

**Table 6. Studies reporting effects on the Male Reproductive System from Fluoride**

Study	Dose	Effect
<p>Biometals. 2005 Jun;18(3):207-12.</p> <p><b>Exposure to high fluoride concentration in drinking water will affect spermatogenesis and steroidogenesis in male albino rats.</b></p> <p>Pushpalatha T, Srinivas M, Sreenivasula Reddy P.</p> <p>Department of Biotechnology, Sri Venkateswara University, India. □</p>	<p>RAT – adult males, Wistar strain</p> <p>NaF oral</p> <p>4.5 and 9.0 ppm for 75 days</p> <p><a href="#">Abstract</a></p>	<p>Significant decrease in body weight, brain index and testicular index.</p> <p>A significant decrease in sperm count, sperm motility, sperm viability and sperm function (HOS positive) with increased sperm abnormalities.</p>
<p>Wei Sheng Yan Jiu. 2005 Jan;34(1):32-4.</p> <p><b>[Relationship between spermatogenic cell apoptosis and serum estradiol level in rats exposed to fluoride]</b></p> <p>Jiang CX, Fan QT, Cheng XM, Cui LX</p> <p>College of Public Health, Zhengzhou University, China.</p>	<p>RAT</p> <p>Dose not reported in abstract</p> <p>30 male Wistar rats</p> <p>28-day control group, 28-day low-dose fluoride treatment group, 28-day high-dose fluoride treatment group, 38-day control group, 38-day low-dose fluoride treatment group, and 38-day high-dose fluoride</p> <p>The fluorosis model was acquired by subcutaneous injection of NaF solution.</p> <p><a href="#">Abstract</a></p>	<p>RESULTS: The content of NaF in testis and the ratio of apoptotic spermatogenic cell in fluoride treatment groups significantly increased with increased experimental dosage and prolonged experimental period (<math>P &lt; 0.05</math>). Meanwhile, the serum estradiol level significantly decreased (<math>P &lt; 0.05</math>), which was negatively correlated with the content of NaF in testis as well as the ratio of apoptotic spermatogenic cell (<math>P &lt; 0.05</math>).</p> <p>CONCLUSION: Excessive fluoride could lead disturbance to serum estradiol level during some range of dose and time, which is an important factor to spermatogenic cell apoptosis.</p>
<p>Fluoride 2004; 37(3); 172-184</p> <p><b>FLUORIDE AND/OR ARSENIC TOXICITY IN MICE TESTIS WITH GIANT CELLS AND SUBSEQUENT RECOVERY BY SOME ANTIDOTES</b></p> <p>NJ Chinoy, K Tewari, DD Jhala.</p>	<p>MOUSE (<i>Mus musculus</i>)</p> <p>NaF, 5 mg/kg body weight</p> <p>30 days</p>	<p>Caused structural alterations (including the formation of giant cells) in mice testis, affected spermatogenesis, reduced protein levels, and lowered activities of HSDs. The latter effect resulted in accumulation of cholesterol and a decline in testosterone levels.</p>
<p>Environ Res 2003, Sept;93(1);20-30</p> <p>Fluoride-induced disruption of reproductive hormones in men.</p> <p>Ortiz-Perez and Rodriguez-Martinez et al.</p> <p>Laboratorio de Toxicologia Ambiental, Facultad de Medicina, Universidad Autonoma de San Luis Potosi, Mexico</p> <p><a href="#">Abstract</a></p>	<p>HUMAN POPULATION STUDY</p> <p>objective was to study reproductive parameters in a population exposed to fluoride at doses of 3-27 mg/day compared with a group of individuals exposed to fluoride at lower doses: 2-13 mg/day. A significant increase in FSH (<math>P &lt; 0.05</math>) and a reduction of inhibin-B, free testosterone, and prolactin in serum (<math>P &lt; 0.05</math>) were noticed in the high F group. A significant negative partial correlation was observed between urinary F and serum levels of inhibin-B (<math>r = 0.333</math>, <math>P = 0.028</math>) in the low F group. Furthermore, a significant partial correlation was observed between a chronic exposure index for F and the serum concentrations of inhibin-B (<math>r = 0.163</math>) in the high F group ... results obtained indicate that a F exposure of 3-27 mg/day induces a subclinical reproductive effect that can be explained by a F-induced toxic effect in both Sertoli cells and gonadotrophs.</p>	

