Yarbrough, D.J. 1979. Seasonal effects on selected tissue enzymes in channel catfish, *Ictalurus punctatus*. Comp.Biochem.Physiol. 62B:151-153.
- McKnight, I.M. 1966. A haematological study on the mountain white fish, *Prosopium williamsoni*. J.Fish.Res.Bd Can 23:45-64.
- Mitra, C.R., Garg, H.S. and Pandey, G.N. 1970. Constituent of *Melia indica*-II Nimbidic acid and Nimbidinin. Tetrahedron Lett. 276-2764.
- Schreck, C.B. and Moyle, P.B. 1990. Method for Fish Biology. Bethesda, MD : American Fisheries Society. pp.491-528.
- Morrow, W.J.W. and Pulsford, A. 1980. Identification of peripheral blood leucocytes of the dogfish (*Scyliorhinus canicula* L.) by electron microscopy. J.Fish Biol. 17:461-475.
- Mulla, M.S., Chaney, J.D. and Rodcharoen, J. 1997. Activity and Efficacy of neem products against mosquito larvae. Proceeding First International Symposium on Biopesticides. pp. 149-156.

- Murad, A. and Houston, A.H. 1988. Leucocytes and leucopoietic capacity in goldfish, *Carassius auratus*, exposed to sublethal levels of cadmium. Aquat Toxicol. 13:141-154.
- Narayanan, C.R. and Lyer, K.N. 1967. Isolation and Characterization of deacetyl-nimbin. Indian J.of Chem. 5:460.
- Narayanan, C.R., Pachapurkar, R.V., Sawant, B.M. and Wadia, M.S. 1969. Vepinin, a new constituent of Neem oil. Indian J.of Chem. 5:187.
- Nikinmaa, M. 1992. How does environmental pollution affect red cell function in fish? Aquat Toxicol. 22:227-238.
- Nussey, G., Vanvuren, J.H.J. and Dupreez, H.H. 1995. Effect of copper on the hematology and osmoregulation of the Mozambique tilapia, *Oreochromis mossambicus* (Cichlidae). Comp.Biochem.Physiol. 111C:369-380.
- Okpanyi, S.N. and Ezeukwu, G.C. 1981. Anti-inflammatory and antipyretic activities of *Azadirachta indica*. Planta Med. 41:34-39.
- Onada, T. 1934. On the classification of the leucocytes of Reptilia and fish. Juzenkai-Zassi. 40:51-66. (In Japanese)
- Osuala, F.O. and Okwuosa, V.N. 1993. Toxicity of *Azadirachta indica* to fresh water snails and fish, with reference to the physicochemical factor effect on potency. Appl. Parasitol. 34(1):63-68.
- Peter, M.C.S. and Peter, V.S. 1997. Protective role of insuline in growth promoting activities of fish exposed to nimbecidine. XIII International Congress of Comparative Endocrinology. pp. 1165-1169.
- Pillai, N.R. and Santhathakumari, G. 1984. Toxicity studies on nimbidin, a potential antiulcer drug. Planta Med. 50:143-145.
- Prakash, O.A., Tewari, K.R. and Mathur, R. 1988. Non-homonal post-coital contraceptive action of neem oil in rats. J.Ethnopharmacol. 23:53-59.
- Rand, G.M. and Petrocelli, S.R. 1985. Fundamentals of Aquatic Toxicology methods and applications. New York:Hemispheic Publishing Cooperation.
- Rao, D.P., Bhaskar, B.R., Rao, K.S. and Prasad, Y.V.K.D. 1990. Haematological effects in fishes from complex polluted waters of Visakhapatnam harbour. Marine Environ.Res. 30:217-231.

- Rawat, A.K.S., Mehrotra, S., Tripathi, S.C. and Shome, U. 1997. Hepatoprotective activity of *Boerhaavia diffusa* L. roots-a popular Indian ethnomedicine. J.Ethnopharmacol. 56:151-153.
- Ruparelia, S.G. Verma, Y., Saiyed, S.R. and Rawat, U.M. 1990. Effect of cadmium on blood of tilapia, *Oreochromis mossambicus* (Peters), during prolonged exposure. Bull.Environ.Contam.Toxicol. 45:305-312.
- Sammons, L.S., Kenyon, R.H., Burger, G.T., Pederson, C.E. and Spertzel, R.O. 1976. Changes in blood serum constituents and hematologic values in *Macaca mulatta* with Rocky Mountain spotted fever. Am.J.of Vet.Res. 37:725-730.
- Sampath, K., Velammal, S., Kennedy, J.J.J.I. and James, R. 1993. Haematological changes and their recovery in *Oreochromis mossambicus* as a function of exposure period and sublethal levels of Ekaluk. Acta Hydrobiol. 35(1):73-83.
- Sano, T. 1957. Haematological studies of the culture fishes in Japan I. On the blood of eel. J.Tokyo Univ.Fish. 43:75-79.
- Schreck, C.B. and Moyle, P.B. 1990. Methods for Fish Biology. Bethesda : American Fisheries Society
- Schwaiger, J., Fent, K., Stecher, H., Ferling, H. and Negele, R.D. 1996. Effects of sublethal concentrations of triphenyltinacetate on rainbow trout (*Oncorhynchus mykiss*). Arch.Environ.Contam.Toxicol. 30:327-334.
- Sharma, J.N. 1977. Changes in biochemical parameters associated with experimental arthritis in rabbits. Biomedicine. 27:252-255.
- Sharma, M.K., Khare, A.K. and Feroz, H. 1983. Effect of neem oil on blood sugar level of normal hyperglycemic effects of *Azadirachta indica*. Indian J. of Pharmacol. 10:247-250.
- Shaw, A.E. 1930. A direct method for counting the leukocytes, thrombocytes and erythrocytes of bird blood. J.Path.Bact. 32:833-835.
- Siddiqui, A.Q. and Naseem, S.M. 1979. The haematology of Rohu, *Labeo rohita*. J. Fish Biol. 14:67-72.
- Siddiqui, S., Mahmood, T., Siddiqui, S.B. and Faizi, S. 1986. Isolation of a triterpenoid from *Azadirachta indica*. Phytochemistry. 25:213-2185.
- Siddiqui, S., Siddiqui, S.B. and Faizi, S. 1985. Studies in the chemical constituents of *Azadirachta indica*-Part II: Isolation and structure of the new triterpenoid azadirachtol. Planta Med. 478-480.



- Singh, K., Singh, A. and Singh, D.K. 1996. Molluscicidal activity of neem (*Azadirachta indica* A.Juss). J. Ethnopharmacol. 52:35-40.
- Singh, K.P., Joshi, K.C., Somani, K.C. and Tariq, M. 1980. Effect of phenelzine, a monoamine oxidase inhibitor, on isoproterenol-induced myocardial damage. Adv. in Myocardiol. 2:165-170.
- Sing, R.P. and Srivastava, R.P. 1997. Effect of formulated neem products in controlling mango leaf hopper, *Idioscopus nitidulus* (Walker). Proceeding First International Symposium on Biopesticides. pp. 133-136.
- Sinniah, R., Sinniah, D., Chia, S.L. and Baskaran, G. 1989. Animal model of Margosa oil ingestion with Reye-like syndrome. Pathogenesis of microvesicular fatty liver. J.Pathol. 159:255-264.
- Smith, L.S. 1991. Introduction to fish physiology. Washington : Argent Laboratories.
- Soldatov, A.A. 1996. The effect of hypoxia on red blood cells of flounder : a morphologic and autoradiographic study. J.Fish Biol. 48:321-328.
- Srivastava, A.K. and Agrawal, S.J. 1979. Haematological anomalies in a fresh water teleost, *Colisa fasciatus*, on acute exposure to cobalt. Acta pharmacol.et toxicol. 44:197-199.
- Srivastava, P.N. and Narain, A.S. 1985. Catfish blood chemistry under environmental stress. Experientia. 41:955-957.
- Srivastava, S.J., Singh, N.D., Srivastava, A.K. and Sinha, R. 1995. Acute toxicity of malachite green and its effects on certain blood parameters of a catfish, *Heteropneustes fossilis*. Aquat Toxicol. 31:241-247.
- Strubelt, O., Obermeier, F., Siegers, C.P. and Volpel, M. 1978. Increased carbon tetrachloride hepatotoxicity after low-level ethanol consumption. Toxicol. 10:261-270.
- Strubelt, O., Siegers, C.P., Volpel, M. and Younes, M. 1979. Studies on the mechanism of paracetamol-induced protection against paracetamol hepatotoxicity. Toxicol. 12:121-133.
- Suarez, K.A. and Bhonsle, P. 1978. Enhanced hepatotoxicity of carbon tetrachloride following sodium nitrite pretreatment. Arch.int.Pharmacodyn. 234:329-334.

- Tacon, P., Ndiaye, P., Cauty, C., Le Menn, F. and Jalabert, B. 1996. Relationships between the expression of maternal behaviour and ovarian development in the mouthbrooding cichlid fish *Oreochromis niloticus*. Aquaculture. 146:261-275.
- Talwar, G.P., Raghuvanshi, P., Misra, R., Mukherjee, S. and Shah, S. 1997. Plant immunomodulators for termination of unwanted pregnancy and for contraception and reproductive health. Immunol. and Cell Biol. 75:190-192.
- Tangtong, B. and Wattanasirmkit, K. 1997. Acute toxicity of neem extract on certain blood parameters of tilapia, *Oreochromis niloticus*. Proceeding First International Symposium on Biopesticides. pp. 94-103.
- Tewari, R.K., Pathak, S. and Prakash, A.O. 1989. Biochemical and histological studies of reproductive organs in cyclic and ovariectomized rats supporting a non-hormonal action for neem oil. J.Ethnopharmacol. 25:281-293.
- Thompson, B.E. and Anderson, C.C. 1978. Cardiovascular effects of *Azadirachta indica* extract. J.Pharmac Sci. 67(10):1476-1478.
- Upadhyay, N.S., Dhawan, S., Garg, S. and Talwar, P.G. 1992. Immunomodulatory effects of neem (*Azadirachta indica*) oil. Int.J.Immunopharmac. 14(7):1187-1193.
- Van der Nat, J.M., van der Sluis, W.G., de Silva, K.T.D. and Labadie, R.P. 1991. Ethnopharmacognostical survey of *Azadirachta indica* A.Juss (Meliaceae). J.Ethnopharmacol. 35:1-24.
- Van der Nat, J.M., Hart, L.A., van der Sluis, G.W., van Dijk, H., van der Berg, J.J.A., de Silva, D.T.K. and Labadie, P.R. 1989. Characterization of anti-complement compounds from *Azadirachta indica*. J.Ethnopharmacol. 27:15-24.
- Van der Nat, J.M., Klerx, J.P.A.M., van Dijk, H., de Silva, K.T.D. and Labadie, R.P. 1987. Immunomodulatory activity of an aqueous extract of *Azadirachta indica* stem bark. J.Ethnopharmacol. 19:125-131.
- Van Vuren, J.H.J. 1986. The effects of toxicants on the haematology of *Labeo umbratus* (Teleostei : Cyprinidae). Comp.Biochem.Physiol. 83C:155-159.
- Vijjan, K.V., Tripath, C.H. and Parihar, S.N. 1982. A note on toxicity of neem (*Azadirachta indica*) seed cake in sheep. J.Environ.Biol. 3(2):47-52.

