
References

- [1]. Sinclair, S. (2000). Male Infertility: Nutritional and Environmental Considerations. *Alternative Medicine Review*, 5(1), 28-38.
- [2]. Pramanik, P. (2012). Impact of Adulthood Lifestyle on Male Infertility: A Critical Review of the Current Literature. *International Journal of Life Science & Pharma Research*, 2(4), 51-60.
- [3]. Dada, R., Gupta, N. P., & Kucheria, K. (2001). Deterioration of Sperm Morphology in Men Exposed to High Temperature. *Journal of the Anatomical Society of India*, 50(2), 107-111.
- [4]. Kumar, N., & Singh, A. K. (2015). Trends of Male Factor Infertility, An Important Cause of Infertility: A Review of Literature. *Journal of Human Reproductive Sciences*, 8(4), 191-196.
- [5]. Invia fertility specialists (2013, October 14). Hormonal Treatment of Male Factor Infertility. Retrieved June 15, 2016, from <https://www.inviafertility.com/blog/blog/ivf/.../hormonal-treatment-of-male-factor-infertility/>
- [6]. American Pregnancy Association. (2017, May 4). Male Infertility. Retrieved August 8, 2017, from <http://www.americanpregnancy.org/Infertility>
- [7]. Pethiyagoda, A., & Pethiyagoda, K. K. (2016). Occupational Distribution of Patients Presenting with Male Factor Subfertility. *International Journal of Scientific and Research Publications*, 9(9), 268-272.
- [8]. Hewabatage., P. N., Gunawardhana, L.K. M. P., Gunarathna, M.K. N. S., Bandara, E. M. S., & De Silva, B.S.S. (2016, November 17). Reasons for Primary Sub-Fertility among Couples Attending Sub-Fertility Clinics at Two Government Hospitals. Retrieved November 21, 2017, from <https://www.ou.ac.lk/ours/wp-content/uploads/2017/04/B404-E.pdf>

-
- [9]. Wijesinghe, D. (2012). Socio - Demographic Determinants of Sub fertility in Sri Lanka. Retrieved September 15, 2017, from <http://www.archive.cmb.ac.lk:8080/research/bitstream/70130/2972/1/Socio.pdf>.
- [10]. De Silva, T. (2008). *Low Fertility Trends: Causes, Consequence and Policy Options* (Working Paper Series: Number 1). Colombo: Institute for Health Policy.
- [11]. Golbabaiei, F., & Khadem, M. (2015). Air Pollution in Welding Processes — Assessment and Control Methods. In *Current Air Quality Issues* (pp. 33-63). Rijeka, Croatia: InTech. doi:10.5772/59793
- [12]. Rahman, M. S., & Pang, M. G. (2016, July 4). Sperm Biology: Towards Understanding Global Issue of Male Infertility. *Austin Andrology, 1*(1), 1003rd ser., 1-3.
- [13]. Caroppo, E. (2011). Male Reproductive Medicine: Anatomy and Physiology. In *An Introduction to Male Reproductive Medicine* (pp. 6–17). essay, New York: Cambridge University Press.
- [14]. Australia, A. (2016, March 23). Male Infertility. *Andrology Australia*. Andrology Australia, School of Public Health & Preventive Medicine, Monash University. Retrieved August 8, 2016, from <https://www.andrologyaustralia.org/your-health/male-infertility>
- [15]. Australia, A. (2014). *Male Infertility a Child of Our Own*. A booklet in the series of consumer guides on male reproductive health (4th ed.). Andrology Australia.
- [16]. Cornwall, G. A., & von Horsten, H. H. (2007). Sperm Maturation in the Epididymis Role of Segment-Specific Micro environments. In *The Genetics of Male Infertility* (pp. 211–231). essay, Totowa, New Jersey, USA: Humana Press Inc.

-
- [17]. OpenStax College. (2013, April 10). Hormonal Control of Human Reproduction. *OpenStax-CNX*. OpenStax-CNX. Retrieved September 17, 2017, from <https://cnx.org/exports/1dadd9c.../hormonal-control-of-human-reproduction-4.pdf>
- [18]. Sofikitis, N., Giotitsas, N., Tsounapi, P., Baltogiannis, D., & Giannakis, D. (2008). Hormonal Regulation of Spermatogenesis and Spermogenesis. *Journal of Steroid Biochemistry and Molecular Biology*, 109(3-5), 323–330. Retrieved September 3, 2017, from <https://doi.org/10.1016/j.jsbmb.2008.03.004>
- [19]. Sheiner, E. K., Sheiner, E., Hammel, R. D., Potashnik, G., & Carel, R. (2003). Effect of Occupational Exposures on Male Fertility: Review. *Industrial Health*, 41(2), 55–62.
- [20]. Jensen, T.K., Bonde, J.P. & Joffe, M. (2006). The Influence of Occupational Exposure on Male Reproductive Function. *Occupational Medicine*, 56(8), 544-553.
- [21]. Hjollund, N. H., Bonde, J. P., Jensen, T. K., Henriksen, T. B., Andersson, A. M., Kolstad, H. A., Ernst, E., Giwercman, A., Skakkebaek, N.E. & Olsen, J. (2000). Male-Mediated Spontaneous Abortion among Spouses of Stainless Steel Welders. *Scandinavian Journal of Work, Environment & Health*, 26(3), 187–192.
- [22]. Kukadia, A. N., Ercole, C. J., Gleich, P., Hensleigh, H., & Pryor, J. L. (1996). Testicular Trauma: Potential Impact on Reproductive Function. *The Journal of Urology*, 156(5), 1643–1646.
- [23]. Singh, R., Hamada, A. J., Bukavina, L., & Agarwal, A. (2012). Physical Deformities Relevant to Male Infertility. *Nature Reviews / Urology*, 9, 156–174. Retrieved from https://www.researchgate.net/publication/221846959_Physical_deformities_relevant_to_male_infertility