<p>Fluoride 2003 Vol. 36 No. 4 263-266</p> <p><b>FLUORIDE CONTENT IN SOFT TISSUES AND URINE OF RATS EXPOSED TO SODIUM FLUORIDE IN DRINKING WATER</b></p> <p>I Inkielewicz, J Krechniak</p> <p>Department of Toxicology, Medical University of Gdańsk, Poland. □</p>	<p>RAT</p> <p>Eight-week-old male Wistar rats</p> <p>NaF in drinking water of 5 and 25 mg F- /L for 12 weeks</p> <p>Controls received tap water containing 0.3 mg F - /L</p> <p><a href="#">FULL STUDY</a></p>	<p>The fluoride content in liver, kidney, brain, and testis increased in a dose-dependent and a time-dependent manner. In animals receiving the higher dose of NaF the increase after 12 weeks of exposure was about two-fold in serum, seven-fold in liver and kidney, nine-fold in brain, and TWELVE FOLD IN TESTIS.</p>
<p>Reprod Toxicol 2002 Jul;16(4):385</p> <p><b>Testicular toxicity in sodium fluoride treated rats: association with oxidative stress.</b></p> <p>Ghosh D, Das(Sarkar) S, Maiti R, Jana D, Das</p> <p>Department of Human Physiology with Community Health, Reproductive Endocrinology and Family Welfare Research Unit, Vidyasagar University, West Bengal, Midnapore, India</p> <p>Abstract</p>	<p>RAT</p> <p>NaF 20mg/kg/day for 29 days oral gavage</p> <p><a href="#">Abstract</a></p>	<p>exerts an adverse effect on the male reproductive system and this effect is associated with indicators of oxidative stress.</p> <p>significant diminution in the relative wet weight of the testis, prostate, and seminal vesicle</p> <p>Epididymal sperm count was decreased significantly</p>
<p>Chung-Kuo Kung Kung Wei Sheng (China Public Health) 2000 Aug;16(8):697-8</p> <p><b>[The primary study of antagonism of selenium on fluoride-induced reproductive toxicity of male rat]</b></p> <p>Zhu XZ, Ying CJ, Liu SH, Yang KD, Wang QZ.</p> <p>Department of Clinic Nutrition, Tongji Hospital Tongji Medical University, Wuhan, China.</p>	<p>RAT</p> <p>150 mg/L NaF in drinking water</p> <p>Toxline abstract available at <a href="#">Toxnet</a></p>	<p>The protective effect of ascorbic acid at dose level of 1.0 mg/L in drinking water against the fluoride-induced damage on reproductive system of rat was studied. 150 mg/L sodium fluoride (NaF) in drinking water of male rat can cause the significant decrease of sperm count and mobility, the increase of serum and testicular lipid peroxides (LPO) contents, and the adenosine triphosphatase (ATPase) activity depression of epididymis. All of those effects are reversible by adding adequate ascorbic acid in drinking water simultaneously. The effects of ascorbic acid against fluoride-induced damages are similar to those produced by 2.0 mg/L Na<sub>2</sub>SeO<sub>3</sub> in the drinking water of rats. However, no significant recovery of fluoride-induced effects on GSH-Px activities in the tissues of testis and epididymis were observed in ascorbic acid and fluoride group.</p>

<p>Fluoride 2000; 33(3):128-134.</p> <p><b>Fertility effects of sodium fluoride in male mice</b></p> <p>Ahmed Elbetieha, Homa Darmani, Ahmad S Al-Hiyasat.</p> <p>Department of Applied Biological Sciences, Faculty of Science, Jordan University of Science and Technology, Irbid, Jordan</p> <p><a href="#">Full paper</a></p>	<p>MOUSE</p> <p>100, 200 and 300 ppm NaF drinking water for 4 or 10 weeks</p> <p><a href="#">FULL STUDY</a></p>	<p>Fertility was significantly reduced at all three concentrations by exposure for 10 weeks</p> <p>results indicate that long-term ingestion of NaF adversely affects fertility in male mice</p>
<p>Environmental Sciences: an International Journal of Environmental Physiology and Toxicology. 2000; 7(1):29-38</p> <p><b>Reversal of fluoride-induced alteration in cauda epididymal spermatozoa and fertility impairment in male mice.</b></p> <p>Chinoy NJ and Sharma A</p>	<p>MOUSE</p> <p>NaF: 10 mg NaF/kg BW</p>	<p>The reduced activity of the enzymes as well as the structural and metabolic alterations in the sperm led to a significant decrease in sperm count, and motility and live:dead ratios but an increase in abnormal sperm which ultimately lead to a poor fertility rate.</p> <p>It is concluded that fluoride has a definite effect on male reproduction and fertility.</p>
