

169. Oliveira PMC, Silva AE, Kemp VL, Juliano Y, Ferraz ML. Comparison of three different schedules of vaccination against hepatitis B in health care workers. *Vaccine* 1995; 13: 791-4.
170. King JW, Taylor EM, Crow SD, White MC, Todd JR, Poe MB, *et al.* Comparison of the immunogenicity of hepatitis B vaccine administered intradermally and intramuscularly. *Rev Infect Dis* 1990; 12: 1035-43.
171. Shaw FE Jr, Guess HA, Roets JM, Mohr FE, Coleman PJ, Mandel EJ, *et al.* Effect of anatomic site, age and smoking on the immune response to hepatitis B vaccination. *Vaccine* 1989; 7: 425-30.
172. Denis F, Mounier M, Hessel L, Michel JP, Gualde N, Dubois F, *et al.* Hepatitis B vaccination in elderly (letter). *J Infect Dis* 1984; 149: 1019.
173. Middleman AB, Kozinetz CA, Robertson LM, DuRant RH, Emans SJ. The effect of late doses on the achievement of seroprotection and antibody titer levels with hepatitis B immunization among adolescents. *Pediatrics* 2001; 107: 1065-9.
174. Navarro JE, Ternel JL, Mateos ML, Mareen R, Ortuno J. Antibody level after hepatitis B vaccination in hemodialysis patients: influence of hepatitis C virus infection. *Am J Nephrol* 1996; 16: 95-7.
175. Mitwalli A. Responsiveness to hepatitis B vaccine in immunocompromised patients by doubling the dose scheduling. *Nephron* 1996; 73: 417-20.

176. Hollinger FB. Factors influencing the immune response to hepatitis B vaccine, booster dose guidelines, and vaccine protocol recommendations. *Am J Med* 1989; 87 Suppl 3A: 36-40.
177. Navarro JF, Ternel JL, Mateos ML, Ortuno J. Hepatitis C virus infection decreases the effective antibody response to hepatitis B vaccine in hemodialysis patients. *Clin Nephrol* 1994; 41: 113-6.
178. Jaiswal SB, Chitnis DS. Antibody response to hepatitis B vaccine among hemodialysis patients (letter). *Lancet* 1995; 346: 1363.
179. Dumann H, Meuer S, Büschenfelde KM, Köhler H. Hepatitis B vaccination and interleukin-2 receptor expression in chronic renal failure. *Kidney Int* 1990; 38: 1164-8.
180. Meuer SC, Dumann H, Meyer Zum Büschenfelde KH, Köhler H. Low-dose interleukin-2 induces systemic immune responses against HBsAg in immunodeficient non-responders to hepatitis B vaccination. *Lancet* 1989; 1: 15-8.
181. Weissman JY, Tsuchiyose MM, Tong MJ, Co R, Chin K, Ettenger RB. Lack of response to recombinant hepatitis B vaccine in non responders to the plasma vaccine. *JAMA* 1988; 260: 173-8.
182. Pol S, Legendre C, Matllinger B, Berthelot P, Kreis H. Genetic basis of non-response to hepatitis B vaccine in hemodialyzed patients. *J Hepatol* 1990; 11: 385-7.

183. Caillat-Zucman S, Gimenez JJ, Albouze G, Lebki B, Naret C, Jungers P, *et al.* HLA genetic heterogeneity of hepatitis B vaccine response in hemodialyzed patients. *Kidney Int* 1993; 41: 157-60.
184. Fraser GM, Ochara N, Fenyves D, Neumann L, Chazan R, Niv Y, *et al.* Increasing serum creatinine and age reduce the response to hepatitis B vaccine in renal patients. *J Hepatol* 1994; 21: 450-4.
185. Horowitz MM, Ershler WB, McKinney WP, Battiola RJ. Duration of immunity after hepatitis B vaccination: efficacy of low-dose booster vaccine. *Ann Intern Med* 1988; 108: 185-9.
186. Zoulek G, Lorbeer B, Zachoval R, Jilg W, Deinhardt F. Smoking and humoral immune response to hepatitis B vaccine. In: Vyas GN, Dienstag J L, Hoofnagle JH, eds. *Viral hepatitis and liver disease*. Oriando, FL: Grune and Stratton, Inc.; 1984. p. 683-4.
187. Roome AJ, Walsh SJ, Cartter ML, Hadler JL. Hepatitis B vaccine in Connecticut public safety personnel. *JAMA* 1993; 270: 2931-4.
188. West DJ, Calandra GB. Vaccine induced immunologic memory for hepatitis B surface antigen: Implications for policy on booster vaccination [Review]. *Vaccine* 1996; 14: 1019-27.
189. Hadler SC, Francis DP, Maynard JE, Thompson SE, Judson FN, Echenberg DF, *et al.* Long-term immunogenicity and efficacy of hepatitis B vaccine in homosexual men. *N Engl J Med* 1986; 315: 209-14.