- Wan, M.T., Watts, R.G., Isman, M.B. and Strub, R. 1996. Evaluation of the acute toxicity to juvenile Pacific Northwest salmon of azadirachtin, neem extract and neem-based products. Bull. Environ. Contam. Toxicol. 56:432-439.
- Wang, et al. 1994. Chromium-induced early changes in renal function among ferrochromium-producing workers. Toxicol. 90:93-101.
- Watson, L.J., Shechmeister, I.L. and Jackson, L.L. 1963. The hematology of goldfish, *Carassius auratus*. Cytologia. 28:118-130.
- Williams, E.M. and Eddy, F.B. 1988. Regulation of blood haemoglobin and electrolytes in rainbow trout *Salmo gairdneri* (Richardson) exposed to nitrite. Aquat Toxicol. 13:13-28.
- Williams, R.W. and Warner, M.C. 1976. Some observations on the stained blood cellular elements of channel catfish, *Ictalurus punctatus*. J. Fish Biol. 9:491-497.
- Wongratana, T. 1996. Taxonomy of Nile Tilapia (Personal Communication).
- Yamamoto, K.I., Itazawa, Y. and Kobayashi, H. 1980. Supply of erythrocytes into the circulating blood from the spleen of exercised fish. Comp. Biochem. Physiol. 65A:5-11.
- Yi, Y., Lin, C.K. and Diana, J.S. 1996. Influence of Nile tilapia (*Oreochromis niloticus*) stocking density in cages on their growth and yield in cages and in ponds containing the cages. Aquaculture. 146-205-215.
- Yokayama, H.O.Ms. 1947. Studies on the origin, development, and seasonal variations in the blood cells of the perch (*Perca flavescens*). Doctoral thesis, University of Wisconsin.
- Zakim, D. and Boyer, T.D. 1982. Hepatology. Philadelphia : W.B. Saunder Company. pp.583-612.

## **APPENDIX A**

### 1. Blood collection

Heparin, 500.0  $\mu$ l

### 2. Blood smearing

Reagents :

#### 2.1 Giemsa stock solution :

Giemsa powder	1.0 g
Absolute methanol	66.0 ml
Glycerol	66.0 ml

Worked Giemsa powder into glycerol and placed in 60 °C waterbath for 2 hr. Added absolute methanol and stopper tightly. Placed at room temperature for 7 days and filtered then.

#### 2.2 Absolute methanol

#### 2.3 Phosphate buffer pH 7.2 :

Solution A : $\text{KH}_2\text{PO}_4$	9.1 g
Distilled water	1000.0 ml

Solution B : $\text{Na}_2\text{HPO}_4$	9.5 g
Distilled water	1000.0 ml

Working solution :

Solution A	28 ml
Solution B	72 ml

#### 2.4 Immersion oil

### 3. Blood dilution

Reagents

#### 3.1 0.75% Sodium chloride solution

Sodium chloride	0.75 g
Distilled water	100.0 ml

### 3.2 Shaw's solution

Solution A : Neutral red	25.0	mg
Sodium chloride	0.9	g
Distilled water	100.0	ml
Solution B : Crystal violet	12.0	mg
Sodium citrate	3.8	ml
Formaldehyde	0.4	ml
Distilled water	100.0	ml

Both solutions were filtered just prior to use and mixed in equal volumes.

## 4. ALP determination

### Reagents

4.1 Sigma 104<sup>®</sup> phosphate substrate, p-Nitrophenyl phosphate disodium 100 mg capsule, Catalog No. 104-100. Stock substrate solution were prepared by removing Sigma 104<sup>®</sup> phosphate substrate from freezer and allowed to room temperature before opening package to avoid moisture pick-up. The stock substrate solution were prepared by dissolving the 100 mg capsule, Catalog No. 104-100 in 25 ml deionized water (contents only). Stored in the freezer (below 0° C).

4.2 Citrate buffer solution, Catalog No. 104-4 , Citrate, 90 mmol/L, and chloride, 10 mmol/L, pH 4.8 at 25 ° C. Chloroform added preservative. Stored in refrigerator (2-6° C).

4.3 p-Nitrophenyl standard solution, Catalog No. 104-1, p-Nitrophenol , 10 mmol/ml for preparing diluted p-Nitrophenol standard solution by pipetting 0.5 ml p-Nitrophenol standard solution into a 100 ml volumetric flask. Diluted to 100 ml with 0.02 N sodium hydroxide solution. Mixed thoroughly. Stored in refrigerator (2-6° C).

4.4 Tartrate acid buffer solution, Catalog No. 104-12, L(+) Tartaric acid , 40 mmol/L, in citrate buffer, 90 mmol/L, pH 4.8 at 25 ° C. Chloroform added as preservative.

4.5 221 Alkaline buffer solution, Catalog No. 221, 2-amino-2-methyl-1-propanol, 1.5 mol/L, pH 10.3 at 25 ° C.

4.6 Hydrochloric acid, concentrated

4.7 Sodium hydroxide solution, 0.1 N, prepared by dissolving 4.0 g sodium hydroxide in 1000 ml deionized water.

4.8 Sodium hydroxide sodium, 0.05 N, prepared by dissolving 2.0 g sodium hydroxide in 1000 ml deionized water.

4.9 Sodium hydroxide sodium, 0.02 N, prepared by dissolving 0.8 g sodium hydroxide in 1000 ml deionized water.

## 5. GOT and GPT determination

### Reagents

5.1 Sigma prepared substrate, Catalog No. 505-1, DL-aspartate, 0.2 mol/L and  $\alpha$ -ketoglutaric acid, 1.8 mmol/L, in phosphate buffer, pH 7.5. Chloroform added as preservative. Stored in refrigerator (2-6°C).

5.2 Sigma color reagent, Catalog No. 505-2, 2,4-dinitrophenylhydrazine (DNP), approximately 20 mg/dl, in acid solution. Stored in refrigerator (2-6°C).

5.3. Calibration solution for transaminase, Catalog No.105-10, sodium pyruvate, 1.5 mmol/L, in phosphate buffer, pH 7.5. Chloroform added as preservative. Stored in refrigerator (2-6°C).

5.4 Alanine- $\alpha$ -kg substrate, Catalog No. 105-51, DL- alanine, 0.2 mol/L, and - $\alpha$ -ketoglutaric acid, 1.8 mmol/L, in phosphate buffer, pH 7.5. Chloroform added as preservative. Stored in refrigerator (2-6°C).

5.5 Sodium hydroxide solution, 0.40 N, prepared by dissolving by 16 g sodium hydroxide in 1000 ml deionized water.

## **APPENDIX B**



### 1. Apparatus and equipment for fish culturing and toxicity testing

- Air pump
- Air line and air stones
- Beaker
- Data sheets
- DO meter
- Electric balances
- 325-L glass aquarium
- 14-L glass jar
- graduated cylinders
- pH meter
- Pipette
- Ruler
- Thermometer
- Tape and markers
- Siphon with bulb and clamp
- Volumetric flask

### 2. Apparatus and equipment for blood collecting

- Centrifuge
- Eppendorf tube
- Rack
- Refrigerator
- Surgical handles and blades
- Syringes with needles, 1 ml

### 3. Apparatus and equipment for preparation of blood smear

- Glass coplin staining jar
- Filter paper
- Forceps
- Microscope glass slide
- Microscope slide tray
- Rubber bulb
- 100-slide boxes
- Timer
- Wash bottle

#### 4. Apparatus and equipments for haematological and biochemistry analysis

- Beaker
- Calculator
- Counter
- Cuvette
- Dropper
- Hemacytometer
- Heparinized capillary tube
- Light microscope
- Lab bottle
- Micro pipette
- Microcapillary centrifuge
- One touch Basic Blood Glucose Meter
- Rack
- RBC diluting pipette
- Spectrophotometer
- Test tube
- Timer
- Waterbath
- WBC diluting pipette

## **APPENDIX C**



16 Mar 98 SPSS for MS WINDOWS Release 6.0

---



---

**PROBIT ANALYSIS**

---

**DATA Information**

9 unweighted cases accepted.  
 1 cases rejected because of missing data.  
 0 cases are in the control group.

**MODEL Information**

ONLY Normal Sigmoid is requested.

---



---



---

**PROBIT ANALYSIS**

---

Parameter estimates converged after 16 iterations.  
 Optimal solution found.

Parameter Estimates (PROBIT model:  $(\text{PROBIT}(p)) = \text{Intercept} + \text{BX}$ ):

	<b>Regression Coeff.</b>	<b>Standard Error</b>	<b>Coeff./S.E.</b>
<i>CONCENTR</i>	.09929	.01460	6.79927
	<b>Intercept</b>	<b>Standard Error</b>	<b>Intercept/S.E.</b>
	-4.73723	.71576	-6.61849

Pearson Goodness-of-Fit Chi Square = 24.434 DF = 7 P = .001

Since Goodness-of-Fit Chi square is significant, a heterogeneity factor is used in the calculation of confidence limits.