-
- [24]. Jacobsen, R., Bostofte, E., Engholm, G., Hansen, J., Olsen, J. H., Skakkebaek, N. E., & Moller, H. (2000). Risk of testicular cancer in men with abnormal semen characteristics: cohort study. *British Medical Journal*, 321(7264), 789–792. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/11009515>
- [25]. Raman, J. D., Nobert, C. F., & Goldstein, M. (2005). Increased Incidence of Testicular Cancer in Men Presenting with Infertility and Abnormal Semen Analysis. *The Journal of Urology*, 174(5), 1819–1822. Retrieved from [http://www.jurology.com/article/S0022-5347\(01\)68788-3/fulltext](http://www.jurology.com/article/S0022-5347(01)68788-3/fulltext)
- [26]. Gorelick, J. I., & Goldstein, M. (1993). Loss of fertility in men with varicocele. *American Society for Reproductive Medicine*, 59(3), 613–616. Retrieved from [http://www.fertstert.org/article/S0015-0282\(16\)55809-9/fulltext](http://www.fertstert.org/article/S0015-0282(16)55809-9/fulltext)
- [27]. Rajeev, K., & Rupin, S. (2005). Varicocele and male infertility: current status. *The Journal of Obstetrics and Gynecology of India*, 55(6), 505–516.
- [28]. Kumar, P., Thakur, D., Patidar, A. & Kumar, N. (2010). Male Hypogonadism: Symptoms and Treatment. *Journal of Advanced Pharmaceutical Technology & Research*, 1(3), 297–301.
- [29]. Pelfrey, R. J., Overstreet, J. W., & Lewis, E. L. (1982). Abnormalities of sperm morphology in cases of persistent infertility after vasectomy reversal. *Fertility and Sterility*, 38(1), 112–114. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/7095158>
- [30]. Saacke, R. G., Nadir, S., & Nebel, R. L. (1994). Relationship of semen quality to sperm transport, fertilization, and embryo quality in ruminants. *An International Journal of Animal Production*, 41(1), 45–50. Retrieved from [http://www.theriojournal.com/article/S0093-691X\(05\)80047-0/abstract](http://www.theriojournal.com/article/S0093-691X(05)80047-0/abstract)

-
- [31]. Jungwirth , A., Diemer, T., Dohle, G. R., Giwercman, A., Kopa, Z., Krausz, C., & Tournaye, H. (2015). Guidelines on Male Infertility. European Association of Urology . Retrieved September 5, 2017, from https://uroweb.org/wp-content/uploads/17-Male-Infertility_LR1.pdf
- [32]. Yu, J. (2014). Endocrine disorders and the neurologic manifestations. *Annals of Pediatric Endocrinology & Metabolism*, 19(4), 184–190. Retrieved from <https://e-apem.org/journal/view.php?doi=10.6065/apem.2014.19.4.184>
- [33]. Sargis, R. M. (2015, April 8). An Overview of the Hypothalamus: The Endocrine System’s Link to the Nervous System. *Endocrine web*. Vertical Health LLC. Retrieved September 17, 2017, from <https://www.endocrineweb.com/endocrinology/overview-hypothalamus>.
- [34]. Amory, J. K., & Bremner, W. J. (2003). Regulation of testicular function in men: implications for male hormonal contraceptive development. *Journal of Steroid Biochemistry & Molecular Biology*, 85(2), 357–361. Retrieved from <https://pdfs.semanticscholar.org/d07d/50f63bd4d398fbb918b6bfee9f180c53ff81.pdf>.
- [35]. Hannu, T., Piipari, R., Kasurinen, H., Keskinen, H., Tuppurainen, M., & Tuomi, T. (2005). Occupational asthma due to manual metal-arc welding of special stainless steels. *European Respiratory Journal*, 26(4), 736–739.
- [36]. Ahsan, S. A., Lackovic, M., Katner, A., & Palermo, C. (2009). Metal fume fever: a review of the literature and cases reported to the Louisiana Poison Control Center. *The Journal of the Louisiana State Medical Society* , 161(6), 348–351. Retrieved from <http://europepmc.org/abstract/med/20108830>

-
- [37]. Saikhun, J., Kitiyanant, Y., Vanadurongwan, V., & Pavasuthipaisit, K. (1998). Effects of Sauna on Sperm Movement Characteristics of Normal Men Measured by Computer-Assisted Sperm Analysis. *International Journal of Andrology*, 21(6), 358–363.
- [38]. Durairajanayagam, D., Agarwal, A., & Ong, C. (2015). Causes, effects and molecular mechanisms of testicular heat stress. *Reproductive BioMedicine Online*, 30(1), 14–27. Retrieved from [www.rbmojournal.com/article/S1472-6483\(14\)00545-8/fulltext](http://www.rbmojournal.com/article/S1472-6483(14)00545-8/fulltext)
- [39]. Kandarakis, E. D., Bourguignon, J. P., Giudice, L. C., Hauser, R., Prins, G. S., Soto, A. M., Zoeller, R. T. & Gore, A. (2009). Endocrine-Disrupting Chemicals: An Endocrine Society Scientific Statement. *Endocrine-Disrupting Chemicals: An Endocrine Society Scientific Statement*, 30(4), 293–342.
- [40]. Figà-Talamanca, I., Traina, M. & Urbani, E. (2001). Occupational Exposures to Metals, Solvents and Pesticides: Recent Evidence on Male Reproductive Effects and Biological Markers. *Occupational Medicine*, 51(3), 174–188.
- [41]. The Effects of Workplace Hazards on Male Reproductive Health. (2014, June 6). *Centers for Disease Control and Prevention*. The National Institute for Occupational Safety and Health. Retrieved September 17, 2017, from <https://www.cdc.gov/niosh/docs/96-132/default.html>
- [42]. Jayachandra, N. & Srinivasa, J. (2011). Impact of Occupational Heat Exposure on Male Reproductive Health. *Pakistan Journal of Physiology*, 7(2), 53-55.
- [43]. Figa-Talamanca, I., Dell'Orco, V., Pupi, A., Dondero, F., Gandini, L., Lenzi, A., Lombardo, F., Scavalli, P. & Mancini, G. (1992). Fertility and semen quality of Workers Exposed to High Temperatures in the Ceramics Industry. *Reproductive Toxicology*, 6(6), 517-523.