190. Desmyter J, Colaert J, De Groote G, Reynders M, Rearink-Brongers EE, Lelie PN, *et al.* Efficacy of heat-inactivated hepatitis B vaccine in hemodialysis patients and staff: double-blind placebo-controlled trial. *Lancet* 1983; 2: 1323-8.
191. Crosnier J, Jungers P, Couroucē AM, Laplanche A, Benhamou E, Degos F, *et al.* Randomised placebo-controlled trial of hepatitis B surface antigen vaccine in French hemodialysis units: II, hemodialysis patients. *Lancet* 1981; 1: 797-800.
192. CDC. Guidelines for infection control in health care personnel, 1998: recommendations of the Hospital Infection Control Practices Advisory Committee. *Am J Infect Control* 1998; 26: 338.
193. CDC. Public Health Service inter-agency guidelines for screening donors of blood, plasma, organs, tissues, and semen for evidence of hepatitis B and hepatitis C. *MMWR* 1991; 40: 1-17.
194. CDC. Recommendations for preventing transmission of human immunodeficiency virus and hepatitis B virus to patients during exposure-prone invasive procedures. *MMWR* 1991; 40: 1-8.
195. Regev A, Schiff ER. Hepatology: A century of progress. Viral hepatitis A, B, and C. *Clin Liver Dis* 2000; 4: 47-71.
196. Kaul H, Girndt M, Sester U, Sester M, Köhler H. Initiation of hemodialysis treatment leads to improvement of T-cell activation in patients with end-stage renal disease. [abstract] *Am J Kidney Dis* 2000; 35: 611-6.

197. Chatenoud L, Herbelin A, Beaurain G, Descamps-Latscha B. Immune deficiency of the uremic patients. *Adv Nephrol* 1990; 19: 259-74.
198. Meuer SC, Hauer M, Kurz P, Meyer Zum Büschenfelde KH, Köhler H. Selective blockade of the antigen-receptor mediated pathway of the T cell activation in patients with impaired primary immune responses. *J Clin Invest* 1987; 80: 743-9.
199. Grimm PC, Sinai-Trieman L, Sekiya NM, Robertson LS, Robinson BJ, Fine RN, et al. Effects of recombinant human erythropoietin on HLA sensitization and cell mediated immunity. *Kidney Int* 1990; 38: 12-8.
200. Meuer SC, Köhler H, Meyer Zum Büschenfelde KH. Monocyte defect in hemodialysis patients supports non-responsiveness in hepatitis B vaccination and development of HBsAg carrier state. In: Zuckerman AI, ed. *Viral hepatitis and liver disease*. New York: Alan Liss Inc; 1988. p. 711-3.
201. Meuer SC, Meyer Zum Büschenfelde KH. T cell receptor triggering induces responsiveness to interleukin-1 and interleukin-2 but does not lead to T cell proliferation. *J Immunol* 1986; 136: 4106-12.
202. Schwab R, Crow MK, Russo C, Weksler ME. Requirements for T cell activation by OKT3 monoclonal antibody: role of modulation of T3 molecules and interleukin-1. *J Immunol* 1985; 135: 1714-7.
203. Morgan DA, Ruscetti FW, Gallo R. Selective in vitro growth of T lymphocytes from normal human bone marrows. *Science* 1976; 193:1007-8.

204. Chang DZ, Wu Z, Ciardelli TL. A point mutation in interleukin-2 that alters ligand internalization. *J Biol Chem* 1996; 271: 13349-55.
205. David D, Bani L, Moreau JL, Demaison C, Sun K, Salvucci O, *et al.* Further analysis of interleukin-2 receptor subunits expression on the different human peripheral blood mononuclear cell subsets. *Blood* 1988; 91: 165-72.
206. Smith KA. Interleukin-2: Inception, impact and implications. *Science* 1988; 240: 1169-76.
207. Roitt IM, ed. *Roitt's essential immunology*. 9th ed. Oxford: Blackwell Science; 1997.
208. Ruscetti FW. Interleukin 2. In: Openheim JJ, Shevach EM, eds. *Immunophysiology: the role of cells and cytokines in immunity and inflammation*. Oxford: Oxford University Press, Inc; 1990. p. 46-66.
209. Roitt IM, Delves PJ, eds. *Encyclopedia of immunology*. Interleukin 2. London: Academic Press; 1992.
210. Alegre ML, Bluestone JA. T cell antigen and costimulatory receptors as therapeutic targets. In: Austin KF, Frank MM, Atkinson JP, Cantor H, eds. *Santer's immunologic diseases*. 6th ed. Philadelphia: Lippincott Williams & Wilkins; 2001. p. 1155-74.
211. Goust JM, Bierer B. Cell-mediated immunity. In: Virella G, ed. *Introduction to medical immunology*. 3rd ed. New York: Marcel Dekker, Inc; 1993. p.187-212.