---

---



---

**PROBIT ANALYSIS**


---



---

Observed and Expected Frequencies

CONCENTR	Number of		Observed	Expected	Residual	Prob
	Subjects	Responses	Responses	Responses		
30.00	15.0	.0	.590	-.590	.03933	
35.00	15.0	.01	.552	-1.552	.10346	
40.00	15.0	8.0	3.329	4.671	.22195	
45.00	15.0	8.0	5.908	2.092	.39389	
50.00	15.0	6.0	8.848	-2.848	.58989	
55.00	15.0	7.0	11.481	-4.481	.76538	
60.00	15.0	15.0	13.332	1.668	.88880	
65.00	15.0	15.0	14.355	.645	.95697	
70.00	15.0	15.0	14.798	.202	.98655	

---



---



---

**PROBIT ANALYSIS**


---



---

Confidence Limits for Effective CONCENTR

Prob	95% Confidence Limits		
	CONCENTR	Lower	Upper
.01	24.28124	-21.09061	34.84505
.02	27.02673	-13.39824	36.65548
.03	28.76866	-8.53741	37.82386
.04	30.07904	-4.89374	38.71573
.05	31.14493	-1.93980	39.45111
.06	32.05218	.56625	40.08525
.07	32.84765	2.75640	40.64843
.08	33.55991	4.71098	41.15912
.09	34.20767	6.48266	41.62952
.10	34.80394	8.10790	42.06811
.15	37.27266	14.76558	43.95525
.20	39.23471	19.94413	45.56784
.25	40.91798	24.26821	47.06995
.30	42.42961	28.01838	48.55189
.35	43.83036	31.33948	50.07911
.40	45.15953	34.31082	51.70836
.45	46.44553	36.97743	53.49288
.50	47.71113	39.36855	55.48230

.55	48.97673	41.51095	57.72045
.60	50.26272	43.43756	60.24496
.65	51.59189	45.19068	63.09244
.70	52.99264	46.82094	66.31050
.75	54.50427	48.38618	69.97736
.80	56.18754	49.95488	74.23486
.85	58.14960	51.62089	79.35999
.90	60.61831	53.55184	85.97386
.91	61.21458	53.99836	87.59116
.92	61.86235	54.47650	89.35510
.93	62.57460	54.99479	91.30209
.94	63.37008	55.56545	93.48476
.95	64.27732	56.20706	95.98333
.96	65.34322	56.94999	98.92972
.97	66.65360	57.84967	102.56558
.98	68.39552	59.02647	107.41800
.99	71.14101	60.84687	115.10039

---



---

#### PROBIT ANALYSIS

---



---

**DATA Information**

9 unweighted cases accepted.  
 1 cases rejected because of missing data.  
 0 cases are in the control group.

**MODEL Information**

ONLY Normal Sigmoid is requested.

---



---

#### PROBIT ANALYSIS

---



---

Parameter estimates converged after 17 iterations.  
 Optimal solution found.

Parameter Estimates (PROBIT model:  $(\text{PROBIT}(p)) = \text{Intercept} + \text{BX}$ ):

	Regression Coeff.	Standard Error	Coeff./S.E.
<i>CONCENTR</i>	.10485	.01706	6.14630

<b>Intercept</b>	<b>Standard Error</b>	<b>Intercept/S.E.</b>
-4.26831	.75246	-5.67246

Pearson Goodness-of-Fit Chi Square = 12.084 DF = 7 P = .098

Since Goodness-of-Fit Chi square is significant, a heterogeneity factor is used in the calculation of confidence limits.

---



---

### PROBIT ANALYSIS

---

Observed and Expected Frequencies

<b>CONCENTR</b>	<b>Number of Observed</b>		<b>Expected</b>	<b>Residual</b>	<b>Prob</b>
	<b>Subjects</b>	<b>Responses</b>			
30.00	15.0	.0	1.962	-1.962	.13077
35.00	15.0	4.0	4.121	-.121	.27475
40.00	15.0	11.0	7.056	3.944	.47041
45.00	15.0	12.0	10.105	1.895	.67365
50.00	15.0	10.0	12.526	-2.526	.83504
55.00	15.0	13.0	13.995	-.995	.93300
60.00	15.0	15.0	14.677	.323	.97845
65.00	15.0	15.0	14.919	.081	.99457
70.00	15.0	15.0	14.984	.016	.99893

---



---

### PROBIT ANALYSIS

---

Confidence Limits for Effective CONCENTR

<b>Prob</b>	<b>95% Confidence Limits</b>		
	<b>CONCENTR</b>	<b>Lower</b>	<b>Upper</b>
.01	18.52107	-7.50814	27.56862
.02	21.12092	-2.33344	29.37826
.03	22.77045	.93974	30.53642
.04	24.01132	3.39562	31.41405
.05	25.02067	5.38849	32.13275
.06	25.87979	7.08081	32.74839
.07	26.63307	8.56129	33.29155
.08	27.30754	9.88390	33.78086
.09	27.92095	11.08406	34.22858



.10	28.48559	12.18629	34.64322
.15	30.82335	16.71862	36.39113
.20	32.68133	20.27341	37.82767
.25	34.27531	23.27568	39.10753
.30	35.70675	25.92072	40.30797
.35	37.03319	28.31414	41.47796
.40	38.29186	30.51831	42.65511
.45	39.50964	32.57171	43.87319
.50	40.70810	34.49851	45.16599
.55	41.90657	36.31458	46.56953
.60	43.12435	38.03249	48.12309
.65	44.38301	39.66669	49.87022
.70	45.70946	41.23861	51.86171
.75	47.14090	42.78167	54.16413
.80	48.73488	44.34776	56.88016
.85	50.59286	46.02191	60.19735
.90	52.93062	47.96958	64.52992
.91	53.49526	48.42082	65.59555
.92	54.10867	48.90435	66.75990
.93	54.78314	49.42887	68.04730
.94	55.53642	50.00688	69.49292
.95	56.39554	50.65736	71.15041
.96	57.40489	51.41136	73.10797
.97	58.64576	52.32561	75.52724
.98	60.29529	53.52331	78.76088
.99	62.89514	55.37993	83.88859

---

## PROBIT ANALYSIS

---

### DATA Information

9 unweighted cases accepted.  
 1 cases rejected because of missing data.  
 0 cases are in the control group.

### MODEL Information

ONLY Normal Sigmoid is requested.

---

---



---

**PROBIT ANALYSIS**


---



---

Parameter estimates converged after 19 iterations.  
Optimal solution found.

Parameter Estimates (PROBIT model: (PROBIT(p)) = Intercept + BX):

	<b>Regression Coeff.</b>	<b>Standard Error</b>	<b>Coeff./S.E.</b>
<i>CONCENTR</i>	.13924	.02416	5.76284

	<b>Intercept</b>	<b>Standard Error</b>	<b>Intercept/S.E.</b>
	-5.41894	.99417	-5.45075

Pearson Goodness-of-Fit Chi Square = 9.369 DF = 7 P = .227

Since Goodness-of-Fit Chi square is NOT significant, no heterogeneity factor is used in the calculation of confidence limits.

---



---

**PROBIT ANALYSIS**


---



---

Observed and Expected Frequencies

<b>CONCENTR</b>	<b>Subjects</b>	<b>Number of Responses</b>	<b>Observed Responses</b>	<b>Expected Residual</b>	<b>Prob</b>
30.00	15.0	.0	1.607	-1.607	.10716
35.00	15.0	5.0	4.390	.610	.29268
40.00	15.0	11.0	8.398	2.602	.55986
45.00	15.0	13.0	12.022	.978	.80145
50.00	15.0	12.0	14.079	-2.079	.93858
55.00	15.0	15.0	14.811	.189	.98743
60.00	15.0	15.0	14.975	.025	.99833
65.00	15.0	15.0	14.998	.002	.99986
70.00	15.0	15.0	15.000	.000	.99999

---

**PROBIT ANALYSIS**


---

**Confidence Limits for Effective CONCENTR**

<b>Prob</b>	<b>CONCENTR</b>	<b>95% Confidence Limits</b>	
		<b>Lower</b>	<b>Upper</b>
.01	22.21074	12.32333	27.29657
.02	24.16852	15.24249	28.80515
.03	25.41066	17.08892	29.76798
.04	26.34508	18.47429	30.49590
.05	27.10516	19.59848	31.09072
.06	27.75211	20.55314	31.59920
.07	28.31935	21.38832	32.04691
.08	28.82725	22.13446	32.44944
.09	29.28917	22.81155	32.81702
.10	29.71436	23.43343	33.15677
.15	31.47478	25.99119	34.58039
.20	32.87390	27.99870	35.73714
.25	34.07423	29.69636	36.75415
.30	35.15215	31.19529	37.69307
.35	36.15101	32.55649	38.59090
.40	37.09883	33.81727	39.47372
.45	38.01586	35.00235	40.36260
.50	38.91835	36.12948	41.27655
.55	39.82084	37.21277	42.23434
.60	40.73786	38.26520	43.25586
.65	41.68568	39.30090	44.36376
.70	42.68454	40.33754	45.58616
.75	43.76247	41.39960	46.96194
.80	44.96279	42.52421	48.55200
.85	46.36191	43.77456	50.46592
.90	48.12233	45.28063	52.94123
.91	48.54752	45.63591	53.54757
.92	49.00944	46.01884	54.20932
.93	49.51734	46.43659	54.94024
.94	50.08459	46.89951	55.76021
.95	50.73153	47.42334	56.69952
.96	51.49161	48.03386	57.80800
.97	52.42603	48.77823	59.17692
.98	53.66818	49.75903	61.00538
.99	55.62596	51.28923	63.90292

---



---

**PROBIT ANALYSIS**


---



---

**DATA Information**

9 unweighted cases accepted.  
 1 cases rejected because of missing data.  
 0 cases are in the control group.

**MODEL Information**

ONLY Normal Sigmoid is requested.

---



---



---

**PROBIT ANALYSIS**


---



---

> Warning # 13527

> Parameter estimates did not converge in maximum number of iterations.

Number of iterations = 20

Optimal solution not found.

Parameter Estimates (PROBIT model: (PROBIT(p)) = Intercept + BX):

	<b>Regression Coeff.</b>	<b>Standard Error</b>	<b>Coeff./S.E.</b>
<i>CONCENTR</i>	.28973	.06404	4.52443
	<b>Intercept</b>	<b>Standard Error</b>	<b>Intercept/S.E.</b>
	-10.50394	2.34725	-4.47501

Pearson Goodness-of-Fit Chi Square = 1.866 DF = 7 P = .967

Since Goodness-of-Fit Chi square is NOT significant, no heterogeneity factor is used in the calculation of confidence limits.

