



# 가

가 40 Wistar rats 0.3%  
가 (15%)  
(Gala )  
13% / /  
E 1/3 가  
21 ( 2%)  
(TGRLP) HDL 가  
가 HDL 가  
FRAP가 MDA

1. 가 가  
가 가 ( , )  
( )  
가 가 (Rimm, Ascherio,  
Giovannucci, Spiegelman, Stampfer. & Willett,  
1966). (2 3%) 가 ( )  
50% 가  
1 1/5

(caechins, anth-  
ocyanidins, dihydrochalcones, etc.)  
(Van der Sluis, Dekker, & Jongen, 1977 ; Wang.  
Cao, & Prior, 1996).

(Girault, Bled. Bou-  
vier, Cornet,& Girault, 1988 ; Ogston, Lea  
Langhorne. & Wilson, 1985 ; Pearson, Tan,  
German, Davis,& Gerschwin, 1999) 가

( Winstar rat)  
150g 1 cage(  
) 2  
, 21  
( , 1).  
22 20:00  
08:00 12  
16:00 08:00  
0, 7, 14, 21  
4  
(Am 8:00) sodium pento-  
barbitol (40mg/kg) , 37  
가  
(10,000g)  
4  
-80  
-20 3g

2.

2.1.

ICN( , )  
Bio-  
trol( , ) BioMerieux(Charbonniere-  
lesBains, )  
(Gala )

10g -80  
. 24  
72 가

2.2.

INRA(No. 87 848)

1. Composition of diets

	Control diet (%)	Apple diet (%)
Casein	15	16
Corn oil	5	5
Mincrals	5	5
Vitamins <sup>a</sup>	1	1
Cholesterol	0.3	0.3
Fructose	7.6	0
Saccharose	3.3	0
Glucose	2.3	0
Lyophilized apple	0	15
Wheat starch	59.5	57.7

-80 25ul 8  
 FeSO<sub>4</sub>  
 triobarbituric acid Lee,  
 Shoeman Saari Csallary(1992)

2.3. Demigne(1974) GC Remesy (200ul) 1.2ml 5%TCA 400ul 0.06M  
 TBA 가 80 water bath  
 20 ethanolic- 90 가  
 KOH(0.5mol/L) 가 , 3 (1360g, 15 ) ( ,  
 -hydroxysteroid dehydrogenase(EC 1.1.1.50, 1:2 MDA:TBA 가 )  
 Sigma) 532, 556 508nm  
 ethanolic- KOH 100ul MDA(malondialdehyde)  
 1ml hexan 가 3 10nM tetraetho-  
 5 -cholestane xypropane  
 가 가 TBARS urinary creatinine nmol  
 hexan (2ul) MDA  
 silica BP10 12m x0.25mm( )  
 (SEG, Vlleneue- St- Georges) Flame-  
 ionisation detection GC  
 가  
 260  
 가 (Biotrol 33-plus)  
 ( )  
 (swing-bucket) TST4141(kon-  
 tron, Zurich, Switzerl and) ( 2). 가  
 (500ul fraction) (30% , 1)  
 가 가 (96 123nM).  
 2 (FRAP) 가 butyrate 가 2  
 2 1 가  
 BenZie Strain(1996) 가 0.3% 가  
 . FRAP pH3.6 300mM (2.48mM)  
 acetate buffer 10mM 2.4.6-tripyridyl-S- ( 3). 가  
 triazine(Sigma, StLouis, Mo) (-9.3%)  
 40mM HCl, 20mM FeCl<sub>3</sub>-6H<sub>2</sub>O ( 3).  
 593nm

가  
 d<1.040 kg/ < Fraction(TGRLP)  
 23% d>1.040 kg/ Fraction( HDL) 58%  
 가  
 HDL-C:TGRLP-C 가 (0.41) 2  
 (0.81)  
 가  
 ( 3). 가  
 ( , 42%) 가  
 (16%, 4)

2. Food intake and weight gain<sup>a</sup>

	Control diet (%)	Apple diet (%)	
Good intake (g/ day)	23.4±2.3	23.9±2.8	N.S
Body weight gain(g/ day)	6.9±1.3	6.7±1.8	N.S
Food conversion efficiency	0.296±0.04	0.282±0.02	

a values are means ± S.D., n=12

3. Plasma and liver lipids in rats adapted to the experimental 0.3% cholesterol diets with (Apple)or without (Control)15% lyophilized apple<sup>a</sup>

	Control diet	Apple diet	
<i>Plasma (mmol/ l)</i>			
Cholesterol	2.48±0.3	2.24±0.25	p<0.05
Triglycerde	1.52±0.67	1.47±0.16	N.S.
<i>Liver (mg/ g)</i>			
Cholesterol	11.2±3.4	10.2±3.9	N.S.
Triglyceride	17.1±5.8	20.6±3.8	N.S.