-
- [44]. Pramanik, P. (2012). Impact of Adulthood Lifestyle on Male Fertility: A Critical Review of the Current Literature. *International Journal of Life Science & Pharma Research*, 2(4), 51-61.
- [45]. Sas, M. & Szöllösi, J. (1979). Impaired Spermiogenesis as a Common Finding among Professional Drivers. *Archives of Andrology*, 3(1), 57-60.
- [46]. Bujan, L., Daudin, M., Charlet, J.P., Thonneau, P. & Mieusset, R. (2000). Increase in Scrotal Temperature in Car Drivers. *Human Reproduction*, 15(6), 1355-1357.
- [47]. Figà-Talamanca, I., Cini, C., Varricchio, G.C., Dondero, F., Gandini, L., Lenzi, A., Lombardo, F., Angelucci, L., Di Grezia, R. & Patacchioli, F.R. (1996). Effects of Prolonged Auto Vehicle Driving on Male Reproduction Function: a Study among Taxi Drivers. *American Journal of Industrial Medicine*, 30(6), 750-758.
- [48]. Jung, A., Leonhardt, F., Schill, W.-B. & Schuppe, H.-C. (2005). Influence of the Type of Under-Trousers and Physical Activity on Scrotal Temperature. *Human Reproduction*, 20(4), 1022-1027.
- [49]. Mieusset, R., Bengoudifa, B. & Bujan, L. (2007). Effect of Posture and Clothing on Scrotal Temperature in Fertile Men. *Journal of Andrology*, 28(1), 170 -175.
- [50]. Dada, R., Gupta, N.P., & Kucheria, K. (2001). Deterioration of Sperm Morphology in Men Exposed to High Temperature. [*Journal of the Anatomical Society of India*](#), 50(2), 107-111.
- [51]. North, C. (2017, September 11). Can Cycling Decrease Fertility in Men? *LIVESTRONG.COM*. Retrieved September 30, 2017, from <https://www.livestrong.com/article/255211-prostate-trouble-and-bike-seats/>

-
- [52]. Cate, A. (2012, June 25). Does cycling affect your fertility?. *Blackmores*. Retrieved January 25, 2016, from <https://www.blackmores.com.au/mens-health/does-cycling-affect-your-fertility>
- [53]. Kubik, C. (2017, May). Can the heat from a laptop affect fertility? *BabyCenter*. Retrieved August 6, 2017, from https://www.babycenter.com/404_can-the-heat-from-a-laptop-affect-fertility_1460107.bc
- [54]. Ashton, J. (2010, November 11). Laptops May Hurt Male Fertility, Study Suggests. *CBS News*. Retrieved June 19, 2015, from <https://www.cbsnews.com/news/laptops-may-hurt-male-fertility-study-suggests/>
- [55]. Sheynkin, Y., Jung, M., Yoo, P., Schulsinger, D., & Komaroff, E. (2004). Increase in scrotal temperature in laptop computer users. *Human Reproduction*, 20(2), 452–455.
- [56]. Ratcliffe, J.M., Schrader, S.M., Clapp,D.E., Halperin,W.E., Turner,T.W. & Hornung, R. W. (1989). Semen Quality in Workers Exposed to 2-Ethoxyethanol. *British Journal of Industrial Medicine*, 46(6), 399-406.
- [57]. Cherry, N., Labrèche, F., Collins, J. & Tulandi,T. (2001). Occupational Exposure to Solvents and Male Infertility. *Occupational and Environmental Medicine*, 58(10), 635-640.
- [58]. Veulemans, H., Steeno, O., Masschelein, R. & Groeseneken,D. (1993). Exposure to Ethylene Glycol Ethers and Spermatogenic Disorders in Man: a Case-Control Study. *British Journal of Industrial Medicine*, 50(1), 71-78.
- [59]. Jelnes, J.E. (1988). Semen quality in workers producing reinforced plastic. *Reproductive Toxicology*, 2(2-3), 209-212.

-
- [60]. Migliore, L., Naccarati, A., Zanello, A., Scarpato, R., Bramanti, L., & Mariani, M. (2002). Assessment of Sperm DNA Integrity in Workers Exposed to Styrene. *Human Reproduction*, 17(11), 2912-2918.
- [61]. Kolstad, H.A., Bonde, J.P., Spano, M., Giwercman, A., Zschiesche, W., Kaae, D., Larsen, S.B. & Roeleveld, N. (1999). Change in Semen Quality and Sperm Chromatin Structure Following Occupational Styrene Exposure. *International Archives of Occupational and Environmental Health*, 73(3), 135-141.
- [62]. Jensen, T.K., Bonde, J.P. & Joffe, M. (2006). The influence of occupational exposure on male reproductive functions. *Occupational Medicine*, 56(8), 544-553.
- [63]. Eskenazi, B., Wyrobek, A.J., Fenster, L., Katz, D.F., Sadler, M., Lee, J., Hudes, M. & Rempel, D.M. (1991). A Study of the Effect of Perchloroethylene Exposure on Semen Quality in Dry Cleaning Workers. *American Journal of Industrial Medicine*, 20(5), 575-591.
- [64]. Ratcliffe, J.M., Schrader, S.M., Steenland, K., Clapp, D.E., Turner, T. & Hornung, R.W. (1987). Semen Quality in Papaya Workers with Long Term Exposure to Ethylenedibromide. *British Journal of Industrial Medicine*, 44(5), 317-326.
- [65]. Wong, O., Utidjian, H.M. & Karten, V.S. (1979). Retrospective Evaluation of Reproductive Performance of Workers Exposed to Ethylene dibromide (EDB). *Journal of Occupational Medicine*, 21(2), 98-102.
- [66]. Schrader, S.M., Turner, T.W. & Ratcliffe, J.M. (1988). The Effects of Ethylene .dibromide on Semen Quality: A Comparison of Short Term and Chronic Exposure. *Reproductive Toxicology*, 2(3/4), 191-198.

-
- [67]. The Effects of Workplace Hazards on Male Reproductive Health. (2014, June). *Centers for Disease Control and Prevention*. The National Institute for Occupational Safety and Health. Retrieved November 7, 2015, from <https://www.cdc.gov/niosh/docs/96-132/default.html>
- [68]. Richard, M.S. (2010). Environmental/Lifestyle Effects on Spermatogenesis. *Philosophical Transactions of the Royal Society B*, 365(1546), 1697–1712.
- [69]. Sharma, A., Sharma, P., Sharma, P. & Joshi, S.C. (2015). A Review on Organ chlorine Pesticides and Reproductive Toxicity in Males. *International Journal of Pharmaceutical Sciences and Research*, 6(8), 3123-3138.
- [70]. Winker, R. & Rüdiger, H.W. (2006). Reproductive Toxicology in Occupational Settings. *International Archives of Occupational and Environmental Health*, 79(1), 1-10.
- [71]. Omura, M., Hirata, M. & Ahaio, M. (1995). Pesticide Causes Testicle Damage Reduces Sperm Counts. *Bulletin of Environmental Contamination Toxicology*, 55(), 1-7.
- [72]. Sheiner, E.K., Sheiner, E., Hammel, R.D., Potashnik, G. & Carel, R. (2003). Effect of Occupational Exposures on Male Fertility. *Industrial Health*, 41(2), 55-62.
- [73]. Strohmer, H., Boldizsar, A. & Plockinger, B. (1993). Low Sperm Counts and Infertility more Common in Agricultural Workers. *American Journal of Industrial Medicine*, 24(), 587-592.
- [74]. Strohmer, H., Boldizsar, A., Plöckinger, B., Feldner-Busztin, M. & Feichtinger, W. (1993). Agricultural Work and Male Infertility. *American Journal of Industrial Medicine*, 24(5), 587-592.
- [75]. Multigner, L. & Oliva, A. (2001). Environment as a Risk Factor for Male Infertility. *The Scientific World*, 1(), 576–578.