<p>Fluoride 1999; 32(4):204-214</p> <p><b>Effects of protein supplementation and deficiency on fluoride-induced toxicity in reproductive organs of male mice</b></p> <p>NJ Chinoy and Dipti Mehta</p> <p>Reproductive Endocrinology and Toxicology Unit, Department of Zoology, School of Sciences, Gujarat University, Ahmedabad, India</p>	<p>MOUSE</p> <p>Fed a protein-deficient diet treated with NaF 5, 10, 20 mg/kg BW for 30 days</p>	<p>caused a significant decrease in protein levels in testes, cauda epididymis, and vas deferens.</p> <p>levels of cholesterol in testis and glycogen in the vas deferens were significantly enhanced as compared to controls.</p>
<p>Fluoride 1998; 31(4):203-216</p> <p><b>Amelioration of fluoride toxicity by Vitamins E and D in reproductive functions of male mice</b></p> <p>NJ Chinoy and A Sharma</p> <p>Reproductive Endocrinology and Toxicology Unit, UGC Department of Special Assistance and COSIST in Zoology, School of Sciences, Gujarat University, Ahmedabad 380009, India.</p>	<p>MOUSE</p> <p>NaF 10 mg/kg BW</p> <p><a href="#">FULL STUDY</a></p>	<p>significant decrease epididymis weight</p> <p>significant decline in cauda epididymal sperm motility and viability</p> <p>significant reduction in fertility rate. The cauda epididymal sperm count was also significantly reduced</p> <p><a href="#">Full Report</a></p>
<p>Continued...</p>		

<p>Toxicology Letters, Volume 95, Supplement 1, July 1998, Page 214</p> <p><b>NaF may disturb male fertility in rodents</b></p> <p>R. Pinto, C. Vieira, H. Mota-Filipe and B. Silva-Lima</p> <p>Lab. Pharmacology, Fac. Pharmacy, University of Lisbon, Portugal</p>	<p>MOUSE: NaF 10 mg/kg/day for 28 days</p> <p>RAT: NaF 1 mg/kg/day and 10 mg/kg/day for 28 days</p> <p><a href="#">FULL TEXT available at Science Direct.</a></p>	<p>Conclusions: The modification of some parameters related to fertility by the repeated oral NaF intake, in rodents, suggest that NaF has potential to disturb male fertility.</p>
<p>Fluoride 1997; 30(1):41-50</p> <p><b>Fluoride toxicity on rat testis and cauda epididymal tissue components and its reversal</b></p> <p>Chinoy NJ*, Shukla S, Walimbe AS, Bhattacharya S</p> <p>* Professor and Head, Zoology Department, School of Sciences, Gujarat University, Ahmedabad, India. □</p>	<p>RAT</p> <p>10 mg NaF/kg BW for 30 days □</p>	<p>the protein profile was disturbed more in testis than in cauda epididymis, whereas phospholipids and glutathione levels were affected more in cauda than in testis. □</p>
<p>Med Sci Res 1997 25(2):97-100.</p> <p><b>Fluoride toxicity in the testis and cauda epididymis of guinea pig and reversal by ascorbate.</b></p> <p>Chinoy NJ, Patel BC, Patel DK, et al.</p> <p>Zoology Department, School of Sciences, Gujarat University, Ahmedabad, India. □</p>	<p>GUINEA PIG</p> <p>NaF 30 mg kg<sup>-1</sup> body weight 30-days</p>	<p>LOAEL 4.5 (mg/ kg/ day decreased sperm motility and viability) □</p> <p>The cauda epididymal spermatozoa were highly sensitive to the effects of NaF as their structural and metabolic alterations led to marked decreases in their motility, live:dead ratio and sperm mitochondrial activity index but increases in sperm abnormalities and alterations in sperm membrane phospholipids, particularly phosphatidylinositol and phosphatidyl serine. The activities of ATPase and succinate dehydrogenase as well as glutathione levels were decreased in testis by NaF treatment, revealing disturbances in its metabolism. □</p>
<p>Environ Sci 5(2):79-94.1997.</p> <p><b>Ultrastructural studies on the leydig cells of rabbits exposed to chronic fluoride toxicity.</b></p> <p>Susheela AK, Kumar A. □</p>	<p>RABBIT □</p>	<p>LOAEL 4.5 mg/ kg/day</p> <p>Leydig cell damage □</p>