MDA  
 FRAP  
 MDA  
 FRAP  
 가 (-26%),  
 가

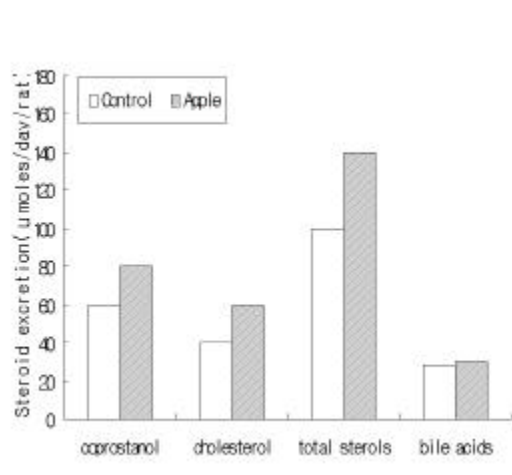


Fig. 3. Faecal excretion of neutral sterols and bile acids in rats adapted to the experimental 0.3% cholesterol diets with or without 15% lyophilized apple. Values are means ± S.D., n=12. \* Significantly different from controls.

4. Total steroid excretion and cholesterol apparent absorption in rats adapted to the experimental 0.3% cholesterol diets with (Apple)or without (Control) 15% lyophilized apple<sup>a</sup>

	Control diet	Apple diet	
Cholesterol intake (umol/ day)	188 ± 17	186 ± 16	N.S
Total steroid excretion (umol/ day)	109 ± 21	156 ± 24	P<0.05
Cholesterol apparent absorption (umol/ day;% of intake)	79 ± 21.42%	30 ± 18.16%	P<0.03

4.

Namara(1994)

가

가

(Citrus vs, Opuntia)

cholesteryl ester transfer protein

(HDL ),

(Tepstra, Lapre, De Vries, & Beynen,

1998). ( )

가 , (Rivas et al, 1998)

가 가 ,

가

가

. Trautwein, Rieckhoff, Kunath-Rau

( 75%, Erbersdobler(1998)

, , )

11 12%

: ( )

*Psyllium*

0.22 (0.3)

, 가 (

(>1)

)

가 (Nassir,

Mazur, Felgines, & Raysiguier, 1993).

가 2%

, 가

가 ,

5 10%

-(C-

40%가 ( )

OO- Ca)\* 가

50%가

(Englyst, Bingham, Runswick, Collinston. & Cummings, 1988).

(Cara et al., 1993).

(Moundras, Behr, Remesy, &

, 가

Demingne, 1977). (1 2%)

가

( LDL ) -5% -10%

( 0.7 0.8%)

, (Levrat-Verny, Behr, Mustad, Remesy, & Demingne, 2000).

가

(Brown, Rosner, Willett, &

Sache, 1999). Fernandez, Lin, Trejo Mc-

가

가 . (C) MDA . MDA가

HDL-C TGRLP-C HDL-C:TGRLP-C 가 TBA MDA

가 apo MDA TBA (VLDL/LDL)

1 3 , MDA

(Gir- ault ) (FRAP, ORAC) FRAP

et al., 1988).

propionate가

가 high- (Prooxidant effect)

propionate (Young et al., 1999).

(hydroxymethyl glutaryl-CoA MDA MDA-modified HDL

redutase) 가 가 (Guertin, Brunet, Gavino, Tuchweber, & Levy, 1994).

가 ( 가 :18.8 C (12mg/ 100g)

± 1.3p/ mol/ mg/ min, 가 :19.4 ± 2.9pmol / mg/ min). 가 C

. Cerda (1994) C 가 , 가 C

가 Leontowicz E ( 0.5mg/ 100g)

(2000) ( 6.3mg, 1.3mg) E

( MDA / FRAP ) 가 catechins, quercetin dihydrochalcones (Van der

Sluis et al., 1977). Wang illy, West, Tucker, & Wiseman., 1996)  
(1996) ,  
ORAC(Oxygen radical absor- bance capacity)  
가 가 5.  
LDL  
(Person et al., 1999). 가 가 1. ( 15%)  
가 , ORAC 熱性 가 抗-不透  
(TGRLP-C HDL-C 가  
)  
. Procyanidins 2.  
(Hangerman 가  
et al., 1998)  
Catechin, epicatechin, chl- orlgeic acid, quercetin 3. MDA  
FRAP 가  
(Kondo, Kurihara, Miyata, SuZuki, &  
Toyoda, 1999 ; Van der Sluis et al., 1197).  
Phloretin < : Food chemistry, 75(4), 445, 2001>