-
- [76]. Dickman, M. D., Leung, C.K.M. & Leong M.K.H. (1998). Hong Kong Male Subfertility Link to Mercury in Human Hair and Fish. *Science of The Total Environment*, 214(1-3), 165-174.
- [77]. Oni, O.M., Amuda, D.B. & Gilbert, C.E. (2011). Effects of Radiofrequency Radiation from WIFI Devices on Human Ejaculated Semen. *International Journal of Research and Reviews in Applied Sciences*, 9(2), 292-294.
- [78]. Pasqualotto, F. F., & Agarwal I, A. (2013). Radiation effects on spermatogenesis. In *Fertility Preservation in Male Cancer Patient* (pp. 104–108). essay, U.K: Cambridge University Press.
- [79]. Amanda L., Ogilvy-Stuart & Stephen M.S. (1993). Effect of Radiation on the Human Reproductive System. *Environmental Health Perspectives Supplements*, 101(2), 109-116.
- [80]. Mair, P. (2005, February). Assessment of EMF (Electromagnetic Fields) and Biological Effects in Arc Welding Applications. *Fronius*. International Institute of Welding. Retrieved June 3, 2017, from https://www3.fronius.com/cps/rde/xbcr/SID-E4153D0B-41FAF4AB/fronius_usa/FA_0205_Assessment_of_EMF_IIW_DOC-XII-1848-05_en.pdf
- [81]. Pizent, A., Tariba, B. & Živković, T. (2012). Reproductive Toxicity of Metals in Men. *Archives of Industrial Hygiene and Toxicology*, 63(1), 35-46.
- [82]. Xuezhi, J., Youxin, L & Yilan, W. (1992). Studies of Lead Exposure on Reproductive System: A Review of Work in China. *Biomedical and Environmental Sciences*, 5(3), 266-275.
- [83]. Vigeh, M., Derek, R., Smith & Ping-Chi Hsu. (2011). How Does Lead Induce Male Infertility. *Iranian Journal of Reproductive Medicine*, 9(1), 1-8.

-
- [84]. Naha, N. & Manna, B. (2007). Mechanism of Lead Induced Effects on Human Spermatozoa after Occupational Exposure. *Kathmandu University Medical Journal (KUMJ)*, 5(1), 85-94.
- [85]. Chowdhury, A.R. (2009). Recent Advances in Heavy Metals Induced Effect on Male Reproductive Function—A Retrospective. [*Al Ameen Journal of Medical Sciences*](#), 2(2), 37-42.
- [86]. Rice, K.M., Walker, E.M., Wu, M., Gillette, C. & Blough, E.R. (2014). Environmental Mercury and Its Toxic Effects. *Journal of Preventive Medicine Public Health*, 47(2), 74-83.
- [87]. Choy, C., M. Y., Lam, C., W. K., Cheung, L., T. F., Briton-Jones, C. M., Cheung, L. P., & Haines, C. J. (2002). Infertility, blood mercury concentrations and dietary seafood consumption: a case-control study. *an International Journal of Obstetrics and Gynaecology*, 109, 1121-1125.
- [88]. Dickman, M. D., Leung, C.K.M. & Leong M.K.H. (1998). Hong Kong Male Subfertility Link to Mercury in Human Hair and Fish. *Science of the Total Environment*, 214(1-3), 165-174.
- [89]. Kumar, M., S. & Siva, C. (2015). Hexavalent Chromium and Its Effects on Male Reproductive System of Albino Rats. *International Journal of Scientific Research*, 4(3), 41-43.
- [90]. Sharma, R., Biedenharn, K. R., Fedor, J. M., & Agarwal, A. (2013, July 16). Lifestyle factors and reproductive health: taking control of your fertility. *BioMed Central. Reproductive Biology and Endocrinology*. Retrieved September 10, 2017, from <https://rbej.biomedcentral.com/articles/10.1186/1477-7827-11-66>
- [91]. Tourmaa, T. E. (2015, June 16). The Adverse Effects of Alcohol on Reproduction. The Association for the Promotion of Preconceptual Care. Retrieved June 19, 2015, from <http://www.come-over.to/FAS/alcohol.html>

-
- [92]. La -Vignera, S., Condorelli, R.A., Balercia, G., Vicari, E. & Calogero, A.E. (2013). Does Alcohol Have Any Effect on Male Reproductive Function? A Review of Literature. *Asian Journal of Andrology*, 15(2), 221–225.
- [93]. Nagler, H. M. (2000). Male Fertility and Sexuality Dysfunctions. In *Smoking and Urology* (pp. 96–98). essay, Mumbai: Magna Publishing Co. Ltd.
- [94]. Kumar, S., Kumari, A. & Murarka, S. (2009). Lifestyle Factors in Deteriorating Male Reproductive Health. *Indian Journal of Experimental Biology*, 47(8), 615-624.
- [95]. Law, J. (2014, October 8). How Drugs and Alcohol Affect Your Fertility. *News.com.au*. Retrieved January 26, 2016, from <http://www.news.com.au/lifestyle/health/how-drugs-and-alcohol-affect-your-fertility/news-story/0476fcd504f4ddc2e101e24da9b7e8de>
- [96]. Drugs and Male Fertility. (2017, August 16). *Cleveland Clinic*. The Cleveland Clinic Foundation. Retrieved September 1, 2017, from <https://my.clevelandclinic.org/health/articles/drugs-and-male-fertility>
- [97]. Gafar, A. (2015, March). Will smoking cannabis affect our chances of conceiving? *BabyCentre*. Retrieved January 26, 2016, from <http://www.babycentre.co.uk/x1013826/will-smoking-cannabis-affect-our-chances-of-conceiving#ixzz3yKbUUA7V>
- [98]. Imai, A., Ichigo, S., Takagi, H., Matsunami, K., Suzuki, N. & Yamamoto, A. (2010). Effects of Cola Intake on Fertility: A Review. *Health*, 2(9), 997-1001
- [99]. Jensen, T., Swan, S., Skakkebaek, N., Rasmussen, S. & Jørgensen, N. (2010). Caffeine Intake and Semen Quality in a Population of 2,554 Young Danish Men. *American Journal of Epidemiology*, 171(8), 883-891