---

---



---

**PROBIT ANALYSIS**


---

Observed and Expected Frequencies

CONCENTR	Number of		Expected Responses	Residual	Prob
	Subjects	Responses			
30.00	15.0	.0	.525	-.525	.03498
35.00	15.0	7.0	5.372	1.628	.35813
40.00	15.0	12.0	12.916	-.916	.86108
45.00	15.0	15.0	14.915	.085	.99436
50.00	15.0	15.0	14.999	.001	.99997
55.00	15.0	15.0	15.000	.000	1.00000
60.00	15.0	15.0	15.000	8.8273E-11	1.00000
65.00	15.0	15.0	15.000	7.1054E-15	1.00000
70.00	15.0	15.0	15.000	.000	1.00000

---



---



---

**PROBIT ANALYSIS**


---

Confidence Limits for Effective CONCENTR

Prob	95% Confidence Limits		
	CONCENTR	Lower	Upper
.01	28.22509	21.58979	31.04728
.02	29.16597	23.21107	31.74249
.03	29.76293	24.23485	32.18845
.04	30.21200	25.00186	32.52706
.05	30.57728	25.62341	2.804853
.06	30.88820	26.15052	33.04322
.07	31.16081	26.61105	33.25387
.08	31.40489	27.02194	33.44393
.09	31.62688	27.39430	33.61812
.10	31.83123	27.73583	33.77969
.15	32.67726	29.13473	34.46375
.20	33.34965	30.22392	35.03003
.25	33.92651	31.13643	35.53776
.30	34.44455	31.93336	36.01625
.35	34.92458	32.64797	36.48351
.40	35.38009	33.30044	36.95252
.45	35.82080	33.90421	37.43379
.50	36.25452	34.46917	37.93667

.55	36.68825	35.00356	38.47013
.60	37.12895	35.51521	39.04353
.65	37.58446	36.01255	39.66766
.70	38.06450	36.50552	40.35656
.75	38.58254	37.00685	41.13065
.80	39.15939	37.53464	42.02312
.85	39.83179	38.11849	43.09473
.90	40.67782	38.81821	44.47797
.91	40.88216	38.98275	44.81652
.92	41.10415	39.15988	45.18594
.93	41.34824	39.35288	45.59390
.94	41.62085	39.56647	46.05149
.95	41.93176	39.80781	46.57563
.96	42.29705	40.08865	47.19412
.97	42.74611	40.43048	47.95792
.98	43.34307	40.87996	48.97817
.99	44.28395	41.57943	50.59518

### Calculation of application factor (AF)

The AF was intended to provide an estimating of the relationship between a test material's chronic and acute toxicity, which could then be applied to aquatic organisms for which a MATC, it was the numerical value of the ratio of the MATC to the incipient LC<sub>50</sub> 96h estimated in dynamic acute toxicity test.

The maximum acceptable toxicant concentration (MATC) was the estimated threshold concentration of a chemical within a range defined by the highest concentration tested at which no significant deleterious effect was observed (NOEC) and the lowest concentration tested at which some significant deleterious effect was observed (LOEC).

$$AF = MACT / LC_{50} 96h$$

$$LC_4 = MACT$$

$$LC_4 = 30.21 \text{ ppm} \rightarrow \text{from calculation of the 96-hr } LC_{50}$$

$$AF = LC_4/LC_{50}$$

$$LC_{50} = 36.25 \text{ ppm} \rightarrow \text{from calculation of the 96-hr } LC_{50}$$

Hence, determination of the AF of the sublethal concentration of neem seed extract for the long-term study was below.

$$AF = 30.21/36.25$$

$$= 0.83$$

From the value of AF calculated, the concentration for the long-term study was also calculated.

$$AF \times LC_4 = 0.83 \times 30.21$$

$$= 25.07 \text{ ppm.}$$

So the sublethal concentration for the long-term study was estimated at 25.07 ppm neem seed extract.

## **APPENDIX D**



Variable	Number			
	of class	Mean	SD	SE of Mean
LYMPHOCYTE				
2mcon	50	85.1000	11.152	1.577
2mtreat	50	93.3800	6.477	.916

Mean Difference = -8.2800

Levene's Test for Equality of Variances : F = 7.165 p = .009

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-4.54	98	.000	1.824	(-11.900, -4.660)
Unequal	-4.54	78.68	.000	1.824	(-11.911, -4.649)

Variable	Number			
	of class	Mean	SD	SE of Mean
MONOCYTE				
2mcon	50	11.9600	9.699	1.372
2mtreat	50	5.1800	5.652	.799

Mean Difference = 6.7800

Levene's Test for Equality of Variances : F = 9.514 p = .003

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	4.27	98	.000	1.588	(3.629, 9.931)
Unequal	4.27	78.84	.000	1.588	(3.619, 9.941)

Variable	Number of class	Mean	SD	SE of Mean
<b>NEUTROPHIL</b>				
2mcon	50	2.0400	2.792	.395
2mtreat	50	1.0800	1.353	.191

Mean Difference = .9600

Levene's Test for Equality of Variances :  $F = 2.394$   $p = .125$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	2.19	98	.031	.439	(.089, 1.831)
Unequal	2.19	70.81	.032	.439	(.085, 1.835)

Variable	Number of class	Mean	SD	SE of Mean
<b>BASOPHIL</b>				
2mcon	50	.5800	.859	.122
2mtreat	50	.3800	.725	.103

Mean Difference = .2000

Levene's Test for Equality of Variances :  $F = 2.970$   $p = .088$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	1.26	98	.212	.159	(-.116, .516)
Unequal	1.26	95.31	.212	.159	(-.116, .516)

Variable	Number of class	Mean	SD	SE of Mean
<b>EOSINOPHIL</b>				
2mcon	50	.1000	.303	.043
2mtreat	50	.0800	.274	.039

Mean Difference = .0200

Levene's Test for Equality of Variances : F = .481 p = .489

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.35	98	.730	.058	(-.095, .135)
Unequal	.35	97.02	.730	.058	(-.095, .135)

Variable	Number of class	Mean	SD	SE of Mean
<b>LYMPHOCYTE</b>				
3mcon	50	95.6800	3.728	.527
3mtreat	50	90.3400	8.475	1.199

Mean Difference = 5.3400

Levene's Test for Equality of Variances : F = 17.688 p = .000

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	4.08	98	.000	1.309	(2.741, 7.939)
Unequal	4.08	67.28	.000	1.309	(2.726, 7.954)

## Number

Variable	of class	Mean	SD	SE of Mean
<b>MONOCYTE</b>				
3mcon	50	3.5400	3.500	.495
3treat	50	7.9400	7.755	1.097

Mean Difference = -4.4000

Levene's Test for Equality of Variances :  $F = 14.953$   $p = .000$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-3.66	98	.000	1.203	(-6.788, -2.012)
Unequal	-3.66	68.17	.000	1.203	(-6.802, -1.998)

## Number

Variable	of class	Mean	SD	SE of Mean
<b>NEUTROPHIL</b>				
3mcon	50	.6000	.904	.128
3treat	50	1.4600	2.0169	.307

Mean Difference = -.8600

Levene's Test for Equality of Variances :  $F = 15.070$   $p = .000$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-2.59	98	.011	.332	(-1.519, -.201)
Unequal	-2.59	65.51	.012	.332	(-1.523, -.197)

Variable	Number of class	Mean	SD	SE of Mean	
<b>BASOPHIL</b>					
3mcon	50	.1600	.468	.066	
3treat	50	.1800	.438	.062	
Mean Difference = -.0200					
Levene's Test for Equality of Variances : F = .092 p = .763					
t-test for Equality of Means					
Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-.22	98	.826	.091	(-.200, .160)
Unequal	-.22	97.57	.826	.091	(-.200, .160)

Variable	Number of class	Mean	SD	SE of Mean	
<b>EOSINOPHIL</b>					
3mcon	50	.0200	.141	.020	
3treat	50	.0800	.274	.039	
Mean Difference = -.0600					
Levene's Test for Equality of Variances : F = 8.165 p = .005					
t-test for Equality of Means					
Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-1.38	98	.172	.044	(-.147, .027)
Unequal	-1.38	73.37	.173	.044	(-.147, .027)

## Number

Variable	of class	Mean	SD	SE of Mean
LYMPHOCYTE				
4mcon	50	94.7400	4.593	.650
4mtreat	50	97.5600	2.205	.312

Mean Difference = -2.8200

Levene's Test for Equality of Variances : F = 18.018 p = .000

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-3.91	98	.000	.721	(-4.250, -1.390)
Unequal	-3.91	70.46	.000	.721	(-4.257, -1.383)

## Number

Variable	of class	Mean	SD	SE of Mean
MONOCYTE				
4mcon	50	4.4400	3.818	.540
4mtreat	50	1.5000	1.432	.203

Mean Difference = 2.9400

Levene's Test for Equality of Variances : F = 33.287 p = .000

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	5.10	98	.000	.577	(1.795, 4.085)
Unequal	5.10	62.52	.000	.577	(1.787, 4.093)

Variable	Number of class	Mean	SD	SE of Mean
<b>NEUTROPHIL</b>				
4mcon	50	.7200	1.356	.192
4mtreat	50	.6800	1.133	.160

Mean Difference = .0400

Levene's Test for Equality of Variances : F = .432 p = .513

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.16	98	.873	.250	(-.456, .536)
Unequal	.16	95.00	.873	.250	(-.456, .536)

Variable	Number of class	Mean	SD	SE of Mean
<b>BASOPHIL</b>				
4mcon	50	.1200	.328	.046
4mtreat	50	.2200	.507	.072

Mean Difference = -.1000

Levene's Test for Equality of Variances : F = 6.012 p = .016

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-1.17	98	.244	.085	(-.269, .069)
Unequal	-1.17	83.97	.245	.085	(-.270, .070)

		Number			
Variable		of class	Mean	SD	SE of Mean
EOSINOPHIL					
4mcon		50	.0000	.000	.000
4mtreat		50	.0400	.198	.028
Mean Difference = -.0400					
Levene's Test for Equality of Variances : F = 8.892 p = .004					
t-test for Equality of Means					
Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-1.43	98	.156	.028	(-.096, .016)
Unequal	-1.43	49.00	.159	.028	(-.096, .016)

