

Progesterone Acetyl-L-Carnitine

The Effects on Sperm Parameters and Membrane after Treatment with Progesterone and/or Acetyl-L-Carnitine; Cryopreservation-Thawing

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Objective: To assess the effects of progesterone and acetyl-L-carnitine used after treated with Isolate[®] gradient before semen cryopreservation-thawing on sperm parameters and membrane integrity.

Material and Methods: From April 2001 to July 2001, ten normal male partner of couples who were visited in vitro fertilization (IVF) clinics. the semens were treated with Isolate[®] gradient before cryopreservation, spermatozoa was incubated with progesterone (1, 5 and 10 μ M), acetyl-L-carnitine (2.5, 5 and 10 μ M), or both (progesterone, 1 μ M; and acetyl-L-carnitine, 5 μ M) for 30 min.

Results: There were no differences in sperm parameters and vital stain among isolate only treated group, progesterone (1, 5 and 10 μ M), acetyl-L-carnitine (2.5, 5 and 10 μ M) and both (progesterone, 1 μ M; and acetyl-L-carnitine, 5 μ M). But, in high concentration of acetyl-L-carnitine (10 μ M) treated group, sperm parameters and vital stain were decreased. The statistical method was used ANOVA (Kruskal-Wallis test) and p value was <0.01.

Conclusions: Neither progesterone nor acetyl-L-carnitine show to be protective effect on the cryodamage assessed by sperm parameters and vital stain (eosin-Y stain) in normal sperm. High concentration of acetyl-L-carnitine (10 μ M), however, was harmful effect on cryoprevention.

Key Words: Progesterone, Acetyl-L-carnitine, Sperm parameters, Cyropreservation

가

1

가

acetyl-L-carnitine

Sertoli cell Leydieg cell
 , acetyl-L-carnitine
 .^{2,3} Acetyl-carnitine
 가
 , actin spectrin
 .^{1,4}
 Progesterone
 Na²⁺ Ca²⁺
 가 progesterone
 , zona pellucida ,
 .^{1,5,6}
 eosin-Y
 (integrity)
 , 가
 .^{1,7}
 Isolat e[®] gradient progesterone acetyl-

2) Progesterone / acetyl - L - carnitine
 가
 Isolate[®] progesterone
 1 μM, 5 μM, 10 μM 가
 acetyl-L-carnitine 2.5 μM, 5 μM, 10 μM
 가 progesterone
 1 μM acetyl-L-carnitine 5 μM 가 .30
 , curvilinear velocity
 (VCL; the velocity derived from all 20head position),
 straight-line velocity (VSL; the velocity based on the
 first and last head positions only) linearity (LIN;
 VSL/VCL, a measure of the straightness of the trajec-
 tory)
 3)
 TYB (the cryoprotectant)
 , 1:1 , programma-
 ble freezer (cryo-magic) -196
 . 24 37
 40~50 가

1.
 2001 4 2001 6
 10
 1992 WHO
 가
 2.
 1)
 Isolat e[®] gradient 8 - 30
 pipette , 1.5 ml
 pipette ,
 가
 , 30~50 ×10⁶/ml
 8

3.
 SPSS+ version70 package ANOVA: Kru-
 skal-Wallis test , p<0.01
 Isolat e[®] -
 53.8 ±36.4 ×10⁶/
 ml, 33.2 ±16.6% , VCL (μM/s), VSL (μM/
 s), LIN (μM/s) 28.9 ±6.0, 12.9 ±4.8, 43.0 ±8.7
 38.2 ±12.9%
 (Table 1).
 Progesterone 가 (1 μM, 5 μM,
 10 μM) , VCL,
 VSL, LIN
 , 38.1, 41.9, 38.2%
 (Table 1, Figure 1, 2).
 Acetyl-L-carnitine 2.5 μM 가

