

pH

pH

2001 12



	
	
	.....	1
1	.....	3
2	.....	6
2.1.	.....	6
2.2.	.....	6
2.3.	.....	8
3	.....	9
3.1. pH	.....	9
3.2. pH가	.....	9
4	.....	13
5	.....	16
	.....	17
	.....	20

1. <i>C. albicans</i>	.....	10
2. pH	.....	11
3. pH	.....	12

1.	.....	10
2.	.....	11

pH

가

pH

Icodextrin

pH

가

, 1.5%

, 1.1

%

, Icodextrin

pH

7.4

C. albicans

1. pH가

가

2. Icodextrin

pH 6.5

3. pH 7.4

pH

가 .

4. Icodextrin pH 7.4
가 .

pH ,
pH

Icodextrin . Icodextrin pH

Icodextrin 가

: , , , Icodextrin, pH, ,

pH

< >

•

. 1989 U.S. National CAPD Registry

1.4

1970

3.5- 15%

, , 가 가

50-90% , 2-84% , 0-27%

¹.

1983

Verbrugh ²

IgG,

Szabo ³

가

C. albicans

GDPs(glucose degraation endproducts)

가 , , , 가
가 , , , , GDPs
pH, , ,
, leukotriene , cytokine ,

4.

pH

1.1%

가 , pH가
가 5. 1990 Icodextrin
Icodextrin

LDL

. Fijter 6 3.86%

Icodextrin

가 *S. epidermis, E. coli*

Posthuma 7 Icodextrin

가

GDPs

pH

pH 6.5

, 가

8 .

pH 7.4

pCO₂가

가

Schambye ⁹ 23 mM

Topley ¹⁰ pCO₂

pH가

pH 7.4

pH

•

1.

가. : 250-300g (Sprague-Dawley rat)
10% (Gibco BRL, Grand Island, NY, U.S.A.)
(Amphotericin, Gentamycin) 가
RPMI1640(Gibco BRL, Grand Island, NY, U.S.A.) 5% CO₂
37 incubator 24 .

. : (N/S) 1.5% (Dianeal, Baxter Healthcare Corporation, Deerfield, IL, U.S.A), 1.1%
(Nutrional, Baxter Healthcare Corporation, Deerfield, IL, U.S.A), Icodextrin
(Extraneal, Baxter Healthcare Corporation, Deerfield, IL, U.S.A)
(NaHCO₃) pH 7.4 . pH
± 10 mOsm/kg (1).

. : *C. albicans*(ATCC 10231) YETD(1% yeast extract-2% polypeptone-2% dextrose; BBL, U.S.A.) 24 4
2000 rpm 15 PBS (phosphate buffered saline; SIGMA, USA) 3 . *C. albicans* 10%
RPMI1640 1 × 10⁵ cell/ml가 .

2.

가. : Thioglycollate medium 2.98 g 100

ml 0.1 ml/kg 3
 .
 . : 4 PBS 100ml
 18G needle
 37 10% (amphotericin,
 Gentamycin)가 RPMI1640 20 ml Trypan blue
 24 well flat plate well 2×10^5
 37 , 5% CO₂ incubator 24 .
 . : plate
 RPMI- 1640 2 well
 10% 가 RPMI1640 1 ml, 0.5 ml, yeast C.
albicans 2×10^4 37 5% CO₂ incubator 2
 . free RPMI 1 *C. albicans*
 2.5% glutaldehyde $40\mu\ell$. 400
 1 *C. albicans*
 가 (phagocytic activity) %
 (1).

$$\text{phagocytic activity} = \frac{\text{---}}{400} \times 100$$

. 1 4
 3 .

3.

± (mean ± SD)
Wilcoxon Signed Rank test Kruskal Wallis test P 0.05
가 .

•

1. pH

pH

C. albicans

, ,
Icodextrin , Icodextrin
가 (2,
2).