-
- [100]. Jensen, T., Jacobsen, R., Christensen, K., Nielsen, N. & Bostofte, E. (2009). Good Semen Quality and Life Expectancy: A Cohort Study of 43,277 Men. *American Journal of Epidemiology*, 170(5), 559-565.
- [101]. Jensen, T., Jørgensen, N., Asklund, C., Carlsen, E., Kristensen, T.S., Holm, M. & Skakkebaek, N.E (2007). Self-Rated Health and Semen Quality among 3,457 Young Danish Men. *Fertility and Sterility*, 88(5), 1366-1373.
- [102]. Nawrot, P., Jordan, S., Eastwood, J., Rotstein, J., Hugenholtz, A. & Feeley, M. (2003). Effects of Caffeine on Human Health. *Food Additives and Contaminants*, 20(1), 1-30.
- [103]. Lucas, G.N. (2012). Mobile Cellular Telephones and Children. *Sri Lanka Journal of Child Health*, 41(1), 1-2.
- [104]. Wdowiak, A., Wdowiak, L. & Wiktor, H. (2007). Evaluation of the Effect of Using Mobile Phones on Male Fertility. *Annals of Agricultural and Environmental Medicine*, 14(1), 169-172.
- [105]. Makker, K., Varghese, A., Desai, N.R., Mouradi, R. & Agarwal, A. (2009). Cell Phones: Modern Man's Nemesis?. *Reproductive Biomedicine Online*, 18(1), 148-157.
- [106]. Fejes, I., Závaczki, Z., Szöllosi, J., Koloszá, S., Daru, J., Kovács, L. & Pál, A. (2005). Is There a Relationship Between Cell Phone Use and Semen Quality?. *Archives of Andrology*, 51(5), 385-393.
- [107]. Wdowiak, A., Wdowiak, L. & Wiktor, H. (2007). Evaluation of the Effect of Using Mobile Phones on Male Fertility. *Annals of Agricultural and Environmental Medicine*, 14(1), 169-172.
- [108]. De Iuliis, G.N., Newey, R.J., King, B.V. & Aitken, R.J. (2009). Mobile Phone Radiation Induces Reactive Oxygen Species Production and DNA Damage in Human Spermatozoa in Vitro. *Public Library of Science (PLoS) One*, 4(7), 1-9.

-
- [109]. Agarwal, A., Desai, N.R., Makker, K., Varghese, A., Mouradi, R., Sabanegh, E. & Sharma R. (2009). Effects of Radiofrequency Electromagnetic Waves (RF-EMW) from Cellular Phones on Human Ejaculated Semen: An in Vitro Pilot Study. *Fertility and Sterility*, 92(4), 1318-1325.
- [110]. Agarwal, A., Deepinder, F., Sharma, R.K., Ranga, G. & Li, J. (2008). Effect of Cell Phone Usage on Semen Analysis in Men Attending Infertility Clinic: An Observational Study. *Fertility and Sterility*, 89(1), 124-128.
- [111]. Ingham, A. (2014, June 2). Stress Affects Men's Fertility. *Guardian Liberty Voice*. Retrieved May 1, 2015, from <http://guardianlv.com/2014/06/stress-affects-mens-fertility/#99fA5W3PLvbYirUB.99>
- [112]. Tedesco, L. (2014, June 2). How Stress Kills His Fertility. *Shape Magazine*. Retrieved June 19, 2015, from <https://www.shape.com/blogs/shape-your-life/how-stress-kills-his-fertility>
- [113]. Sharpe, R. M. (2010). Environmental/lifestyle effects on spermatogenesis. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365(1546), 1697–1722. Retrieved May 1, 2015, from <https://www.ncbi.nlm.nih.gov/pubmed/20403879>
- [114]. Durairajanayagam, D., Agarwal, A. & Ong, C. (2015). Causes, effects and molecular mechanisms of testicular heat stress. *Reproductive Biomedicine Online*, 30(), 14-27.
- [115]. Kumar, S., Zaidi, S.S.A., Gautam, A.K., Dave, L.M. & Saiyed, H.N. (2003). Semen Quality and Reproductive Hormones among Welders - a Preliminary Study. *Environmental Health and Preventive Medicine*, 8(2), 64–67.

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- [116]. Isaxon, C., Pagels, J., Gudmundsson, A., Asbach, C., John, A.C., Kuhlbusch, T.A.J., Karlsson, J.E., Kammer, R., Tinnerberg, H.,Nielsen, J. & Bohgard, M. (2009). Characteristics of Welding Fume Aerosol Investigated in Three Swedish Workshops. *Journal of Physics: Conference Series*, 151(1), 1-5.
- [117]. Bonde, J.P. (1992). Semen quality in welders exposed to radiant heat. *British Journal of Industrial Medicine*, 49(1), 5-10.
- [118]. Bonde, J.P. (1990). Semen quality and sex hormones among mild steel and stainless steel welders: a cross sectional study. *British Journal of Industrial Medicine*, 47(8), 508-514.
- [119]. Aluminium and health. (2016, October 11). *Norsk Hydro*. The European Aluminium Association. Retrieved September 23, 2017, from <https://www.hydro.com/en/about-aluminium/Aluminium-and-health/>
- [120]. Klein, J. P., Mold, M., Mery, L., Cottier, M., & Exley, C. (2014). Aluminum content of human semen: Implications for semen quality. *Reproductive Toxicology*, 50, 43–48.
- [121]. Robbins, W. A. (2006). Epidemiological and Occupational Studies of Metals in Male Reproductive Toxicity. In *Metals, Fertility, and Reproductive Toxicity* (1st Edition. pp. 200–202). essay, London: Taylor and Francis Group.
- [122]. Bonde, J.P. & Ernst, E. (1992). Sex Hormones and semen Quality in Welders Exposed to Hexavalent Chromium. *Human & Experimental Toxicology*, 11(4), 259-263.
- [123]. Danadevi, K., Rozati, R., Reddyd, P.P. & Grover, P. (2003). Semen quality of Indian Welders Occupationally Exposed to Nickel and Chromium. *Reproductive Toxicology*, 17(), 451–456.

