

Tumor necrosis factor- $\alpha$ 가

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The Lack of a Direct Effect of Tumor Necrosis Factor-Alpha on Sperm Motility

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=Abstract=

Male genital tract inflammatory conditions may be associated with unexplained infertility. The presence of cytokine such as tumor necrosis factor-alpha (TNF- $\alpha$ ) was reported in the semen of infertile men. However, the effect of these cytokines on human sperm function is still unclear. The purpose of this study was to investigate the in-vitro effects of TNF- $\alpha$  on human sperm motility with computer assisted sperm analysis. Washed sperm from 16 normal men were incubated without and with TNF- $\alpha$  (0.1, 10, 1000ng/ml). The changes of parameters of sperm motility were recorded at different time intervals (0, 5, 24 hour). There was no significant change of parameters of sperm motility in the incubation with TNF- $\alpha$ . It is suggested that TNF- $\alpha$  alone does not interfere with the sperm motility and more studies are needed.

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Key Words: Tumor necrosis factor-alpha, Sperm motility

cytokine (Anderson et al, 1982;Plente et al,1994). Seminal plasma interleukin- 1, interleukin-2, tumor necrosis factor- alpha(TNF- ), Interferon- cytokine cytokine 가 (Anderson & Hill, 1988;Hussenet et al, 1993) .

TNF- cytokines가 , cytokines . TNF- 가 (Gruschwitz et al, 1996). cytokines가 가 (Balsco, 1984;Dohlberg,1988), 가 (Barrat et al, 1993). TNF- 가 TNF-

1997 1 1997 12

가

16

Ham's F10(Gibco, Grand island, NY)

, 'swim up'

Hamilton-Thorne

(average path velocity; VAP),

(amplitude of lateral head displacement; ALH),

(beat cross frequency; BCF)

5 24

가  $10^6/M\emptyset$

plate 2 well 0.1 ml , human recombinant tumor necrosis factor-alpha (TNF- ) (R & D Systems, Mineapolis, MN), TNF-

TNF- 1000ng/ml, 10ng/ml, 0.1ng/ml

가

TNF-

5% CO<sub>2</sub>

가

24

TNF-

5

24

t test

### 1. VAP

5 VAP ( ± , %)  $72 \pm 10.4$  TNF- 1000ng/ml, TNF-  
10ng/ml, TNF- 0.1ng/ml 5 VAP  $71 \pm 10.0$ ,  $61 \pm 16.8$ ,  $71 \pm 16.1$  , 24  
VAP  $33 \pm 5.4$  TNF- 1000ng/ml, TNF- 10ng/ml, TNF-  
0.1ng/ml 24 VAP  $34 \pm 8.2$ ,  $33 \pm 8.3$ ,  $30 \pm 3.8$  .  
TNF- VAP 가 (Fig. 1).

### 2. ALH

5 ALH ( ± , %)  $98 \pm 17.4$  TNF- 1000ng/ml, TNF-  
10ng/ml, TNF- 0.1ng/ml 5 ALH  $108 \pm 25.4$ ,  $90 \pm 18.5$ ,  $79 \pm 25.9$  ,  
24 ALH  $55 \pm 59.1$  TNF- 1000ng/ml, TNF- 10ng/ml, TNF-  
0.1ng/ml 24 ALH  $57 \pm 95.2$ ,  $67 \pm 51.6$ ,  $70 \pm 114.7$  .  
TNF- ALH 가 (Fig. 2).

### 3. BCF

5 BCF ( ± , %)  $88 \pm 10.3$  TNF- 1000ng/ml, TNF-  
10ng/ml, TNF- 0.1ng/ml 5 BCF  $99 \pm 13.2$ ,  $88 \pm 16.3$ ,  $90 \pm 8.0$  , 24  
BCF  $87 \pm 19.4$  TNF- 1000ng/ml, TNF- 10ng/ml, TNF-  
0.1ng/ml 24 BCF  $97 \pm 29.0$ ,  $82 \pm 25.4$ ,  $83 \pm 25.5$  .  
TNF- BCF 가 (Fig. 3).

(McConnell,1987),

가 in vitro (Taegue et al, 1971).

가 (McConnell,1987;Taegue et al, 1971).

가 ,

가 ,

(Oak et al,1985;Burke,1987,;Soldati et al,1989;Eisenmann et al,1989).

가 가

가 , hydrogen peroxide reactive oxygen, nitrogen intermediates ,

가 가 , cytokine (Anderson et al,1982;Plente et al 1994). seminal plasma IL- 1, IL- 2, TNF, IFN- cytokines

cytokine 가 (Anderson & Hill,1988;Hussenet et al,1993).

가 (Anderson,1990).

가 가 interleukin- 2 interleukin- 8 가 (Shimoya et al,1993;Sikka et al,1995), 가 TNF 가 (Hill et al;1987;Hill et al,1989;Anderson,1990;), TNF , TNF 가 (McConnell,1987;Eisermann et al,1988;Berkowitz et al,1988). Haney (Haney et al, 1992) Fedder Ellermann- Eriksen (Fedder & Ellermann- Eriksen,1995) TNF- , cytokines cytokine

가

(Balsco,1984;Dohlberg,1988).