Table 1. The Results of Sperm parameters and vital stain

	Conc ($\times 10^6$ /ml)	Motility (%)	VCL (μ m/s)	VSL (μ m/s)	LIN	Vital stain (%)
Postthaw (control)	53.8 \pm 36.4	33.2 \pm 16.6	28.9 \pm 6.0	12.9 \pm 4.8	43.0 \pm 8.7	38.2 \pm 12.9
P ₄ -1 μ M	56.1 \pm 40.2	36.9 \pm 13.8	33.6 \pm 11.9	17.4 \pm 10.2	48.4 \pm 12.2	38.1 \pm 13.0
P ₄ -5 μ M	54.0 \pm 39.0	33.5 \pm 18.1	29.4 \pm 9.8	13.3 \pm 7.0	42.7 \pm 11.2	41.9 \pm 16.2
P ₄ -10 μ M	57.7 \pm 35.5	34.5 \pm 17.1	30.4 \pm 9.9	13.8 \pm 7.7	41.9 \pm 13.2	38.2 \pm 14.7
Comb (P ₄ -1+A ₅)	50.8 \pm 39.2	37.3 \pm 16.1	30.5 \pm 7.0	14.8 \pm 6.4	46.4 \pm 10.5	38.4 \pm 13.6
acetyl-L-carnitine						
2.5 μ M	58.5 \pm 36.4	39.3 \pm 15.7	31.8 \pm 8.9	15.8 \pm 6.8	47.5 \pm 11.4	43.5 \pm 15.4
5 μ M	52.5 \pm 40.2	32.8 \pm 16.5	27.0 \pm 7.9	12.5 \pm 6.9	43.6 \pm 10.6	35.5 \pm 14.9
10 μ M	69.0 \pm 27.2	7.9 \pm 3.9*	13.7 \pm 3.2*	2.1 \pm 1.5*	14.9 \pm 7.9*	5.1 \pm 9.4*
Comb (P ₄ -1+A ₅)	50.8 \pm 39.2	37.3 \pm 16.1	30.5 \pm 7.0	14.8 \pm 6.4	46.4 \pm 10.5	38.4 \pm 13.6

*p<0.01 (ANOVA: Kruskal-Wallis test)

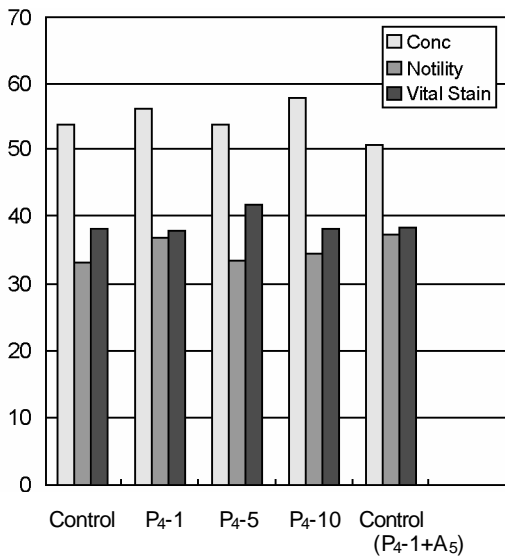


Figure 1. Comparison of concentration, motility and vital stain (control vs progesterone treated groups)

*conc. ($\times 10^6$ /ml), motility (%), vital stain (%)

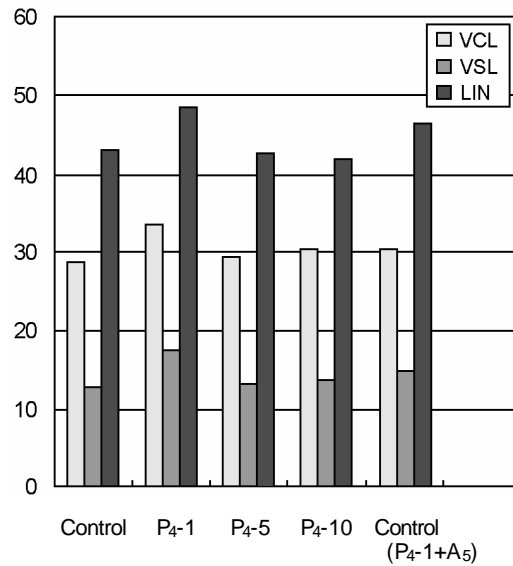


Figure 2. Comparison of VCL, VSL and LIN (control vs progesterone treated groups)

*VCL (μ m/s), VSL (μ m/s), LIN (μ m/s)

43.5% 가 ,
 . 5 μ M 가

(Table 1, Figure 3, 4).

Acetyl-L-carnitine 10 μ M

33.2 \pm 16.6% 7.9 \pm 3.9%

, VCL, VSL, LIN 1.37 \pm 3.2, 2.1 \pm 1.5,
 14.9 \pm 7.9

5.1 \pm 9.4% (Table 1,

Figure 3).