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- [124]. Bowditch, W. A., Bowditch, K. E., & Bowditch, M. A. (2009). SMAW: Equipment and Supplies. In *Welding Technology Fundamentals* (4th Edition, p. 52). essay, The Goodheart-Willcox Company.
- [125]. Masubuchi, K. (2013). Analysis of Welded Structures: Residual Stresses, Distortion, and Their Consequences. *Google Books*. Elsevier. Retrieved June 9, 2016, from https://books.google.lk/books/about/Analysis_of_Welded_Structures.html?id=TUgVBQAAQBAJ&redir_esc=y
- [126] Elert, G. (2003, June 17). Temperature of a MIG Welder. *The Physics Factbook*. Retrieved September 13, 2017, from <https://hypertextbook.com/facts/2003/EstherDorzin.shtml>

**DETAILS OF THE PERSONAL'S WHO CONSENT TO PARTICIPATE FOR
THE RESEARCH "EFFECTS OF WELDING ON MALE FERTILITY"**

Identification No. :-

Personal Details

1. Rate :-

2. Date of birth :-

3. Age :-

4. Weight :- Kg.

5 Height :- ...ft ...inch

6. BMI :-

7. Residency:-

Urban	
Suburban	
Rural	

8. Marital status:-

Single	
Married	
Divorced	
Separated	
Living together	

9. Date of married:

--	--	--

DD / MM / YY

10. Age to the date of marriage:-

--	--	--

DD / MM / YY

11. Children:-

i. a. Sex :-

Male	
Female	

b. Date of birth

--	--	--

DD / MM / YY

c. Time duration after marriage: -

d. Before After
Commencement of profession

ii. a. Sex :-

Male	
Female	

b. Date of birth

--	--	--

DD / MM / YY

c. Time duration after marriage:-.....

d. Before After
Commencement of profession

Professional Details

1. Date of enlistment to Sri Lanka Navy

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DD / MM / YY

2. Inception of profession as a welder in SLN

--	--	--

DD / MM / YY

3. Professional service in SLN

--	--	--

DD / MM / YY

4. Profession prior to joint SLN :

5. Professional service prior to joint SLN

--	--	--

DD / MM / YY

6. Total service as welder

--	--	--

DD / MM / YY

7. Nature of the present duty

Yard	
Workshop	

8. Type of welding

Arc		Gas	
TIG		Multi welding	
MIG		Other	

9. Average time duration exposed to active welding per day: -Hrs

10. Do you use a respirator during welding?

Yes	
No	

11. Type of dust mask if yes:-.....

12. Do you use an apron during welding?

Yes	
No	

13. Type of apron if yes :-.....

14. Normal position of welding:-

Standing	
Sitting/squatting	

Lifestyle Factors

1. Smoking

Yes	
No	

 if yes, frequency

2. Tobacco chewing

Yes	
No	

 if yes, frequency

3. Alcohol

Yes	
No	

 if yes, frequency

4. Use of illegal drugs

Yes	
No	

 if yes, frequency

5. Addiction to beverages containing caffeine.
If yes, frequency: -

Yes	
No	

7. Do you attend physical exercise?

Yes	
No	

8. Use of sauna / steam bath
If yes, frequency:-.....

Yes	
No	

9. Food habits.....
.....

10 Any chronic disease
 Details if yes.....

Yes	
No	

11. Use of any medication at present
 Details if yes.....

Yes	
No	

12. Use of mobile phone

Yes	
No	

13. If yes, where do you keep it?

Shirt pocket	
Trouser pocket	
Other place	

14 Use of cosmetic

Yes	
No	

15. Use of laptop.

Yes	
No	

On lap	
Table	

16. Sleep deprivation

Yes	
No	

17 Any domestic / occupational stress

Yes	
No	

18. Contact with any chemical / solvent
 Details, if yes.

Yes	
No	

.....

19. Mumps / any viral infection	Yes		Childhood	
	No		Teenage	
			Adults	

20. Prolong bicycling.....	Yes	
	No	

21. Family planning.....	Yes		Condom	
	No		Drugs	
			Natural means	

22. Surgery proceeded on testis	Yes	
	No	

23. Details of surgery proceeded, if Yes.....

 .

24. Cultural belief	Yes	
	No	

25. Presence of testis	Yes	
	No	

26. Un-descended testis	Yes	
	No	

27. Fitness of underpants	Normal	
	Tight	

28. Colour of unde pants

Dark	
Light	

29. Type of unde pants

Cotton	
Synthetics	
Mix	

30. Working dress.....

Overall	
Other	

31. Colour of working dress

Dark	
Light	

32. Type of working dress

Cotton	
Synthetics	
Mix	

33. Any social transmitted disease
Details, if yes.....


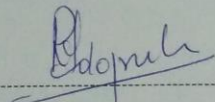
Yes	
No	

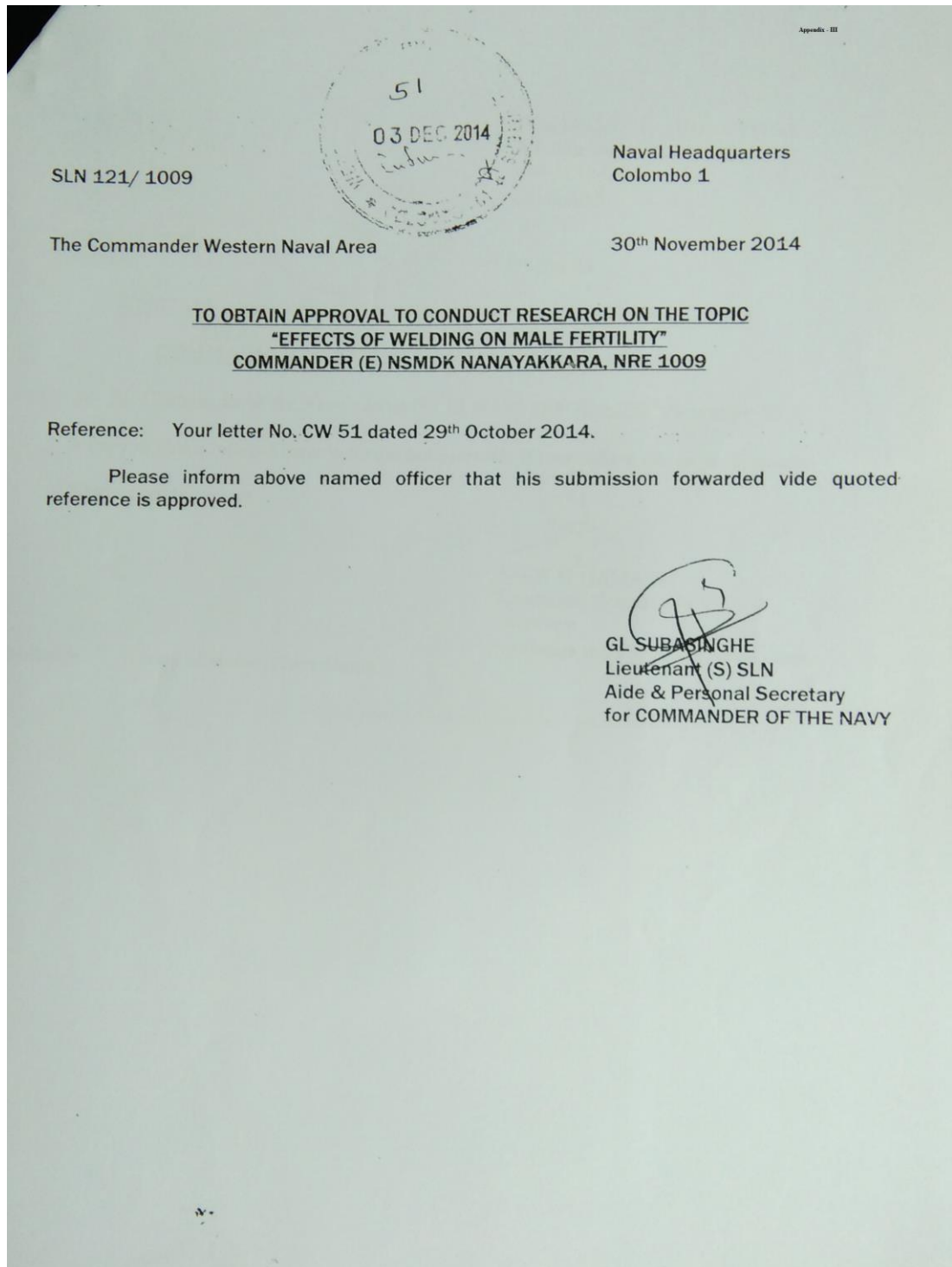
34. Masturbation
Frequency.....