<p>Continued...</p>		

<p>1997 PhD THESIS.</p> <p>The effect of fluoride on the physiology of the pineal gland</p> <p>Jennifer Anne Luke</p> <p>School of Biological Sciences, University of Surrey, Guildford, UK.</p>	<p>GERBIL</p> <p>High fluoride (HF) pups = 2.3 ug F/g BW/day from birth to 24 days whereafter food contained 37 mg F/kg.</p> <p>Low fluoride (LF) pups: from 24 days old food contained 7 mg F/kg. □</p>	<p>At 16 weeks: Mean testes weight of High fluoride group significantly less than Low fluoride group □</p>
<p>J Toxicol Clin Toxicol 1996;34(2):183-9</p> <p><b>Circulating testosterone levels in skeletal fluorosis patients.</b></p> <p>Susheela AK, Jethanandani P.</p> <p>Fluoride and Fluorosis Research Laboratories, All India Institute of Medical Sciences, New Delhi, India. □</p>	<p>Humans</p> <p>Serum testosterone concentrations in patients with skeletal fluorosis.</p> <p><a href="#">Abstract</a> □</p>	<p>Circulating serum testosterone in skeletal fluorosis patients were significantly lower than those of Control 1 at <math>p &lt; 0.01</math>. □</p>
<p>Comp Biochem Physiol C Pharmacol Toxicol Endocrinol 1996 Jan;113(1):81-4</p> <p><b>Photoperiodic elevation of testicular zinc protects seminiferous tubules against fluoride toxicity in the bank vole (<i>Clethrionomys glareolus</i>).</b></p> <p>Krasowska A, Wlostowski T.</p> <p>Institute of Biology, Bialystok Branch of Warsaw University, Poland. □</p>	<p>BANK VOLE</p> <p>1 group on moderate photoperiod of 12 hr light/12 hour dark</p> <p>1 group on long photoperiod 16 hr dark/8 hr light</p> <p>Fluoride group received 200 µg F/ml as NaF drinking water for 4 months.</p> <p>Control group received distilled water</p> <p>The diet contained 20-25 µg Zn/g dry weight and 18-25 µg F/g dry weight, 65% seeds; 22% dried green feed; and 22% meat and bone meal.</p> <p><a href="#">Abstract</a></p> <p><a href="#">FULL TEXT available at Science Direct.</a> □</p>	<p>A long photoperiod of fluoride loading increased significantly (<math>p &lt; 0.05</math>) the weight of testes in the animals.</p> <p>The fluoride exposure decreased significantly (<math>p &lt; 0.05</math>) zinc concentration in the testes of bank voles kept under moderate photoperiod (12 hr light/12 hr dark), but the exposure did not affect the zinc concentration in this organ in the animals exposed to a long photoperiod (16 hr light/8 hr dark).</p> <p>The fluoride exposure brought about a three- and ten fold increase in the testicular and bone fluoride, respectively, in either photoperiod. However, at the long photoperiod the fluoride concentrations in the testes tended to increase (control) or increased significantly (<math>p &lt; 0.05</math>) (fluoride treated group) as compared to the moderate photoperiod groups.</p> <p>Histopathological changes in the seminiferous tubules (<b>vacuolization</b> of germinal epithelium and a decrease in its area appeared in all voles from the moderate photoperiod fluoride-treated group, and no changes were seen in any vole from any other group. □</p>
<p>Continued ...</p>		

<p>Fluoride 1995; 28(2):75-86</p> <p><b>Amelioration of fluoride toxicity in some accessory reproductive glands and spermatozoa of rat</b></p> <p>Chinoy NF, Narayana MV, Dalal V, Rawat M, Patel D</p> <p>Reproductive Endocrinology and Toxicology Unit, School of Sciences, Gujarat University, Ahmedabad 380 009, India</p>	<p>RAT</p> <p>NaF 10 mg/kg BW for 30 and 50 days</p> <p>ATSDR - Page 81 LOAEL 4.5 mg/ kg/ day (decreased sperm motility and count)</p>	<p>A significant reduction in electrolyte levels of sperm also occurred which would also affect their viability. The protein levels in cauda epididymal sperm suspension, vas deferens, seminal vesicle and prostate were significantly decreased after NaF administration</p> <p>The results, corroborated by earlier data from our laboratory, show that fluoride has a definite effect on male reproduction and fertility.</p>