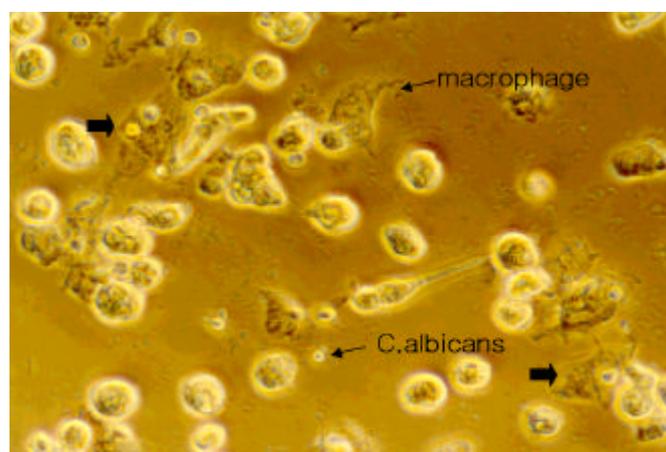
2. pH가

pH 7.4

Icodextrin 가
pH
(2, 3).

1.

				Icodextrin
osmotic agent	sodium	13.6 mg/ml	1.1%	Icodextrin 75 mg/ml
sodium (mmol/L)	153	132	132	133
calcium (mmol/L)	0	1.25- 1.75	1.25	1.25
magnesium (mmol/L)	0	0.25- 0.75	0.25	0.25
chloride(mmol/L)	153	102	105	105
lactate(mmol/L)	0	35- 40	40	40
pH	4.5	5.0- 5.2	6.2- 6.7	5.2- 5.6
osmolality (mOsm/kg)	308	346	365	284



1. *C. albicans* (➡) (×400).

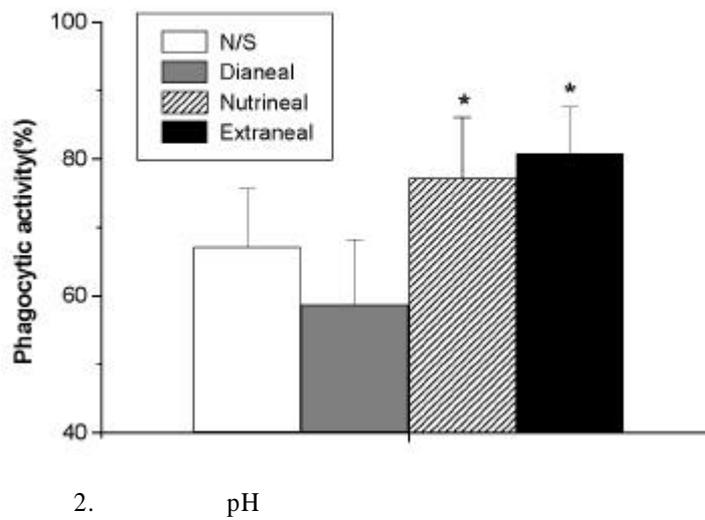
2.

(mean value \pm S.D. %)

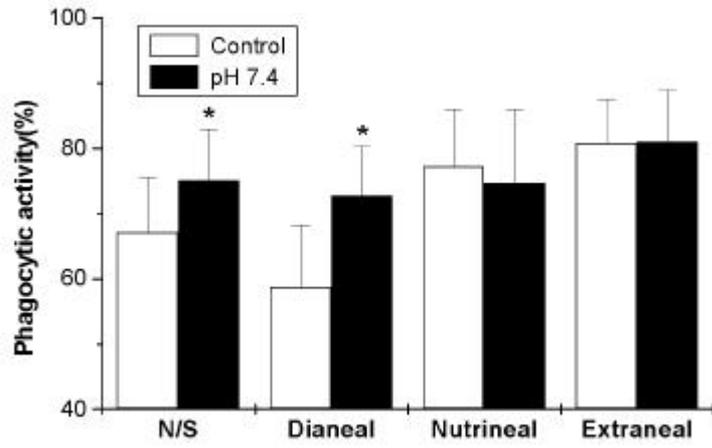
	Icodextrin			
pH	67.08 \pm 8.53	58.66 \pm 9.61	77.17 \pm 8.86*	80.75 \pm 6.84*
pH 7.4	75.08 \pm 7.87#	72.75 \pm 7.58#	74.67 \pm 11.32	81.00 \pm 7.95