		Number			
Variable		of class	Mean	SD	SE of Mean
LYMPHOCYTE					
5mcon		50	95.8600	3.796	.537
5mtreat		50	97.0400	3.044	.430
Mean Difference = -1.1800					
Levene's Test for Equality of Variances : F = 2.566 p = .112					
t-test for Equality of Means					
Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-1.71	98	.090	.688	(-2.546, .186)
Unequal	-1.71	93.58	.090	.688	(-2.546, .186)



Variable	Number of class	Mean	SD	SE of Mean
<b>MONOCYTE</b>				
5mcon	50	2.6000	2.836	.401
5mtreat	50	1.9200	2.098	.297

Mean Difference = .6800  
Levene's Test for Equality of Variances : F = 3.937 p = .050

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	1.36	98	.176	.499	(-.310, 1.670)
Unequal	1.36	90.28	.176	.499	(-.311, 1.671)

Variable	Number of class	Mean	SD	SE of Mean
<b>NEUTROPHIL</b>				
5mcon	50	.5600	1.013	.143
5mtreat	50	.2600	.527	.075

Mean Difference = .3000  
Levene's Test for Equality of Variances : F = 14.043 p = .000

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	1.86	98	.066	.162	(-.021, .621)
Unequal	1.86	73.71	.067	.162	(-.022, .622)

Variable	Number of class	Mean	SD	SE of Mean
<b>BASOPHIL</b>				
5mcon	50	.8600	1.400	.198
5mtreat	50	.7200	1.179	.167

Mean Difference = .1400

Levene's Test for Equality of Variances : F = 1.096 p = .298

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.54	98	.590	.259	(-.374, .654)
Unequal	.54	95.24	.590	.259	(-.374, .654)

Variable	Number of class	Mean	SD	SE of Mean
<b>EOSINOPHIL</b>				
5mcon	50	.0800	.274	.039
5mtreat	50	.0600	.424	.060

Mean Difference = .0200

Levene's Test for Equality of Variances : F = .200 p = .656

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.28	98	.780	.071	(-.122, .162)
Unequal	.28	83.83	.780	.071	(-.122, .162)

## Number

Variable	of class	Mean	SD	SE of Mean
<b>LYMPHOCYTE</b>				
6mcon	50	96.8400	3.359	.475
6mtreat	50	97.0000	3.097	.438

Mean Difference = -.1600

Levene's Test for Equality of Variances : F = .178 p = .674

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.25	98	.805	.646	(-1.442, 1.122)
Unequal	-.25	97.36	.805	.646	(-1.443, 1.123)

## Number

Variable	of class	Mean	SD	SE of Mean
<b>MONOCYTE</b>				
6mcon	50	1.8200	2.192	.310
6mtreat	50	2.2000	2.807	.397

Mean Difference = -.3800

Levene's Test for Equality of Variances : F = 1.989 p = .162

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.75	98	.452	.504	(-1.380, .620)
Unequal	-.75	92.56	.452	.504	(-1.380, .620)

Variable	Number of class	Mean	SD	SE of Mean
<b>NEUTROPHIL</b>				
6mcon	50	.3000	.580	.082
6mtreat	50	.3000	.647	.091

Mean Difference = .0000

Levene's Test for Equality of Variances : F = .023 p = .881

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.00	98	1.000	.123	(-.244, .244)
Unequal	.00	96.87	1.000	.123	(-.244, .244)

Variable	Number of class	Mean	SD	SE of Mean
<b>BASOPHIL</b>				
6mcon	50	1.0000	1.796	.254
6mtreat	50	.4800	.814	.115

Mean Difference = .5200

Levene's Test for Equality of Variances : F = 3.191 p = .077

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	1.86	98	.065	.279	(-.033, 1.073)
Unequal	1.86	68.33	.066	.279	(-.037, 1.077)

Variable	Number of class	Mean	SD	SE of Mean
<b>EOSINOPHIL</b>				
6mcon	50	.0200	.141	.020
6mtreat	50	.0200	.141	.020

Mean Difference = .0000

Levene's Test for Equality of Variances : F = .000 p = 1.000

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.00	98	1.000	.028	(-.056, .056)
Unequal	.00	98.00	1.000	.028	(-.056, .056)

Variable	Number of class	Mean	SD	SE of Mean
<b>LYMPHOCYTE</b>				
7mcon	50	95.2800	3.580	.506
7mtreat	50	95.5000	4.273	.604

Mean Difference = -.2200

Levene's Test for Equality of Variances : F = .399 p = .529

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.28	98	.781	.788	(-1.785, 1.345)
Unequal	-.28	95.09	.781	.788	(-4.785, 1.345)

## Number

Variable	of class	Mean	SD	SE of Mean
<b>MONOCYTE</b>				
7mcon	50	3.3000	2.936	.415
7mtreat	50	3.2200	3.489	.493

Mean Difference = .0800

Levene's Test for Equality of Variances : F = .071 p = .791

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.12	98	.902	.645	(-1.200, 1.360)
Unequal	.12	95.22	.902	.645	(-1.201, 1.361)

## Number

Variable	of class	Mean	SD	SE of Mean
<b>NEUTROPHIL</b>				
7mcon	50	.6600	.872	.123
7mtreat	50	.3600	.827	.117

Mean Difference = -.3000

Levene's Test for Equality of Variances : F = 2.795 p = .098

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	1.77	98	.081	.170	(-.037, .637)
Unequal	1.77	97.73	.081	.170	(-.037, .637)

Variable	Number of class	Mean	SD	SE of Mean
<b>BASOPHIL</b>				
7mcon	50	.7400	1.046	.148
7mtreat	50	.9000	1.460	.207

Mean Difference = -.1600

Levene's Test for Equality of Variances :  $F = 2.755$   $p = .100$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.63	98	.530	.254	(-.664, .344)
Unequal	-.63	88.80	.530	.254	(-.665, .345)

Variable	Number of class	Mean	SD	SE of Mean
<b>EOSINOPHIL</b>				
7mcon	50	.0200	.141	.020
7mtreat	50	.0200	.141	.020

Mean Difference = .0000

Levene's Test for Equality of Variances :  $F = .000$   $p = 1.000$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.00	98	1.000	.028	(-.056, .056)
Unequal	.00	98.00	1.000	.028	(-.056, .056)

		Number			
Variable	of class	Mean	SD	SE of Mean	
<b>LYMPHOCYTE</b>					
8mcon	50	93.7400	7.722	1.092	
8mtreat	50	93.6600	7.427	1.050	
Mean Difference = .0800					
Levene's Test for Equality of Variances : F = .209    p = .648					
t-test for Equality of Means					
Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	.05	98	.958	1.515	(-2.928, 3.088)
Unequal	.05	97.85	.958	1.515	(-2.928, 3.088)

		Number			
Variable	of class	Mean	SD	SE of Mean	
<b>MONOCYTE</b>					
8mcon	50	4.7400	6.639	.939	
8mtreat	50	4.7600	6.4602	.914	
Mean Difference = -.0200					
Levene's Test for Equality of Variances : F = .064    p = .800					
t-test for Equality of Means					
Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-.02	98	.988	1.310	(-2.620, 2.580)
Unequal	-.02	97.93	.988	1.310	(-2.620, 2.580)



Variable	Number of class	Mean	SD	SE of Mean
<b>NEUTROPHIL</b>				
8mcon	50	.9000	1.418	.201
8mtreat	50	.4600	1.054	.149

Mean Difference = .4400

Levene's Test for Equality of Variances : F = 2.705 p = .103

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	1.76	98	.081	.250	(-.056, .936)
Unequal	1.76	90.48	.082	.250	(-.056, .936)

Variable	Number of class	Mean	SD	SE of Mean
<b>BASOPHIL</b>				
8mcon	50	.6000	1.069	.151
8mtreat	50	.9200	1.104	.156

Mean Difference = -.3200

Levene's Test for Equality of Variances : F = .015 p = .904

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-1.47	98	.144	.217	(-.751, .111)
Unequal	-1.47	97.90	.144	.217	(-.751, .111)

Variable	Number of class	Mean	SD	SE of Mean
EOSINOPHIL				
8mcon	50	.0200	.141	.020
8mtreat	50	.0200	.141	.020

Mean Difference = .0000

Levene's Test for Equality of Variances : F = .000 p = 1.000

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.00	98	1.000	.028	(-.056, .056)
Unequal	.00	98.00	1.000	.028	(-.056, .056)

Variable	Number of class	Mean	SD	SE of Mean
<b>WBC</b>				
5mcon	10	22.7250	11.275	3.566
5mtreat	10	225.4500	157.105	49.681

Mean Difference = -202.7250

Levene's Test for Equality of Variances : F = 13.962 p = .002

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-4.07	18	.001	49.809	(-307.395, -98.055)
Unequal	-4.07	9.09	.003	49.809	(-315.431, -90.019)

Variable	Number of class	Mean	SD	SE of Mean
<b>RBC</b>				
5mcon	10	197.8000	71.313	22.551
5mtreat	10	140.0500	65.202	20.619

Mean Difference = 57.7500

Levene's Test for Equality of Variances : F = .139 p = .714

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	1.89	18	.075	30.556	(-6.462, 121.962)
Unequal	1.89	17.86	.075	30.556	(-6.462, 121.962)

Variable	Number of class	Mean	SD	SE of Mean
HCT				
5mcon	10	30.8000	3.698	1.170
5mtreat	10	29.6500	5.457	1.726

Mean Difference = 1.1500

Levene's Test for Equality of Variances : F = .283 p = .601

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.55	18	.588	2.085	(-3.231, 5.531)
Unequal	.55	15.83	.589	2.085	(-3.270, 5.570)

Variable	Number of class	Mean	SD	SE of Mean
MCV				
5mcon	10	1.7180	.533	.169
5mtreat	8	1.9975	.534	.189

Mean Difference = -.2795

Levene's Test for Equality of Variances : F = .081 p = .779

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-1.10	16	.286	.253	(-.816, .257)
Unequal	-1.10	15.13	.287	.253	(-.819, .260)