(average path velocity; VAP), (amplitude of lateral head displacement; ALH)

(beat cross frequency, BCF) 가

(Barratt et al, 1993). Swim up

가

cytokine

TNF-

Haney

(Haney et al, 1992)

Fedder

Ellermann-Eriksen (Fedder & Ellermann-Eriksen, 1995)

TNF- 1000ng/ml,

TNF- 10ng/ml TNF- 0.1ng/ml 가

24

TNF- 1000ng/ml, TNF- 10ng/ml TNF- 0.1ng/ml 가

5

24

가

TNF-

Cytokine

cytokine

cytokine

cytokine

가

cytokine

cytokine

cytokines

가

cytokine

TNF- 가  
, TNF- TNF- 가  
TNF- cytokines 가  
가 .



1. Anderson DJ et al.: Immunity to tumor associated antigens in vasectomized men. *J Natl Cancer Inst* 1992,66,551-554..
2. Anderson DJ, Hill JA: Cell-mediated immunity in infertility. *Am J Reprod Immunol Microbiol* 1988,17,22-25..
3. Anderson DJ: Cell-mediated immunity and inflammatory processes in male infertility, *Arch Immunol Ther Exp* 1990,38,79-83.
4. Balsco L. Clinical tests of sperm fertilizing ability. *Fertil Steril* 1984, 41,177-81.
5. Barratt CLR, Tomlinson MJ, Cooke ID. Prognostic significance of computerized motility analysis for in vivo fertility. *Fertil Steril* 1993, 60, 520-5.
- 6.. Berkowitz RS, Hill JA, Kurts CB, Anderson DJ. Effect of products of activated leukocyte(lymphokines and monokines) on the growth of malignant trophoblast cells in vitro. *Am J Obstet Gynecol* 1988,158,199-203.
7. Burke RK. Effect of peritoneal washings from women with endometriosis on sperm velocity. *J Reprod Med* 1987,32,743-6.
8. Dohlberg B. Sperm motility infertile men and males in infertile units: In vitro test. *Arch Androl* 1988,20,509-13.
9. Eisermann J, Gast MJ, Pineda J, Odemm RR, Colins JL. Tumor necrosis factor in peritoneal fluid of women undergoing laparoscopic surgery. *Fertil Steril* 1988, 50, 573-9.
10. Eisermann J, Register KB, Strickler RC, Collins JL. The effect of tumor necrosis factor on human sperm motility in vitro. *J Androl* 1989,10,270-4.
11. Fedder J, Ellermann-Eriksen S. Effect of cytokines on sperm motility and ionophore-stimulated acrosome reaction. *Arch Androl* 1995,35,173-185.

12. Gruschwitz MS, Brezinschek R, Brezinschek HP. Cytokine levels in the seminal plasma of infertile males. *J Androl* 1996,17,158-63.
13. Haney AF, Hughes SF, Weinberg JB. The lack of effect of tumor necrosis factor-alpha, interleukin-1-alpha, and interferon-gamma on human sperm motility in vitro. *J Androl* 1992, 13, 249-53.
14. Hill JA et al: Effects of soluble products of activated lymphocytes and macrophages(lymphokines and monokines) on human sperm motion parameters. *Fertil Steril* 1987,47,460-463.
16. Hill JA, Cohen J, Anderson DJ: The effects of lymphokines and monokines on human fertilizing ability in the zona-free hamster egg penetration test. *Am J Obstet Gynecol* 1989,160,1154-1158.
17. Hussenet F et al: Tumor necrosis factor alpha and interleukin 2 in normal and infected human seminal fluid. *Hum Reprod* 1993,8,409-412.
18. McConnell JD: The role of infection in male infertility. *Prob Urol* 1987,1,467-470.
19. Oak MK, Chantler EN, VaughaniWilliams CA, Elstein M. Sperm survival studies in peritoneal fluid from infertile women with endometriosis and unexplained infertility. *Clin Reprod Fertil* 1985,3,297-303.
20. Plente M, de Lamirande E, Gagnon C: Reactive oxygen species released by activated neutrophils, but not by deficient spermatozoa, are sufficient to affect sperm motility. *Fertil Steril* 1994,62,387-392.
21. Shimoya K, Taniguchi T, Matsuzaki N, Saji F, Tsutsui T, Tanizawa O. Detection of interleukin-8(IL-8) in seminal plasma and elevated IL-8 in seminal plasma of infertile patients with leukospermia. *Fertil Steril* 1993,59,885-8.
22. Sikka S, Rajasekaran M, Hellstrom W. Oxidative stress and interleukins in seminal plasma during leukocytospermia. *J Urol* 1995,153, 500A.

23. Soldati G, Piffaretti-Yanez A, Campana A, Marchini M, Luerti M, Balerna M. Effect of peritoneal fluid on sperm motility and velocity distribution using objective measurements. *Fertil Steril* 1989;52,113-9.
  
24. Teague NS, Boyarsky S, Glenn GF: Interference of human sperm motility by *Escherichia coli*, *Fertil Steril* 1971.22,281-286.

Fig. 1. The comparison of sperm average path velocity between control and TNF- $\alpha$  administered group during 5 hour and 24 hour incubation period.

Fig. 2. The comparison of sperm amplitude of lateral head displacement between control and TNF- $\alpha$  administered group during 5 hour and 24 hour incubation period.

Fig. 3. The comparison of sperm beat across frequency between control and TNF- $\alpha$  administered group during 5 hour and 24 hour incubation period.