212. Robb RJ. Interleukin-2: The molecule and its function. *Immunol Today* 1984; 5: 203-6.
213. Mosmann T. Cytokines and immune regulation. In: Recti RR, Fleisher TA, Schwartz BD, Sheares WT, Strober W, eds. *Clinical immunology. Principles and practice*. St Louis: Mosby-Year Book, Inc; 1996. p. 217-230.
214. Wang KS, Ritz J, Frank DA. IL-2 induces STAT4 activation in primary NK cells and NK cell lines, but not in T cells. *J Immunol* 1999; 162: 299-304.
215. Reya T, Carding SR. The role of cytokines in hematolymphoid development. In: Monroe JG, Rothenberg EV, eds. *Molecular biology of B cell and T cell development*. Totowa: Humana Press NJ; 1998. p. 149-75.
216. Theze J, Alzari PM, Bertoglio J. Interleukin-2 and its receptors: Recent advances and new immunological functions. *Immunol Today* 1996; 17: 481-6.
217. Roifman CM, Dadi HK. Cytokine and CD3 Receptor Deficiencies. Human interleukin-2 receptor alpha deficiency. *Immunol and Allerg Clin N Am* 2000; 20: 39-50.
218. Waldmann TA. The IL-2/IL-2 receptor system: a target for rational immune intervention. *Immunol Today* 1993; 14: 264-9.
219. Takeshita T, Ohtani K, Asao H, Kumaki S, Nakamura M, Sugamura K. An associated molecule, p64, with IL-2 receptor beta chain. Its possible involvement in the formation of the functional intermediate- affinity IL-2 receptor complex. *J Immunol* 1992; 148: 2154-8.

-
220. Cruse JM, Lewis RE, eds. Atlas of immunology. CRC Press & Springer; 2000.
221. Nakamura Y, Russell SM, Mess SA, Friedmann M, Erdos M, Francois C, *et al.* Heterodimerization of the IL-2 receptor beta- and gamma-chain cytoplasmic domains is required for signaling. *Nature* 1994; 369: 330-3.
222. Nelson BJ, Lord JD, Greenberg PD. Cytoplasmic domains of the interleukin-2 receptor beta and gamma chains mediate the signal for T-cell proliferation. *Nature* 1994; 369: 333-6.
223. Lotze MT, Frana LW, Sharrow SO, Robb RJ, Rosenberg SA. In vivo administration of purified human interleukin-2. Half-life and immunologic effects of the Jurkat cell line-derived interleukin-2. *J Immunol* 1985; 134: 157-66.
224. Cotran RS, Pober JS, Gimbrone MA Jr, Springer TA, Wiebke EA, Gaspari AA, *et al.* Endothelial activation during interleukin 2 immunotherapy. A possible mechanism for the vascular leak syndrome. *J Immunol* 1988; 140: 1883-8.
225. Margolin KA. Interleukin-2 in the treatment of renal cancer. *Semin Oncol* 2000; 27: 194-203.
226. Atkins MB, Lotze MT, Dutcher JP, Fisher RI, Weiss G, Margolin K, *et al.* High-dose recombinant interleukin-2 therapy for patients with metastatic melanoma: analysis of 270 patients treated between 1985 and 1993. *J Clin Oncol* 1999; 17: 2105-16.