Variable	Number of class	Mean	SD	SE of Mean
WBC				
6mcon	10	72.6750	49.432	15.632
6mtreat	10	217.1750	174.761	55.264

Mean Difference = -144.5000

Levene's Test for Equality of Variances : F = 5.951 p = .025

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-2.52	18	.022	57.433	(-265.191, -23.809)
Unequal	-2.52	10.43	.030	57.433	(-272.502, -16.498)

Variable	Number of class	Mean	SD	SE of Mean
RBC				
6mcon	10	120.1000	36.445	11.525
6mtreat	10	127.9000	45.209	14.296

Mean Difference = -7.8000

Levene's Test for Equality of Variances : F = 1.388 p = .254

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.42	18	.676	18.363	(-46.389, 30.789)
Unequal	-.42	17.22	.676	18.363	(-46.553, 30.953)

Variable	Number of class	Mean	SD	SE of Mean
HCT				
6mcon	10	30.3500	2.310	.730
6mtreat	10	22.3000	4.990	1.578

Mean Difference = 8.0500

Levene's Test for Equality of Variances : F = 2.865 p = .108

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	4.63	18	.000	1.739	(4.396, 11.704)
Unequal	4.63	12.69	.001	1.739	(4.292, 11.808)

Variable	Number of class	Mean	SD	SE of Mean
MCV				
6mcon	10	2.7270	.808	.256
6mtreat	10	1.8400	.447	.141

Mean Difference = .8870

Levene's Test for Equality of Variances : F = 1.101 p = .308

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	3.04	18	.007	.292	(.273, 1.501)
Unequal	3.04	14.05	.009	.292	(.260, 1.514)

Variable	Number of class	Mean	SD	SE of Mean
WBC				
7mcon	10	155.6500	66.367	20.987
7mtreat	10	216.0980	97.807	30.929

Mean Difference = -60.4480

Levene's Test for Equality of Variances : F = 3.561 p = .075

t-test for Equality of Means				95%	
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-1.62	18	.123	37.377	(-138.994, 18.098)
Unequal	-1.62	15.84	.126	37.377	(-139.704, 18.808)

Variable	Number of class	Mean	SD	SE of Mean
RBC				
7mcon	10	138.0500	27.242	8.615
7mtreat	10	141.4000	32.202	10.183

Mean Difference = -3.3500

Levene's Test for Equality of Variances : F = .010 p = .922

t-test for Equality of Means				95%	
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.25	18	.805	13.338	(-31.380, 24.680)
Unequal	-.25	17.52	.805	13.338	(-31.380, 24.680)

## Number

Variable	of class	Mean	SD	SE of Mean
HCT				
7mcon	10	29.5000	2.635	.833
7mtreat	10	28.5500	3.218	1.018

Mean Difference = .9500

Levene's Test for Equality of Variances :  $F = .029$   $p = .867$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.72	18	.479	1.315	(-1.814, 3.714)
Unequal	.72	17.33	.479	1.315	(-1.826, 3.726)

## Number

Variable	of class	Mean	SD	SE of Mean
MCV				
7mcon	10	2.2000	.374	.118
7mtreat	9	1.9244	.249	.083

Mean Difference = .2756

Levene's Test for Equality of Variances :  $F = 1.225$   $p = .284$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	1.87	17	.079	.148	(-.036, .587)
Unequal	1.87	15.74	.075	.144	(-.031, .582)



Variable	Number of class	Mean	SD	SE of Mean
<b>WBC</b>				
8mcon	10	65.9500	41.859	13.237
8mtreat	10	299.6750	81.973	25.922

Mean Difference = -233.7250

Levene's Test for Equality of Variances :  $F = 7.757$   $p = .012$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-8.03	18	.000	29.106	(-294.890, -172.560)
Unequal	-8.03	13.39	.000	29.106	(-296.621, -170.829)

Variable	Number of class	Mean	SD	SE of Mean
<b>RBC</b>				
8mcon	10	190.8100	54.234	17.150
8mtreat	10	147.1500	40.572	12.830

Mean Difference = 43.6600

Levene's Test for Equality of Variances :  $F = 2.580$   $p = .126$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	2.04	18	.056	21.418	(-1.349, 88.669)
Unequal	2.04	16.67	.058	21.418	(-1.540, 88.860)

## Number

Variable	of class	Mean	SD	SE of Mean
HCT				
8mcon	10	33.2500	1.477	.467
8mtreat	10	29.2000	3.225	1.020

Mean Difference = 4.0500

Levene's Test for Equality of Variances : F = 6.249 p = .022

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	3.61	18	.002	1.122	(1.693, 6.407)
Unequal	3.61	12.62	.003	1.122	(1.626, 6.474)

## Number

Variable	of class	Mean	SD	SE of Mean
MCV				
8mcon	10	1.8830	.583	.184
8mtreat	10	2.1460	.696	.220

Mean Difference = -.2630

Levene's Test for Equality of Variances : F = .182 p = .675

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.92	18	.372	.287	(-.867, .341)
Unequal	-.92	17.46	.372	.287	(-.287, .341)

Variable	Number		Mean	SD	SE of Mean
	of class				
WBC					
5treat	10		225.4500	157.105	49.681
6treat	10		217.1750	174.761	55.264

Mean Difference = 8.2750

Levene's Test for Equality of Variances :  $F = .043$   $p = .838$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.11	18	.913	74.312	(-147.888, 164.438)
Unequal	.11	17.80	.913	74.312	(-147.888, 164.438)

Variable	Number		Mean	SD	SE of Mean
	of class				
RBC					
5treat	10		140.0500	65.202	20.619
6treat	10		127.9000	45.209	14.296

Mean Difference = 12.1500

Levene's Test for Equality of Variances :  $F = .989$   $p = .333$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.48	18	.634	25.090	(-40.575, 64.875)
Unequal	.48	16.03	.635	25.090	(-41.052, 65.352)

Variable	Number of class	Mean	SD	SE of Mean
HCT				
5treat	10	29.6500	5.457	1.726
6treat	10	22.3000	4.990	1.578

Mean Difference = 7.500

Levene's Test for Equality of Variances : F = .021 p = .885

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	3.14	18	.006	2.338	(2.436, 12.264)
Unequal	3.14	17.86	.006	2.338	(2.436, 12.264)

Variable	Number of class	Mean	SD	SE of Mean
MCV				
5treat	8	1.9975	.534	.189
6treat	10	1.8400	.447	.141

Mean Difference = 0.1575

Levene's Test for Equality of Variances : F = .226 p = .641

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.68	16	.505	.231	(-0.333, 0.648)
Unequal	.67	13.71	.516	.236	(-0.349, 0.664)

Variable	Number of class	Mean	SD	SE of Mean
WBC				
5treat	10	225.4500	157.105	49.681
7treat	10	216.0980	97.807	30.929

Mean Difference = 9.3520

Levene's Test for Equality of Variances : F = 1.381 p = .255

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.16	18	.875	58.522	(-113.628, 132.332)
Unequal	.16	15.07	.875	58.522	(-115.416, 134.120)

Variable	Number of class	Mean	SD	SE of Mean
RBC				
5treat	10	140.0500	65.202	20.619
7treat	10	141.4000	32.202	10.183

Mean Difference = -1.3500

Levene's Test for Equality of Variances : F = 4.222 p = .055

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.06	18	.954	22.996	(-46.675, 46.975)
Unequal	-.06	13.14	.954	22.996	(-51.043, 48.343)

Variable	Number			
	of class	Mean	SD	SE of Mean
HCT				
5treat	10	29.6500	5.457	1.726
7treat	10	28.5500	3.218	1.018

Mean Difference = 1.1000

Levene's Test for Equality of Variances :  $F = 1.291$   $p = .271$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.55	18	.590	2.003	(-3.110, 5.310)
Unequal	.55	14.59	.591	2.003	(-3.171, 5.371)

Variable	Number			
	of class	Mean	SD	SE of Mean
MCV				
5treat	8	1.9975	.534	.189
7treat	9	1.9244	.249	.083

Mean Difference = .0731

Levene's Test for Equality of Variances :  $F = 3.226$   $p = .093$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.37	15	.717	.198	(-0.349, 0.495)
Unequal	.35	9.64	.731	.206	(-0.387, 0.533)

Variable	Number			
	of class	Mean	SD	SE of Mean
WBC				
5mtreat	10	225.4500	157.105	49.681
8mtreat	10	299.6750	81.973	25.922

Mean Difference = -74.2250

Levene's Test for Equality of Variances :  $F = 2.469$   $p = .134$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-1.32	18	.202	56.037	(-191.983, 43.533)
Unequal	-1.32	13.56	.207	56.037	(-194.443, 45.993)

Variable	Number			
	of class	Mean	SD	SE of Mean
RBC				
5mtreat	10	140.0500	65.202	20.619
8mtreat	10	147.1500	40.572	12.830

Mean Difference = -7.1000

Levene's Test for Equality of Variances :  $F = 1.941$   $p = .181$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.29	18	.773	24.284	(-58.132, 43.932)
Unequal	-.29	15.06	.774	24.284	(-58.874, 44.674)

## Number

Variable	of class	Mean	SD	SE of Mean
HCT				
8mtreat	10	29.6500	5.457	1.726
8mtreat	10	28.2000	3.225	1.020

Mean Difference = .4500

Levene's Test for Equality of Variances :  $F = .847$   $p = .369$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.22	18	.825	2.005	(-3.762, 4.662)
Unequal	.22	114.60	.825	2.005	(-3.824, 4.724)

## Number

Variable	of class	Mean	SD	SE of Mean
HCT				
5mtreat	10	29.6500	5.457	1.726
8mtreat	10	29.2000	3.225	1.020

Mean Difference = .4500

Levene's Test for Equality of Variances :  $F = .847$   $p = .369$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.22	18	.825	2.005	(-3.762, 4.662)
Unequal	.22	14.60	.825	2.005	(-3.824, 4.724)



Variable	Number of class	Mean	SD	SE of Mean
MCV				
5mtreat	8	1.9975	.534	.189
8mtreat	10	2.1460	.696	.220

Mean Difference = - .1485

Levene's Test for Equality of Variances : F = .710 p = .412

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.50	16	.626	.299	(- .783, .486)
Unequal	-.51	15.99	.616	.290	(- .764, .467)