Yes	
No	

35. Any other information's.....

**Letter of approval received form ethical committee at Kothalawala
Defense University**

 <p style="text-align: right;"><i>Ethical Review Committee</i></p> <p>Faculty of Medicine General Sir John Kotelawala Defence University Ratmalana</p> <p style="text-align: right;">Tel:+94(0)11-2635268 Fax:+94(0)11-2638660 Email:ethicalreview.committee.fomkdu@gmail.com</p>	
Prof BMR Fernandopulle (Chair)	20/04/2017
Prof ND Warnasuriya	
Prof J Welihinda	Capton (E) NSMDK Nanayakkara
Dr NFJ Fernando	Marine/Mechanical Engineer
Lt Col (Dr) A Balasuriya	Naval Headquarters
Dr PR Ruwanpura	Colombo 01.
Dr PBV Navaratne	<u>(RP/2016/18) "The study of the effects of welding on male fertility."</u>
Dr RANK Wijesinghe	The project proposal submitted by you for ethical clearance under the above title was taken up at the Ethical Review Committee meeting held on the 20 th of April 2017. We are pleased to inform you that the committee has decided to grant the ethical approval.
Dr IHS Kumarasinghe(Secretary)	Please submit a progress report on the completion of your research project or at the end of one year after starting the project.
Mr Nuwan Herath	
Mr Mangala Wijesinghe	
Mrs MKOK De Silva	
Ms Randima Attygalle	
	 ----- Snr Prof Rohini Fernandopulle (Chair, Ethics Review Committee) FOM,KDU.



INFORMATION TO PARTICIPANTS AND CONSENT FORM

SPONSOR:

INVESTIGATOR (Principal and at least one Co-Investigator):

.....

Name of Participant:

Title: study to determine the effects of welding on male fertility

1. You are invited to take part in this research study. The information in this document is meant to help you decide whether or not to take part. Please feel free to ask if you have any queries or concerns. You are being asked to participate in this study being conducted in (Name of the institution) because you satisfy our eligibility criteria which are:

- (1) Identified as occupational welder (or working at office or workshop without exposing to welding) in Sri Lanka Navy.
- (2) You are exposure to welding (or working at office/workshops without exposing to welding) more than 03 years.
- (3) Age between 23 to 36 years.

You will be one of the (give total number of participants to be enrolled in the study) participant we plan to recruit in this study. You will be assigned to either of the two study groups. One group of participants (those who will not be exposed to welding) will be tested as a control group while other group of participant (occupational welders) will be the subject group. Investigations and sample testing will be conducted at the Naval General Hospital – Colombo with the approval of the Commander of the Navy.

2. What is the purpose of research?

The purpose of this study is to evaluate the relationship between male fertility and exposure to welding emission. Discussion made with infertile male welders, who

exposed to welding emission long period discovered that a conceptual idea has been established amongst them that the infertility caused by the long term exposure to welding emissions. However it is very hard to find a research in Sri Lanka context to support or expel this concept amongst the welders. Therefore this study will assist to evaluate the so called relationship and to take actions to mitigate exposure.

3. The study design

All participants in the study will be divided into two groups. You will be assigned to either of the two groups. One group is the subject group, composed with welders and the other group is the control group, consist of personals, who will not be exposed to welding. Each participant has to give semen sample thrice at the laboratory of Naval General Hospital – Colombo. Second sample of semen will be tested after six month in case of any abnormalities are found in the first. Third sample of semen will be received in any abnormalities found in the second sample. Healthy personals will be selected for the control group and their SFA parameter will be kept as a reference value to compare with the subject group.

4. Study Procedures

Semen will be collected by self-masturbation into an approved sterile container, at the laboratory of Naval General Hospital – Colombo. Participants should be abstained from ejaculation for 3 -4 days before providing the semen. The fresh semen sample will be incubated for 30 min at 37°C for liquefaction and routine semen fluid analysis (SFA) will be performed according to WHO standards to measure volume, sperm Count /ml/10⁶, total motility, and total morphology. Obtained sample will be undergone investigation for approximately 02 hrs. You can collect the sample after the test if not the sample will be washed out as routine procedure by the laboratory staff.

Once you are enrolled in the study, you will be required to follow the instructions given below.

- (1) Taking of any medication prescribed by the physician

(2) Change of any lifestyle factors [diet / take the drugs as instructed and detailed on the envelope / avoid alcohol / smoking / any other precautions].