<p>Fluoride 1995; 28(3):128-130</p> <p><b>The influence of fluoride on the content of testosterone and cholesterol in rat</b></p> <p>Zhao ZL, Wu NP, Gao WH</p> <p>Department of Preventive Medicine, Ningxia Medical College, 750004 China</p>	<p>RAT</p> <p>NaF in drinking water 100 mg/L, and 200 mg/L for 2, 4, and 6 weeks.</p>	<p>Results suggest that fluoride may have some harmful effects on the reproductive system in male rats.</p>
<p>Int J Exp Pathol 1995 Feb;76(1):1-11</p> <p><b>Effects of chronic fluoride toxicity on the morphology of ductus epididymis and the maturation of spermatozoa of rabbit.</b></p> <p>Kumar A, Susheela AK.</p> <p>Department of Anatomy, All India Institute of Medical Sciences, New Delhi.</p>	<p>RABBIT</p> <p>10 mg NaF/kg BW/day for 20 and 23 months</p> <p>LOAEL 4.5 M mg/ kg/ day</p>	<p>structural damage of the spermatid and epididymal spermatozoa</p> <p>The structural changes observed in the caput and cauda ductus epididymis might adversely affect the maturation of spermatozoa</p>
<p>Fluoride 1994; 27(1):7-12</p> <p><b>Effect of fluoride on rat testicular steroidogenesis</b></p> <p>MV Narayana and NJ Chinoy</p> <p>Zoology Department, School of Sciences, Gujarat University, Ahmedabad 380 009, Gujarat, India</p>	<p>RAT</p> <p>NaF 10 mg/kg BW for 50 days</p>	<p>The histomorphometric studies revealed significant change in the Leydig cell diameter in correlation with the androgen levels. These results indicate that fluoride does interfere with steroidogenesis in short-term low-dose exposures in rats.</p>
<p>Fluoride 1994; 27(2):67-75</p> <p><b>Beneficial effects of ascorbic acid and calcium on reproductive functions of sodium fluoride-treated prepubertal male rats</b></p> <p>Chinoy NJ, Reddy VVPC, Michael M</p>	<p>RAT (21-24 days old)</p> <p>NaF 10 mg/kg BW for 30 days</p>	<p>changes resulted in a significant decrease in sperm motility and thereby fertility rate.</p>
<p>Continued ...</p>		

<p>International Journal of Fertility 39 (6) 337-346. 1994.</p> <p><b>Reversible effects of sodium fluoride ingestion on spermatozoa of the rat.</b></p> <p>Narayana MV, Chinoy NJ.</p> <p>Reproductive Endocrinology &amp; Toxicology Unit, School of Sciences, Gujarat University, Ahmedabad, India. □</p>	<p>RAT</p> <p>NaF 10 mg/kg BW 50 day</p> <p><a href="#">Abstract</a></p>	<p>sperm acrosomal hyaluronidase and acrosin were reduced</p> <p>low sperm motility and count □</p>
<p>Int J Fertil Menopausal Stud 1994 May-Jun;39(3):164-71</p> <p><b>Ultrastructural studies of spermiogenesis in rabbit exposed to chronic fluoride toxicity.</b></p> <p>Kumar A, Susheela AK</p> <p>Department of Anatomy, All India Institute of Medical Sciences, New Delhi, India. □</p>	<p>RABBIT</p> <p>10 mg NaF/kg BW daily for 18 months</p> <p>LOAEL 4.5 M mg/ kg/day</p> <p><a href="#">Abstract</a> □</p>	<p>structural damage of the spermatid and epididymal spermatozoa</p> <p>The abnormalities observed render the sperm nonfunctional and ineffective, and thus there is a possible role of fluoride in causing infertility □</p>
<p>Reprod Toxicol 1994 Mar-Apr;8(2):155-9.</p> <p><b>In vitro fluoride toxicity in human spermatozoa.</b></p> <p>Chinoy NJ, Narayana MV</p> <p>Department of Zoology, School of Sciences, Gujarat University, Ahmedabad, India. □</p>	<p>HUMAN spermatozoa</p> <p><a href="#">Abstract</a> □</p>	<p>The altered lysosomal enzyme activity and glutathione levels together with morphologic anomalies resulted in a significant decline in sperm motility with an effective dose of 250 mM □</p>
<p>Comp Biochem Physiol C. 1992 Sep;103(1):31-4.</p> <p><b>The effect of high fluoride intake on tissue trace elements and histology of testicular tubules in the rat.</b></p> <p>Krasowska A, Wlostowski T.</p> <p>Institute of Biology, Bialystok Branch of Warsaw University, Poland. □</p>	<p>RAT</p> <p>F 100- and 200 ppm in their drinking water for 6- and 16 weeks.</p> <p><a href="#">Abstract</a></p>	<p>after 16 weeks of exposure, seminiferous tubule atrophy was observed at 7.5 mg fluoride/kg/day and higher □</p>