* : P<0.05 versus other peritoneal dialysis fluid by Kruskal Wallis test

: P<0.05 versus pre-collection control by Wilcoxon Signed Rank test



* : P<0.05 versus other peritoneal dialysis fluid by Kruskal Wallis test



3. pH

* : P < 0.05 versus pre-collection control by Wilcoxon Signed Rank test

1923 Gantner¹¹

pH,

GDPs가

가

protein kinase C가

가

가

¹². Gotloib ¹³

가

가

. Duwe ¹⁴

. van Bronswijk ¹⁵ 180

30

. Liberek ¹⁶

pH

가

가

가

pH

가

Icodextrin

, pH 6.2

pH

Icodextrin

Fijter ⁶

3.86% Icodextrin S.
epidermis, E. coli
Icodextrin .
Icodextrin Icodextrin
Icodextrin 가
. Fijter ⁶ Icodextrin 가
Icodextrin
Icodextrin Icodextrin
가 .
. Garosi ¹⁷ 60
, Brulez ⁵ 1.1%
2.27%
pH .
pH
Douvdevani ¹⁸ pH 6.5 pH
가 가
pH DNA
pH가
. Duwe ¹⁴ 30 , 1 30
pH가
. Fracasso ¹⁹
pH가
Mackenzie ²⁰ pH pH 7.4
TNF

pH 7.4
가 Icodextrin
pH 가
pH가
Icodextrin 가
pH
Icodextrin 가
pH
Icodextrin 가
pH
Icodextrin 가
pH
Icodextrin 가
pH 6.5
pH
가
Icodextrin
Icodextrin 가
가

•

pH *C. albicans*

1. Icodextrin pH 6.5

2. pH 7.4 pH

가

Icodextrin

pH

가

pH

pH

Icodextrin

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ABSTRACT

Effects of pH and osmolality of peritoneal dialysis solutions on peritoneal macrophage phagocytic activity in rat

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Background : Continuous ambulatory peritoneal dialysis(CAPD) is accepted as one of a standard renal replacement therapy for the management of chronic renal failure patients. But the peritonitis is major problem of CAPD. In CAPD patients, peritoneal macrophages are most predominant cell type in peritoneal fluid and it play role in host defense against invading microorganism. Non-physiologic composition of peritoneal dialysis solution such as low pH and high osmolality is known as a leading cause local peritoneal defense impairment. Recently more physiologic pH amino-acid dialysis solution and iso-osmolar Icodextrin dialysis solution are clinically introduced. Improvement of macrophage activity under the physiologic dialysis solutions were reported. Our study is designed for evaluation of the effect of pH and osmolality on the peritoneal macrophage(PM) phagocytic activity in various peritoneal dialysis solutions.

Method : Peritoneal macrophages were isolated from Sprague-Dawley rat peritoneum. Four dialysis solutions which contain none(normal saline) or 1.5% glucose or 1.1% amino-acid or Icodextrin are used as a original pH and corrected pH 7.4 status respectively. Phagocytic activity of PM is measured by ratio of *C. albicans*(ATCC 10231) uptake macrophage under high power microscope field.

Result : PM phagocytosis activity in Icodextrin dialysis solution or amino-acid dialysis solution is better than those in glucose dialysis solution($p < 0.05$). There is significant increment of phagocytic activity after pH 7.4 correction in glucose dialysis solution. But these effect is not found in amino acid and Icodextrin contained dialysis solution.

Conclusion : Our data suggest that phagocytic activity of PM was increased in iso-osmolar Icodextrin dialysis solution and pH 7.4 glucose dialysis solution. But pH in amino acid dialysis solution and Icodextrin dialysis solution did not independently affect phagocytic activity of rat PM. Further study should be planned for the confirmation of direct effect of pH and osmolality on PM phagocytosis.

Key words : Peritoneal macrophage, Phagocytosis, Biocompatibility, Icodextrin, pH, Osmolality, dialysis solution