227. Mandell GL, Bennett JE, Dolin R, eds. Mandell, Douglas and Bennett's principles and practice of infectious diseases. 5th ed. Philadelphia: Churchill Livingstone; 2000.
228. Marks-Konczalik J, Dubois S, Losi JM, Sabzevari H, Yamada N, Feigenbaum L, *et al.* IL-2 induced activation-induced cell death is inhibited in IL-15 transgenic mice. *Proc Natl Acad Sci USA* 2000; 97: 11445-50.
229. Waldmann TA, Dubois S, Tagaya Y. Contrasting roles of IL-2 and IL-15 in the life and death of lymphocytes: implications for immunotherapy. *Immunity* 2001; 14: 105-10.
230. Rosenberg SA, Yang JC, Schwartzentruber D, Hwu P, Marincola FM, Topalian SL, *et al.* Immunologic and therapeutic evaluation of a synthetic tumor associated peptide vaccine for the treatment of patients with metastatic melanoma. *Nat Med* 1998; 4: 321-7.
231. Fallon EM, Liparoto SF, Lee KJ, Ciardelli TL, Lauffenburger DA. Increased endosomal sorting of ligand to recycling enhances potency of an interleukin-2 analog. *J Biol Chem* 2000; 275: 6790-7.
232. Khatri VP, Fehniger TA, Baiocchi RA, Yu F, Shah MH, Schiller DS, *et al.* Ultra low dose interleukin-2 therapy promotes a type 1 cytokine profile in vivo in patients with AIDS and AIDS-associated malignancies. *J Clin Invest* 1988; 101: 1373-8.
233. Jacobson EL, Pilaro F, Smith KA. Rational interleukin 2 therapy for HIV positive individuals: Daily low doses enhance immune function without toxicity. *Proc Natl Acad Sci USA* 1996; 93: 10405-10.

234. Kovacs JA, Vogel S, Albert JM, Falloon J, Davey RT, Walker RE, *et al.* Controlled trial of interleukin-2 infusions in patients infected with the human immunodeficiency virus. *N Eng J Med* 1996; 335: 1350-6.
235. Kawamura H, Rosenberg SA, Berzofsky JA. Immunization with antigen and interleukin-2 in vivo overcomes Ir gene low responsiveness. *J Exp Med* 1985; 162: 381-6.
236. Beaurain G, Naret C, Marcon I., Grateau G, Drueke T, Urena P, *et al.* In vivo T cell preactivation in chronic uremic hemodialyzed and non-hemodialyzed patients. *Kidney Int* 1989; 36: 636-44.
237. Jungers P, Deviller P, Salomon H, Cerisier JF, Couroucé AM. Randomised placebo-controlled trial of recombinant interleukin-2 in chronic uraemic patients who are non-reponders to hepatitis B vaccine. *Lancet* 1994; 344: 856-7.
238. Fulgueiras AG, Tormo MJ, Rodriguez T, Flores DP, Chirlaque D, Navarro C. Prevalence of hepatitis B and C markers in the south-east of Spain: An unlinked community-based serosurvey of 2,203 adults. *Scand J Infect Dis* 1996; 28: 17-20.
239. Chiaramonte M, Majori S, Ngatchu T. Two different dosages of yeast-derived recombinant hepatitis B vaccines: Comparison of immunogenicity. *Vaccine* 1996; 14: 135-7.
240. Carpenter AB. Enzyme linked immunoassays. In: Rose NB, Macario EC, Fahey JL, Friedman H, Penn GM, eds. *Manual of clinical laboratory*

- immunology. 4th ed. Washington: American Society for Microbiology; 1992. p. 2-9.
241. Davis HL, Brazolot Millan CL, Mancini M, McCluskie MJ, Hadchouel M, Comanita L, *et al.* DNA-based immunization against hepatitis B surface antigen (HBsAg) in normal and HBsAg-transgenic mice. *Vaccine* 1997; 15: 849-52.
242. Yousry AH. Hepatitis B virus infection in non-risk population in Alexandria [Egypt]. *Bull High Inst Public Health* 1995; 25: 235-8.
243. Abou Donia HA. Radioimmunoassay and enzyme linked immunosorbent assay for detection of hepatitis A and hepatitis B antibodies in blood donors' sera. *Bull High Inst Public Health* 1990; 20: 67-73.
244. El-Wakil HS, Hashish MH, Zaky SA. Hepatitis B vaccination in hemodialysis patients: protective level of HBV antibodies could be achieved by the ordinary schedule? *Alex Med J* 2001; 43: 872-94.
245. Franco E, Olivadese A, Valeri M, Albertoni F, Petrosillo N. Control of hepatitis B virus infection in dialysis units in Latium, Italy. *Nephron* 1992; 61: 329-30.
246. El-Baz Z. Evaluation of program for dialysis patients in some hospitals in Cairo. Report of Egyptian Society of Caring of Renal Patients 1993.
247. Bruguera M, Cremades M, Rodicio JL, Alcazar JM, Oliver A, Del Rio G, *et al.* Immunogenicity of a yeast-derived hepatitis B vaccine in hemodialysis patients. *Am J Med* 1989; 87 Suppl 3A: 30-5.