Variable	Number of class	Mean	SD	SE of Mean
WBC				
6mtreat	10	217.1750	174.761	1.726
7mtreat	10	216.0980	97.807	30.929

Mean Difference = 1.0770

Levene's Test for Equality of Variances : F = 1.647 p = .216

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.02	18	.987	63.331	(-132.008, 134.162)
Unequal	.02	14.13	.987	63.331	(-134.788, 136.942)

## Number

Variable	of class	Mean	SD	SE of Mean
RBC				
6mtreat	10	127.9000	45.209	14.296
7mtreat	10	141.4000	32.202	10.183

Mean Difference = -13.5000

Levene's Test for Equality of Variances : F = 1.976 p = .177

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.77	18	.452	17.552	(-50.385, 23.385)
Unequal	-.77	16.26	.453	17.552	(-50.718, 23.718)

## Number

Variable	of class	Mean	SD	SE of Mean
HCT				
6mtreat	10	22.3000	4.990	1.578
7mtreat	10	28.5500	3.218	1.018

Mean Difference = -6.2500

Levene's Test for Equality of Variances : F = 1.117 p = .305

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-3.33	18	.004	1.878	(-10.196, -2.304)
Unequal	-3.33	15.38	.004	1.878	(-10.253, -2.247)

## Number

Variable	of class	Mean	SD	SE of Mean
MCV				
6mtreat	10	1.8400	.447	.141
7mtreat	9	1.9244	.249	.083

Mean Difference = -.0844

Levene's Test for Equality of Variances : F = 1.988 p = .177

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.50	17	.623	.169	(-.441, .272)
Unequal	-.51	14.34	.614	.164	(-.436, .267)

## Number

Variable	of class	Mean	SD	SE of Mean
WBC				
6mtreat	10	217.1750	174.761	55.264
8mtreat	10	299.6750	81.973	25.922

Mean Difference = -82.5000

Levene's Test for Equality of Variances : F = 2.640 p = .122

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-1.35	18	.193	61.042	(-210.776, 45.776)
Unequal	-1.35	12.78	.200	61.042	(-214.407, 49.407)

## Number

Variable	of class	Mean	SD	SE of Mean
RBC				
6mtreat	10	127.9000	45.209	14.296
8mtreat	10	147.1500	40.572	12.830

Mean Difference = -19.2500

Levene's Test for Equality of Variances : F = .289 p = .597

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-1.00	18	0.330	19.209	(-59.617, 21.117)
Unequal	-1.00	17.79	0.330	19.209	(-59.617, 21.117)

## Number

Variable	of class	Mean	SD	SE of Mean
HCT				
6mtreat	10	22.3000	4.990	1.578
8mtreat	10	29.2000	3.225	1.020

Mean Difference = -6.9000

Levene's Test for Equality of Variances : F = .672 p = .423

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-3.67	18	.002	1.879	(-10.848, -2.952)
Unequal	-3.67	15.40	.002	1.879	(-10.906, -2.894)

## Number

Variable	of class	Mean	SD	SE of Mean
MCV				
6mtreat	10	1.8400	.447	.141
8mtreat	10	2.1460	.696	.220

Mean Difference = -.3060

Levene's Test for Equality of Variances : F = 1.940 p = .181

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-1.17	18	.258	.262	(-.856, .244)
Unequal	-1.17	15.35	.260	.262	(-.864, .252)

## Number

Variable	of class	Mean	SD	SE of Mean
WBC				
7mtreat	10	216.0980	97.807	30.929
8mtreat	10	299.6750	81.973	25.922

Mean Difference = -83.5770

Levene's Test for Equality of Variances : F = .315 p = .582

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-2.07	18	.053	40.356	(-168.382, 1.228)
Unequal	-2.07	17.47	.053	40.356	(-168.741, 1.587)

		Number			
Variable		of class	Mean	SD	SE of Mean
RBC					
7mtreat		10	141.4000	32.202	10.183
8mtreat		10	147.1500	40.572	12.830
Mean Difference = -5.700					
Levene's Test for Equality of Variances : F = .688 p = .418					
t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.35	18	.730	16.380	(-40.172, 28.672)
Unequal	-.35	17.12	.730	16.380	(-40.317, 28.817)

		Number			
Variable		of class	Mean	SD	SE of Mean
HCT					
7mtreat		10	28.5500	3.218	1.018
8mtreat		10	29.2000	3.225	1.020
Mean Difference = -.6500					
Levene's Test for Equality of Variances : F = .169 p = .686					
t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.45	18	.657	1.441	(-3.678, 2.378)
Unequal	-.45	18.00	.657	1.441	(-3.678, 2.378)

Variable	Number of class	Mean	SD	SE of Mean
MCV				
7mtreat	9	1.9244	.249	.083
8mtreat	10	2.1460	.696	.220

Mean Difference = -.2216

Levene's Test for Equality of Variances :  $F = 6.479$   $p = .021$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.90	17	.380	.246	(-.740, .297)
Unequal	-.94	17.47	.366	.235	(-.740, .296)

Variable	Number of class	Mean	SD	SE of Mean
GLUCOSE				
3mcon	50	44.1800	116.161	2.285
3mtreat	50	30.8600	7.959	1.126

Mean Difference = 13.3200

Levene's Test for Equality of Variances :  $F = 9.754$   $p = .002$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	5.23	98	.000	2.548	(8.263, 18.377)
Unequal	5.23	71.45	.000	2.548	(8.239, 18.401)

Variable	Number of class	Mean	SD	SE of Mean
GLUCOSE				
4mcon	50	53.8400	11.638	1.646
4mtreat	50	35.2200	10.933	1.546

Mean Difference = 18.6200

Levene's Test for Equality of Variances :  $F = .509$   $p = .477$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	8.25	98	.000	2.258	(14.138, 23.102)
Unequal	8.25	97.62	.000	2.258	(14.138, 23.102)



Number					
Variable	of class	Mean	SD	SE of Mean	
GLUCOSE					
5mcon	50	58.0200	20.779	2.939	
5mtreat	50	81.9000	25.618	3.623	
Mean Difference = -23.8800					
Levene's Test for Equality of Variances : F = 1.507 p = .223					
t-test for Equality of Means					
Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-5.12	98	.000	4.665	(-33.139, -14.621)
Unequal	-5.12	94.00	.000	4.665	(-33.144, -14.616)

Number					
Variable	of class	Mean	SD	SE of Mean	
GLUCOSE					
6mcon	50	80.2800	34.254	4.844	
6mtreat	50	77.1000	28.679	4.056	
Mean Difference = 3.1800					
Levene's Test for Equality of Variances : F = 4.390 p = .039					
t-test for Equality of Means					
Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	.50	98	.616	6.318	(-9.361, 15.721)
Unequal	.50	95.06	.616	6.318	(-9.365, 15.725)

Variable	Number of class	Mean	SD	SE of Mean
GLUCOSE				
7mcon	50	74.8600	28.162	3.983
7mtreat	50	66.0800	27.252	3.854

Mean Difference = 8.7800

Levene's Test for Equality of Variances : F = .215 p = .644

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	1.58	98	.116	5.542	(-2.221, 19.781)
Unequal	1.58	97.89	.116	5.542	(-2.221, 19.781)

Variable	Number of class	Mean	SD	SE of Mean
GLUCOSE				
8mcon	50	43.4400	9.740	1.377
8mtreat	50	76.4400	26.126	3.695

Mean Difference = -33.0000

Levene's Test for Equality of Variances : F = 38.966 p = .000

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-8.37	98	.000	3.943	(-40.827, -25.173)
Unequal	-8.37	62.36	.000	3.946	(-40.884, -25.116)

Variable	Number of class	Mean	SD	SE of Mean
ALP(U)				
5mcon	10	1.0133	1.525	.482
5mtreat	10	.9302	1.137	.359

Mean Difference = .0830

Levene's Test for Equality of Variances : F = .321 p = .578

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.14	18	.892	.601	(-1.181, 1.347)
Unequal	.14	16.64	.892	.601	(-1.186, 1.352)

Variable	Number of class	Mean	SD	SE of Mean
GOT(U)				
5mcon	10	3240.5682	638.279	201.842
5mtreat	10	3154.6968	862.549	272.762

Mean Difference = 85.8714

Levene's Test for Equality of Variances : F = .889 p = .358

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.25	18	.803	339.322	(-627.191, 798.934)
Unequal	.25	16.58	.803	339.322	(-630.211, 801.954)

Variable	Number of class	Mean	SD	SE of Mean
GPT(U)				
5mcon	8	648.3358	328.790	116.245
5mtreat	10	3154.6968	161.605	51.104

Mean Difference = 24.8746

Levene's Test for Equality of Variances :  $F = 3.680$   $p = .073$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.21	18	.836	118.096	(-225.540, 275.289)
Unequal	.20	9.69	.843	126.982	(-258.135, 307.884)

Variable	Number of class	Mean	SD	SE of Mean
ALP(U)				
6mcon	10	1.3934	2.422	.766
6mtreat	10	.1981	1.752	.554

Mean Difference = .1954

Levene's Test for Equality of Variances :  $F = .590$   $p = .452$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.21	18	.839	.945	(-1.791, 2.182)
Unequal	.21	16.39	.839	.945	(-1.809, 2.200)

## Number

Variable	of class	Mean	SD	SE of Mean
GOT(U)				
6mcon	10	3146.7643	518.022	163.813
6mtreat	10	3604.0270	594.438	187.978

Mean Difference = -457.2627

Levene's Test for Equality of Variances :  $F = .060$   $p = .810$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-1.83	18	.083	249.340	(-981.234, 66.700)
Unequal	-1.83	17.67	.084	249.340	(-981.234, 66.709)

## Number

Variable	of class	Mean	SD	SE of Mean
GPT(U)				
6mcon	10	521.8917	299.755	94.791
6mtreat	10	1275.4959	797.473	254.183

Mean Difference = -753.6042

Levene's Test for Equality of Variances :  $F = 6.109$   $p = .024$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-2.80	18	.012	269.410	(-1319.75, -187.457)
Unequal	-2.80	11.49	.017	269.410	(-1346.73, -160.482)

Variable	Number of class	Mean	SD	SE of Mean
ALP(U)				
7mcon	10	.7949	1.424	.450
7mtreat	10	1.1995	1.557	.492