<p>Fluoride 1992; 25(2):71-76</p> <p><b>Reversible fluoride induced fertility impairment in male mice</b></p> <p>NJ Chinoy and E Sequeira</p> <p>Dept. of Zool., Univ. Sch. of Sciences, Gujarat Univ., Ahmedabad-380 009, India. □</p>	<p>MOUSE</p> <p>NaF 10 mg 20 mg/kg BW for 30 days.</p>	<p>LOAEL: 4.5 mg/ kg/ day</p> <p>decreased sperm motility and count and infertility □</p>

<p>Journal of Environmental Biology 13 (1) 55-61. 1992.</p> <p><b>Effects of fluoride ingestion on the physiology of reproductive organs of male rats</b></p> <p>Chinoy NJ, Pradeep PK, Sequeira E.</p> <p>Dept. of Zool., Univ. Sch. of Sciences, Gujarat Univ., Ahmedabad-380 009, India.</p> <p>□</p>	<p>RAT</p> <p>NaF 5 and 10 mg/kg BW/day) for 30 days</p>	<p>LOAEL: 2.3 mg/ kg/ day</p> <p>decreased fertility and sperm counts□</p>
<p>Fluoride 1992; 25(3):149-154</p> <p><b>Biochemical effects of fluoride on lipid metabolism in the reproductive organs of male rabbits</b></p> <p>A Shashi</p> <p>Department of Zoology, Punjabi University, Patiala, India.□</p>	<p>RABBIT</p> <p>NaF 5, 10, 20, and 50 mg/kg BW/day □</p>	<p>abnormal accumulation of lipids in testes.</p> <p>The increase of concentration of all lipid classes except free fatty acids in testes was directly correlated with the increase in dosage of fluoride administered.□</p>
<p>Indian J Pathol Microbiol. 1992 Oct;35(4):351-6.</p> <p><b>Testicular proteins and DNA in experimental fluorosis.</b></p> <p>Shashi, Kaur D.</p> <p>Department of Zoology, Punjabi University, Patiala, India.□</p>	<p>RABBIT</p> <p>NaF 5, 10, 20 and 50 mg via subcutaneous injections for a period of 3-1/2 months</p> <p><a href="#">Abstract</a>□</p>	<p>The testicular structural, nuclear and total proteins were significantly depleted in all test groups of animals as compared to the control. There was a significant (p &lt; 0.001) reduction in the testicular DNA after drug administration. □</p>
<p>J CHINA MED UNIV; 19 (5). 1991. 339-342.</p> <p><b>Ultrastructural observations of testes and prostate gland in rat with chronic fluorosis.</b></p> <p>Song K et al.</p> <p>Dep. Histoembryol. □</p>	<p>RAT</p> <p>chronic fluorosis was developed with drinking water containing high fluoride in male rat.</p> <p>Toxline abstract at <a href="#">Toxnet</a>□</p>	<p>Significant change did not appear in spermatogonium but appeared in spermatid. Spermiogenesis was blocked. There were impairment in the epithelium and interstitial tissue to some extent</p>
<p>J Reprod Fertil 1991 Jul;92(2):353-60</p> <p><b>A study of the effect of high concentrations of fluoride on the reproductive organs of male rabbits, using light and scanning electron microscopy.</b></p> <p>Susheela AK, Kumar A.</p> <p>Department of Anatomy, All India Institute of Medical Sciences, New Delhi.□</p>	<p>RABBIT</p> <p>10 mg NaF/kg BW for 18 or 29 months.</p> <p><a href="#">Abstract</a></p>	<p>LOAEL 4.5 mg/ kg/day</p> <p>complete cessation of spermatogenesis in animals treated for 29 months -- the spermatogenic cells in the seminiferous tubules were disrupted, degenerated and devoid of spermatozoa.□□</p>
<p>Continued ...</p>		

<p>Fluoride 1991; 24(1):29-39</p> <p><b>Effects of vitamin C and calcium on the reversibility of fluoride-induced alterations in spermatozoa of rabbits</b></p> <p>Chinoy NJ , Sequeira E, Narayana MV</p> <p>Department of Zoology, University School of Sciences, Gujarat University, Ahamadabad, India. □</p>	<p>RABBIT</p> <p>NaF 20 and 40 mg/kg BW for 30 days □</p>	<p>Reduction in sperm motility, count, and changes in their morphology and metabolism led to the significant decline in fertility of the treated animals. □</p>