(3) Taking any medications other than the ones prescribed by your physician. If you need to take some treatment (drug / physiotherapy / other), you must inform your investigator before taking that treatment

5. Preparation for Semen Analysis

The laboratory technician will let you know what you should do in preparation for the semen analysis. It's very important to follow these instructions to get the best sample for accurate results

- Refrain from any sexual activity, including masturbation, for 3 to 4 days before the test. Longer or shorter periods are also not recommended.
- Avoid alcohol, caffeine, and drugs such as cocaine and marijuana two to five days before test
- Stop taking any herbal medications, what you have already declared to the investigation team
- Avoid any hormone medications
- Give the specimen directly to the laboratory staff or the receptionist to ensure immediate attention.
- Discuss any medications you're taking with your investigator team, if any.

6. Possible risks to you

The study team expects only semen samples from you for the analysis and you will not be given any medications for the study. Certain emotional and physical discomfort risks may be associated with the collection of semen samples by masturbation, unless other than that there is no any potential risk involvement of taking semen samples for this study.

7. Possible benefits to you

You will be able to get following benefits on this research study.

- (1) Free investigation of your semen samples and get to know the quality of your semen sample
- (2) At the end of the study you may be able to know, that any effects of welding emission on your fertility.

8. Compensation

You will not receive any compensation for the inconvenience and travel. You will be provided only transport facilities. You will also benefit from being on this research study in terms of free investigations/tests. Additionally participants will be provided medical facilities in case of any risk involvement observed during the period of research

9. Possible benefits to the institution and other people

The results of the research may provide benefits to the institution & society in terms of advanced knowledge of welding technology and how to mitigate welding emissions. The results of the study may further support to change the working environment and lifestyle of occupational welders to ensure health and wellbeing

10. Cost to the participant

You will not be required to pay for the semen sample analysis. You will be provided transport facilities to travel from your workstation to Naval General Hospital – Colombo to participate the research study.

11. Who is paying for this research?

Sri Lanka Navy is the sponsors of the study and are providing laboratory facilities at the Nava General Hospital - Colombo for the research. The investigator or any of his/her team member or any participant for the study does not receive any direct payment from the sponsor.

12. Confidentiality of the information obtained from you

You have the right to confidentiality regarding the privacy of your information (personal details, occupational details, lifestyle and results of semen analysis). By signing this document, you will be allowing the research team investigators, other study personnel, sponsors, institutional ethics committee and any person or agency required to view your data, if required. The information from this study, if published in scientific journals or presented at scientific meetings, will not reveal your identity.

It is ensured that only research team will have access to review your personal data obtained through questioner. It is further confirmed that the details of semen analysis will not be reflected identification of the participant whilst dissemination of study finding through a research paper or journal or any publication

13. How will your decision to not participate in the study affect you?

Your decision not to participate in this research study will not affect your relationship with the investigator or the institution. You will further not lose any benefits to which you are entitled.

14. Can you decide to stop participating in the study once you start?

The participation in this research is purely voluntary and you have the right to withdraw from this study at any time during the course of the study without giving any reasons. However, it is advisable that you talk to the research team prior to stopping participation. However it is not mandatory to give reason for withdrawing.

15. Can the investigator take you off the study?

You may be taken off the study without your consent if you do not follow instructions of the investigators or the research team or if the investigator thinks that further participation may cause you harm.

16. Right to know information

The obtained results will be disclosed to any participants on their personal request.

17. Right to new information

If the research team gets any new information during this research study that may affect your decision to continue participating in the study, or may raise some doubts, you will be told about that information.

18. Contact persons

For further information / questions, you can contact us at the following address:

Principal Investigator:

Captain (E) N.S.M.D.K. Nanayakkara Ph 071 822 3860

Dept. of Marine Engineering, Sri Lanka Naval Headquarters, Colombo 01

Email: kapila1009@gmail.com / kapila1009@navy.lk

Co-Investigator

Dr. H.K.G Punchihewa, Ph. 071 622 0236

Dept. of Mechanical Engineering, University of Moratuwa, Katubedda, Moratuwa.

Email: hkgpunchihewa@gmail.com Fax: +94 11 2650622

Contact Person(s):

Captain (E) N.S.M.D.K. Nanayakkara Ph 071 822 3860

Dept. of Marine Engineering, Sri Lanka Naval Headquarters, Colombo 01

Email: kapila1009@gmail.com / kapila1009@navy.lk

PARTICIPANTS CONSENT FORM

[Title of the study]

Name of the participant: _____

Name of the Principal (Co-) Investigator: _____

Name of the Institution: _____

Name and address of the sponsoring (funding) agency (ies): _____

Documentation of the informed consent

I... ..have read the information in this form (or it has been read to me). I was free to ask any questions and they have been answered. I am over 18 years of age and, exercising my free power of choice, hereby give my consent to be included as a participant in “.....
.....
.....” (title of the study)

- (1) I have read and understood this consent form and the in formations provided to me.
- (2) I have had the consent document explained to me.
- (3) I have been explained about the nature of the study.
- (4) My rights and responsibilities have been explained to me by the investigator.
- (5) I have been advised about the risks associated with my participation in the study.
- (6) I have informed the investigator of all the treatments I am taking or have taken in the past... .. months including any *desi* (alternative) treatments.
- (7) I agree to cooperate with the investigator and I will inform him/her immediately if I get any medical treatment during the study period
- (8) I have not participated in any research study within the past month(s).

-
- (9) I am aware of the fact that I can opt out of the study at any time without having to give any reason and this will not affect my future.
 - (10) I am also aware that the investigators may terminate my participation in the study at any time, for any reason, without my consent.
 - (11) I hereby give permission to the investigators to release the information obtained from me as result of participation in this study to the sponsors, regulatory authorities, Government agencies, and ethics committee. I understand that they may inspect my original records.
 - (13) My identity will be kept confidential if my data are publicly presented.
 - (14) I have had my questions answered to my satisfaction.
 - (15) I have decided to be in the research study.

I am aware, that if I have any questions during this study, I should contact at one of the addresses listed above. By signing this consent form, I attest that the information given in this document and the consent form has been clearly explained to me and apparently understood by me. I will be given a copy of this consent document.

For participants

Name and signature / thumb impression of the participant (or legal representative if participant incompetent):

..... (Name)
 (Signature)

Date: Time:

Name and signature of impartial witness (required for illiterate patients):

..... (Name)
 (Signature)

Date:..... Time:

Address and contact number of the impartial witness:

.....

and signature of the Investigator or his representative obtaining consent:

..... (Name)

(Signature)

..... (Date)

Investigator Certificate

I certify that all the elements including the nature, purpose and possible risks and benefits of the above study as described in this consent document have been fully explained to the subject. In my judgment, the participant possesses the legal capacity to give informed consent to participate in this research and is voluntarily and knowingly giving informed consent to participate,

Signature of the Investigator: _____ Dated: _____

Name of the Investigator: _____