Mean Difference = -.4046

Levene's Test for Equality of Variances : F = .198 p = .662

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.61	18	.552	.667	(-1.806, .997)
Unequal	-.61	17.86	.552	.667	(-1.806, .997)

Variable	Number of class	Mean	SD	SE of Mean
GOT(U)				
7mcon	10	3722.9644	548.932	173.587
7mtreat	10	3360.6579	610.139	192.943

Mean Difference = 362.3065

Levene's Test for Equality of Variances : F = .405 p = .533

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	1.40	18	.180	259.537	(-183.094, 907.707)
Unequal	1.40	17.80	.180	259.537	(-183.094, 907.707)

## Number

Variable	of class	Mean	SD	SE of Mean
GPT(U)				
7mcon	8	385.2690	206.132	72.878
7mtreat	10	806.0923	451.588	142.805

Mean Difference = -420.8233

Levene's Test for Equality of Variances : F = 22.357 p = .000

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-2.43	16	.027	173.184	(-788.048, -53.598)
Unequal	-2.62	13.15	.021	160.326	(-767.275, -74.372)

## Number

Variable	of class	Mean	SD	SE of Mean
ALP(U)				
8mcon	10	.3629	.362	.114
8mtreat	10	1.1275	.985	.628

Mean Difference = -.7646

Levene's Test for Equality of Variances : F = 3.365 p = .083

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-1.20	18	.246	.638	(-2.106, .576)
Unequal	-1.20	9.60	.260	.638	(-2.187, .658)

## Number

Variable	of class	Mean	SD	SE of Mean
GOT(U)				
8mcon	10	2174.7575	536.704	169.721
8mtreat	10	2852.5103	361.934	114.454

Mean Difference = -677.7528

Levene's Test for Equality of Variances : F = .427 p = .522

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-3.31	18	.004	204.706	(-1107.96, -247.575)
Unequal	-3.31	15.78	.004	204.706	(-1111.82, -243.687)

## Number

Variable	of class	Mean	SD	SE of Mean
GPT(U)				
8mcon	10	1235.7833	528.208	167.034
8mtreat	10	1612.8860	947.816	299.726

Mean Difference = -377.1027

Levene's Test for Equality of Variances : F = 4.925 p = .040

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-1.10	18	.286	343.127	(-1098.16, 343.956)
Unequal	-1.10	14.10	.290	343.127	(-1113.22, 359.017)



Variable	Number of class	Mean	SD	SE of Mean
ALP(U)				
5mtreat	10	.9302	1.137	.359
6mtreat	10	1.1981	1.752	.554

Mean Difference = -.2678

Levene's Test for Equality of Variances :  $F = 1.800$   $p = .196$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.41	18	.690	.660	(-1.656, 1.120)
Unequal	-.41	15.43	.691	.660	(-1.676, 1.140)

Variable	Number of class	Mean	SD	SE of Mean
GOT(U)				
5mtreat	10	3154.6968	862.549	272.762
6mtreat	10	3604.0270	594.438	187.978

Mean Difference = -449.3302

Levene's Test for Equality of Variances :  $F = 1.316$   $p = .266$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-1.36	18	.192	331.262	(-1145.46, 246.797)
Unequal	-1.36	15.98	.194	331.262	(-1151.75, 253.089)

Variable	Number			
	of class	Mean	SD	SE of Mean
GPT(U)				
5mtreat	8	623.4611	161.605	51.104
6mtreat	10	1275.49.59	797.473	252.183

Mean Difference = -652.0348

Levene's Test for Equality of Variances : F = 10.686 p = .004

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-2.53	18	.021	257.309	(-1192.75, 111.316)
Unequal	-2.53	9.74	.030	257.309	(-1225.51, 78.562)

Variable	Number			
	of class	Mean	SD	SE of Mean
ALP(U)				
5mtreat	10	.9302	1.137	.359
7mtreat	10	1.1995	1.557	.492

Mean Difference = -.2693

Levene's Test for Equality of Variances : F = .247 p = .625

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.44	18	.664	.609	(-1.550, 1.012)
Unequal	-.44	16.47	.664	.609	(-1.562, 1.023)

Variable	Number of class	Mean	SD	SE of Mean
GOT(U)				
5mtreat	10	3154.6968	862.549	272.762
7mtreat	10	3360.6579	610.139	192.943

Mean Difference = -205.9611

Levene's Test for Equality of Variances : F = .976 p = .336

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.62	18	.545	334.105	(-908.061, 196.139)
Unequal	-.62	16.20	.546	334.105	(-914.407, 502.485)

Variable	Number of class	Mean	SD	SE of Mean
GPT(U)				
5mtreat	10	623.4611	161.605	51.104
7mtreat	10	806.0923	451.588	142.805

Mean Difference = -182.6312

Levene's Test for Equality of Variances : F = 41.640 p = .000

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-1.20	18	.244	151.673	(-501.363, 136.100)
Unequal	-1.20	11.27	.253	151.673	(-516.549, 151.287)

Variable	Number of class	Mean	SD	SE of Mean
ALP(U)				
5mtreat	10	.9302	1.137	.359
8mtreat	10	1.1275	1.985	.628

Mean Difference = -.1973

Levene's Test for Equality of Variances : F = .260 p = .616

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.27	18	.788	.723	(-1.717, 1.323)
Unequal	-.27	14.33	.789	.723	(-1.749, 1.355)

Variable	Number of class	Mean	SD	SE of Mean
GOT(U)				
5mtreat	10	3154.6968	862.549	272.762
8mtreat	10	2852.5103	361.934	114.454

Mean Difference = 302.1865

Levene's Test for Equality of Variances : F = 5.003 p = .038

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	1.02	18	.321	295.802	(-319.422, 923.795)
Unequal	1.02	12.07	.321	295.802	(-342.477, 946.850)

Variable	Number of class	Mean	SD	SE of Mean
GPT(U)				
5mtreat	10	623.4611	161.605	51.104
8mtreat	10	1612.8860	947.816	299.726

Mean Difference = -989.4249

Levene's Test for Equality of Variances : F = 18.315 p = .000

t-test for Equality of Means				95%	
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-3.25	18	.004	304.051	(-1628.37, -350.481)
Unequal	-3.25	9.52	.009	304.051	(-1667.07, -311.776)

Variable	Number of class	Mean	SD	SE of Mean
ALP(U)				
6mtreat	10	1.1981	1.752	.554
7mtreat	10	1.1995	1.557	.492

Mean Difference = -.0014

Levene's Test for Equality of Variances : F = .444 p = .514

t-test for Equality of Means				95%	
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.00	18	.998	.741	(-1.559, 1.556)
Unequal	.00	17.75	.998	.741	(-1.559, 1.556)

Variable	Number of class	Mean	SD	SE of Mean
GOT(U)				
6mtreat	10	3604.0270	594.438	187.978
7mtreat	10	3360.6579	610.139	192.943

Mean Difference = 243.3691

Levene's Test for Equality of Variances : F = .054 p = .819

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.90	18	.378	269.374	(-322.704, 809.442)
Unequal	.90	17.99	.378	269.374	(-322.704, 809.442)

Variable	Number of class	Mean	SD	SE of Mean
GPT(U)				
6mtreat	10	1275.4959	797.473	252.183
7mtreat	10	806.0923	451.588	142.805

Mean Difference = 469.4036

Levene's Test for Equality of Variances : F = 1.730 p = .205

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	1.62	18	.123	289.809	(-139.612, 1078.420)
Unequal	1.62	14.23	.127	289.809	(-152.333, 1091.140)

Variable	Number			
	of class	Mean	SD	SE of Mean
ALP(U)				
6mtreat	10	1.1981	1.752	.554
8mtreat	10	1.1275	1.985	.628

Mean Difference = .0706

Levene's Test for Equality of Variances : F = .154 p = .699

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.08	18	.934	.837	(-1.689, 1.830)
Unequal	.08	17.73	.934	.837	(-1.689, 1.830)

Variable	Number			
	of class	Mean	SD	SE of Mean
GOT(U)				
6mtreat	10	3604.0270	594.438	187.978
8mtreat	10	2852.5103	361.934	114.454

Mean Difference = 751.5167

Levene's Test for Equality of Variances : F = 1.426 p = .248

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	3.41	18	.003	220.080	(289.032, 1214.001)
Unequal	3.41	14.87	.004	220.080	(282.310, 1220.724)

## Number

Variable	of class	Mean	SD	SE of Mean
GPT(U)				
6mtreat	10	1275.4959	797.473	252.183
8mtreat	10	1612.8860	947.816	299.726

Mean Difference = -337.3901

Levene's Test for Equality of Variances : F = .609 p = .445

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.86	18	.400	391.704	(-1160.53, 485.751)
Unequal	-.86	17.49	.401	391.704	(-1164.02, 489.236)

## Number

Variable	of class	Mean	SD	SE of Mean
ALP(U)				
7mtreat	10	1.1995	1.557	.492
8mtreat	10	1.1275	1.985	.628

Mean Difference = .0720

Levene's Test for Equality of Variances : F = .016 p = .900

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.90	18	.929	.798	(-1.604, 1.748)
Unequal	.09	17.03	.929	.798	(-1.612, 1.756)



Variable	Number of class	Mean	SD	SE of Mean
GOT(U)				
7mtreat	10	3360.6579	610.139	192.943
8mtreat	10	2852.5103	361.934	114.454

Mean Difference = 508.1476

Levene's Test for Equality of Variances :  $F = 2.517$   $p = .130$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	2.27	18	.036	224.336	(36.720, 979.575)
Unequal	2.27	14.64	.039	224.336	(29.868, 986.428)

Variable	Number of class	Mean	SD	SE of Mean
GPT(U)				
7mtreat	10	806.0923	451.588	142.805
8mtreat	10	1612.8860	947.816	299.726

Mean Difference = -806.7937

Levene's Test for Equality of Variances :  $F = 5.556$   $p = .030$

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-2.43	18	.026	332.007	(-1504.49, -109.102)
Unequal	-2.43	12.89	.030	332.007	(-1524.23, -89.353)

## **Biography**

**Name** : Bangon Tangtong  
**Date of birth** : October 8th, 1974  
**Place of birth** : Trat, Thailand  
**Education** : Bachelor of Science (Biology)  
Department of Biology  
Faculty of Science  
Chulalongkorn University