<p>Reproductive Toxicology 1991;5(6):505-512</p> <p><b>Microdose vasal injection of sodium fluoide in the rat</b></p> <p>Chinoy NJ, Rao MV, Narayana MV, Neelakanta E</p> <p>Department of Zoology, University School of Sciences, Gujarat University, Ahamadabad, India. □</p>	<p>RAT</p> <p>single microdose (50 ug/50 ul) NaF into vasa deferentia of Rattus norvegicus</p> <p><a href="#">Abstract</a> □</p>	<p>arrest of spermatogenesis and absence of spermatozoa in the lumina of the seminiferous tubules of the testes, which consequently led to a decline in the sperm count in the caudae epididymides.</p> <p>Scanning electron microscopy of cauda and vas deferens sperm revealed deflagellation and tail abnormalities. □</p>
<p>Folia Morphol (Praha) 1990;38(1):63-5</p> <p><b>Histopathological changes in rabbit testes during experimental fluorosis.</b></p> <p>Shashi.</p> <p>Department of Zoology, Punjabi University, Patiala, India. □</p>	<p>RABBIT</p> <p>NaF 5, 10, 20 and 50 mg/kg/day for 100 days</p> <p><a href="#">Abstract</a> □</p>	<p>Deficient maturation and differentiation of the spermatocytes and an increase in the amount of interstitial tissue were found in the experimental animals. In the higher dosage groups, spermatogenesis stopped and the seminiferous tubules became necrotic. □</p>
<p>J BIOL SCI RES; 20 (1). 1989. 19-30.</p> <p><b>Effect of high fluoride on the reproductive performance of the male rat.</b></p> <p>Araibi AA, Yousif WH, Al-Dewachi OS. □</p>	<p>RAT</p> <p>100 or 200 ppm NaF (5 or 10 mg fluoride/kg/day) 60 days</p> <p>Toxline abstract at <a href="#">Toxnet</a></p>	<p>LOAEL 4.5 mg/ kg/ day</p> <p>50% reduction in fertility, decrease in percentage of seminiferous tubules containing spermatozoa and decreased testosterone levels</p> <p>Rats exhibited a significant increase in the thickness of the peritubular membrane of the seminiferous tubules. □ □</p>
<p>Reprod Toxicol 1989;3(4):261-7</p> <p><b>Effects of fluoride on the histoarchitecture of reproductive organs of the male mouse.</b></p> <p>Chinoy NJ, Sequeira E. □</p>	<p>MOUSE</p> <p>NaF 10 mg 20 mg/kg BW for 30 days.</p> <p><a href="#">Abstract</a> □</p>	<p>NaF treatment caused severe disorganization and denudation of germinal epithelial cells of seminiferous tubules with absence of sperm in the lumina. epithelial cell nuclear pyknosis and absence of luminal sperm were observed. □</p>
<p>Continued ...</p>		

<p>Fluoride 1989; 22(1):78-85</p> <p><b>Fluoride induced biochemical changes in reproductive organs of male mice</b></p> <p>Chinoy NJ, Sequeira E. □</p>	<p>MOUSE</p> <p>NaF 10 mg 20 mg/kg BW for 30 days. □</p>	<p>testis succinic dehydrogenase levels decreased, in the epididmides sialic acid and ATPase levels decreased; in the vas deferens glycogen levels increased, seminal vesicles fructose levels increased in the prostate glands, acid phosphatase and total protein levels increased. □</p>
<p>Caryologia 1987, 40:1-2; 79-87</p> <p><b>Genotoxic effect of an environmental pollutant, sodium flouride, in mammalian in vivo test system</b></p> <p>Pati PC and Bhunya SP</p> <p>Laboratory of Genetic Toxicology, Department of Zoology, Utkal University, Vani Vihar, Bhubaneswar, India □</p>	<p>MOUSE</p> <p>NaF 10, 20, 40 mg/kg Different assays were used □</p>	<p>Incidence of micronucleus and sperm abnormality increased with dose.</p> <p>... Of all the assay results in the present study, the sperm abnormality was highest ... □</p>
<p>3rd International Congress of Andrology, Boston, Massachusetts. J Androl 6:59 (1985)</p> <p><b>Reproductive toxicology of fluoride</b></p> <p>Chubb C</p> <p>University of Texas Health Science Center, Dallas, Texas 75235. □</p>	<p>RAT</p> <p>5 ppm F □</p>	<p>A lowering in the production of testosterone was thought to be due to Perfluorochemicals exposure. A series of tests using sodium fluoride exposure to rats were performed. "The results provide unequivocal evidence that 250 uM fluoride inhibits testosterone secretion by rat testes perfused in vitro...</p> <p>The present observation of deleterious effects by 250 uM fluoride (5 ppm) emphasizes the sensitivity of steroidogenesis to fluoride." □</p>