Progesterone acetyl-L-carnitine

progesterone 1 μ M acetyl-L-

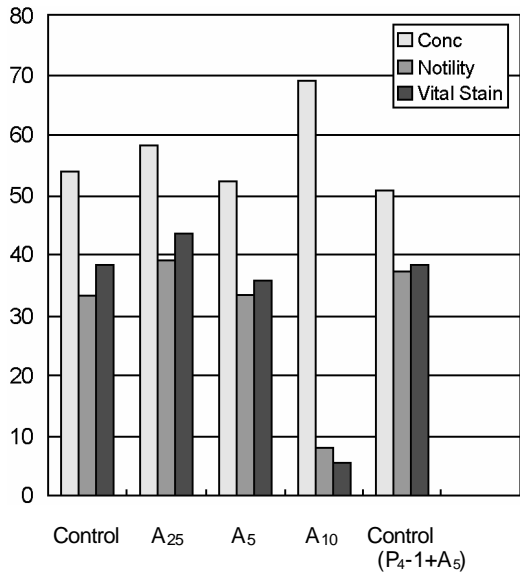


Figure 3. Comparison of concentration, motility and vital stain (control vs acetyl-L-carnitine treated groups)

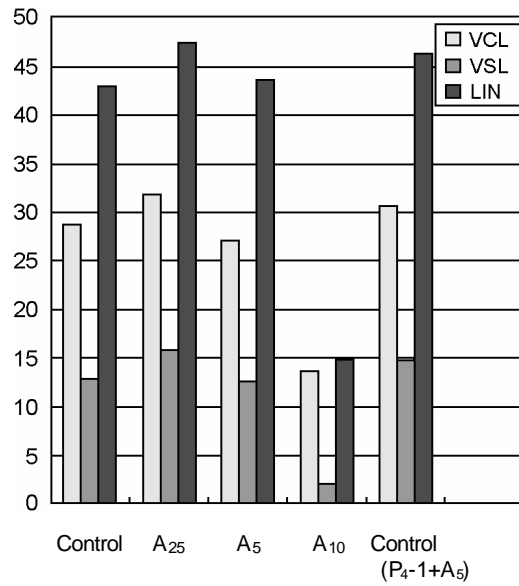


Figure 4. Comparison of VCL, VSL and LIN (control vs acetyl-L-carnitine treated groups)
*VCL ($\mu\text{M/s}$), VSL ($\mu\text{M/s}$), LIN ($\mu\text{M/s}$)

carnitine 5 μM 가

(Table 1, Figure 1, 2, 3).

(Artificial Insemination by Donor semen;
AID)
(Asthenozoospermia)
(rapid and progressive motility) 50%
가 (Oligozoospermia)
(Artificial Insemination by Husband semen; AIH)

가
9
10 (motility) (viability)
5-13
7,12
가 15
가
TEST-
yolk, Glycerol
programmed freezer
TEST-yolk가
15
TYB
Isolate[®] gradient
swim-up

7 Grizard 가

swim-up (oligoasthenospermia) 가
 Isolate[®] gradient acetyl-L-carnitine lactate
 progesterone Ca²⁺ 가 dehydrogenase NADPH-cytochrome P450 reductase
 spermatozoa Ca²⁺ 가 ,²² Grizard (1973)
 progesterone acetyl-L-carnitine 210 ±
 (2001) 29 nmol/10⁸ cells .⁹ Duru
 progesterone acetyl-L-carnitine
 itine ,
 terone (myelinization) (signaling molecule) subfertile
 (phospholipid) progesterone acetyl-L-carnitine 가
 .^{1,18,19}
 acetyl-L-carnitine acetyl-L-carnitine
 carnitine acetyl-L-carnitine 가
 가 ,
 L-carnitine ,
 progesterone 가 Acetyl-L-carnitine
 ,^{3,9}
 가 ,^{20,21}
 viability 가 .¹
 L-carnitine 가 progesterone acetyl-L-carnitine
 Isolate[®] gradient 가
 . Duru (2001) (oligoasthenotera-
 tozoospermia) 가 progesterone
 acetyl-L-carnitine cryo-
 survival (20 mM)
 acetyl-L-carnitine .
 Isolate[®] gradient ,
 (10 μM) acetyl-L-carnitine
 . Duru (2001) 가

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