248. Allegra V, Vasile A, Maschio M, Mengozzi G. Immune response after vaccination with recombinant hepatitis surface antigen in maintenance hemodialysis patients and healthy controls. *Nephron* 1992; 61: 339-40.
249. Buti M, Viladomin L, Jardi R. Long-term immunogenicity and efficacy of hepatitis B vaccine in hemodialysis patients. *Am J Nephrol* 1992; 12: 144-7.
250. Shatat HZ, Kotkat AM, Farghaly AG. Immune response to hepatitis B vaccine in hemodialysis patients. *J Egypt Publ Hlth Assoc* 2000; 75: 257-75.
251. Peces R, De La Torre M, Alcazar R, Urra JM. Prospective analysis of the factors influencing the antibody response to hepatitis B vaccine in hemodialysis patients. [abstract] *Am J Kidney Dis* 1997; 29: 239-45.
252. Magnani G, Calzetti C, Campari M, Lehndorff II, Pizzaferrri P, Rossi E. Immune response to hepatitis B vaccine and duration of protection in a dialysis unit. *Acta Biomed Ateneo Parmense* 1987; 58: 41-7.
253. Scotto G, Savastano AM, Forcella M, Tantimonaco G, Amato G, Salatino G, *et al.* HCV infection in dialysis patients. *Nephron* 1992; 61: 320-1.
254. Mazzoni A, Innocenti M, Consaga M. Retrospective study on the prevalence of B and non-A, non-B hepatitis in a dialysis unit: 17-years follow-up. *Nephron* 1992; 61: 316-7.

262. Michel P, Janin G, Chevallier P, Girard P, Laville M, Trepo C. Eradication of hepatitis B in dialysed patients through repeated sero vaccinations. [abstract] *Nephrologie* 1986; 7: 114-7.
263. Clemens R, Sanger R, Kruppenbacher J, Hobel W, Stanbury W, Bock HL, *et al.* Booster immunization of low- and non-responders after a standard three dose hepatitis B vaccine schedule-results of post-marketing surveillance. *Vaccine* 1997; 15: 349-52.
264. Stevens CE, Alter HJ, Taylor PE, Sang EA, Harley EJ, Szmuness W. Hepatitis B vaccination in patients receiving hemodialysis. *N Eng J Med* 1984; 311: 496-501.
265. Kurz P, Kohler H, Meuer SC, Hutteroth T, Meyer Zum Buschenfelde KH. Impaired cellular immune response in chronic renal failure: Evidence for a T cell defect. *Kidney Int* 1986; 29: 1209-14.
266. Faneili V, Sanna G, Solinas A. Expectation of impaired response to recombinant hepatitis B vaccination. *Nephron* 1992; 61: 293-5.
267. Xie J, Wang X, Zhuang G, Xu H, Hao B, Tang X, *et al.* Relation between interleukin-2, interleukin-2 receptor and non and hypo-responsiveness to hepatitis B vaccine. [abstract] *Zhoughua Gan Zang Bing Za Zhi* 2000; 8: 332-4.

APPENDIX I

Questionnaire

Name:

Age:

Sex: male female

Address:

Occupation: :

Smoking:

Date of vaccination 1st dose

2nd dose

3rd dose

Dose (μg) :

Compliance to the vaccination schedule :

☐ yes☐ no

Vaccine side effect :

□ local

- general

Booster dose :

☐ yes☐ no

Post vaccination screening :

☐ yes

□ no

History of jaundice :

☐ yes☐ NO

Number of blood transfusion :

Duration of hemodialysis :

Number of session of dialysis / week

- twice

□ trice

Type of buffer

☐ bicarbonate

↳ acetate

Adequacy of dialysis (kt/v) :

Concomittent HCV infection :

Other chronic diseases

□ DM

- liver disease

- rheumatoid dis

- bronchial asthma

weight

```
□ pre dialysis
```

□ post dialysis

Height

Management of HBs Ag positive cases

APPENDIX II

Statistical Analysis

The results of the presented work were tabulated and statistical analysis was carried out by different significance to the situation of comparison:

1. Arithmetic mean ($\bar{X}$):

It was used as a measure of central tendency (averages):

$$\bar{X} = \frac{\sum x}{n}$$

Where: $\sum x$ = The sum of observations.

n = The number of observations.

2. Standard deviation (s):

It was used as a measure of dispersion:

$$s = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n - 1}}$$

Where: n = The number of observations.

$\sum x^2$ = The sum of the squares of observations.

$(\sum x)^2$ = The squares of the sum of observations.