<p>Toxicol Lett 1984 May;21(2):167-72</p> <p><b>Alterations in drug metabolising enzymes and lipid peroxidation in different rat tissues by fluoride.</b></p> <p>Soni MG, Kachole MS, Pawar SS.</p> <p>Biochem. Div., Dept. Chem., Marathwada Univ., Aurangabad 431004, India. □</p>	<p>RAT</p> <p>NaF 5.0 mg/kg and 20.0 mg/kg</p> <p><a href="#">Abstract</a> □</p>	<p>NaF at 5.0 mg/kg glutathione-S-transferase activity increased 4-fold in the testis</p> <p>NaF at 20.0 mg/kg decrease in lipid peroxidation in testes □</p>
<p>Continued ...</p>		

<p>IRCS Med. Sci. 11, 813-814 (1983)</p> <p><b>In vitro inhibition of testosterone synthesis in the presence of fluoride ions</b></p> <p>Kanwar KC, Vig PS, Kalla NR</p> <p>Department of Biophysics, Panjab University, Chandigarh, India. □</p>	<p>RAT □</p>	<p>A marked fall (<math>P &lt; 0.01</math>) in the testosterone production was recorded at a fluoride concentration of 100 ppm and testosterone synthesis was maximally inhibited (<math>P &lt; 0.01</math>) at 200 ppm. There was a noticeable, though marginal, inhibition in testosterone synthesis even at 10 ppm fluoride concentration... The fluoride ions which diffuse into the cells inhibit steroidogenesis... □</p>
<p>FLUORIDE; 15 (3). 1982. 110-118</p> <p><b>Cytological effects of sodium fluoride on mice.</b></p> <p>Mohamed AH Chandler ME</p> <p>Dept. of Biology and School of Medicine, University of Missouri, Kansas City □</p>	<p>MOUSE</p> <p>Inbred mice, fed a low-F- diet, 0.263   .028 ppm F-, were given drinking water containing 0, 1, 5, 10, 50, 100 or 200 ppm F- for 3-6 wk □</p>	<p>Cytological studies on bone marrow cell chromosomes and spermatocytes showed that 1-200 ppm F- (as NaF) was able to induce chromosomal changes in a dose-dependent manner. The frequency of the induced chromosomal damage was significantly higher in each treatment than in the controls. The abnormalities included translocations, dicentrics, ring chromosomes, and bridges plus fragments, or fragments by themselves. There was a significant correlation between the amount of F- in the body ash and the frequency of chromosomal abnormalities. □</p>
<p>J TOKYO MED COLL; 39 (3). 1981. 441-460.</p> <p><b>Hygienic study on fluoride: 4. Physiological effects of fluoride on rat.</b></p> <p>Tomomatsu T</p> <p>Dep. Biochem., Tokyo Med. Coll. □</p>	<p>RAT</p> <p>Weanling Male Wistar</p> <p>50 mg%F- in diet for 30 days</p> <p>Control group fed a basal diet containing 0.09 mg% F-</p> <p>Toxline abstract at <a href="#">Toxnet</a> □</p>	<p>The amount of F- accumulated in brain, heart, thymus, kidney, testes, adrenal and femur of the F--fed group was significantly higher than those of controls. □</p>
<p>Fluoride 1980; 13(4):160-162</p> <p><b>Histological Finding of Mice Testes Following Fluoride Ingestion</b></p> <p>Kour K, Singh J.</p> <p>Department of Anatomy, Government Medical College, Srinagar, Kashmir, India □</p>	<p>MOUSE</p> <p>NaF 500 and 1000 ppm in drinking water for 3 months □</p>	<p>lack of maturation and differentiation of spermatocytes</p> <p>spermatogenesis had stopped and seminiferous tubules became necrotic. □</p>
<p>Probl Endokrinol (Mosk) 1977 Jul-Aug;23(4):104-7</p> <p><b>[Effect of inorganic fluorine compounds on the functional state of the pituitary-testis system]</b></p> <p>Tokar' VI, Savchenko ON.</p>	<p>Human males suffering from fluorosis</p> <p><a href="#">Abstract</a> □</p>	<p>Compared to healthy controls, testosterone content proved to be decreased and FSH content elevated in patients with fluorosis □</p>

Fluoride 1972; 5(2):86-88 <b>Calcification of the vas deferens in a patient with endemic fluorosis</b> Case report SPS Teotia and M Teotia	Patient with endemic fluorosis	bilateral calcification of the vas deferens
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