



**Effect of bicarbonate/lactate-buffered peritoneal dialysis (PD) solution on serum ferritin levels in Japanese PD patients**

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Slide Forum VIII  
Mon. 13 March 2017  
10:45 am – 12:15 pm

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**Background and Purpose of Study**

- Biocompatibility of PD solution is a causative factor of peritoneal deterioration and consequent PD withdrawal in patients receiving long-term PD.
- Bicarbonate/lactate-buffered PD solution was developed as a new more biocompatible solution.
- We collected and analyzed the clinical indexes of the patients receiving PD with the new bicarbonate/lactate-buffered PD solution switched from the conventional lactate-buffered PD solution. We compared the indexes before and after the switch. We also compared the indexes of the switched patients to those of the patients with the conventional PD solution throughout the switching term.

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**Background and Purpose of Study**

- The conventional PD solution (Dianeal-N®)
- The new PD solution (Reguneal®)

	pH	Glucose [w/v %]	Na <sup>+</sup> [mEq/l]	Ca <sup>2+</sup> [mEq/l]	Mg <sup>2+</sup> [mEq/l]	Cl <sup>-</sup> [mEq/l]	HCO <sub>3</sub> <sup>-</sup> [mEq/l]	lactate [mEq/l]
Dianeal-N® PD-2 1.5/2.5	6.5-7.5	1.36/2.27	132	3.5	0.5	96	-	40
Reguneal® LCa 1.5/2.5	6.8-7.8	1.36/2.27	132	3.5	0.5	101	25	10

- Keio University Hospital (Tokyo, Japan)  
55 patients receiving PD (including 15 patients with APD)  
The incidence of PD peritonitis: one episode per 132 patient-months  
We have started to switch to the new solution in January 2016.

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### Study Design

- A single-center retrospective observational study.
- Among the 55 patients, the 15 APD patients were excluded.
- The other 21 patients were excluded due to... complications or comorbidity. receiving iron administration.
- We collected data of blood sampling, examined in December 2015 (before switching) and in March 2016 (after switching), of the **15** patients switched from the conventional solution to the new solution and **4** patients prescribed the conventional solution throughout the term. We analyzed the results with paired t-test and two sample t-test.

	Patients with the new solution	Patients with the conventional solution
Age	65.6 ± 2.3	63.6 ± 3.9
Sex (Male/Female)	11 / 4	3 / 1
Diabetic Nephropathy	5 of 15 cases	1 of 4 cases

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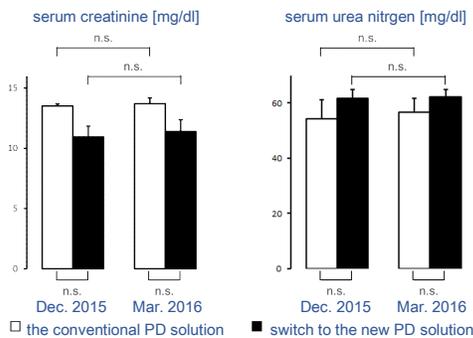
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### Results




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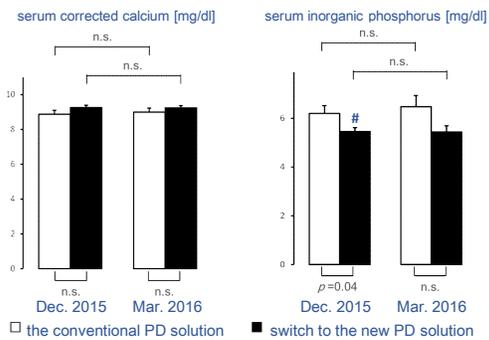
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### Results




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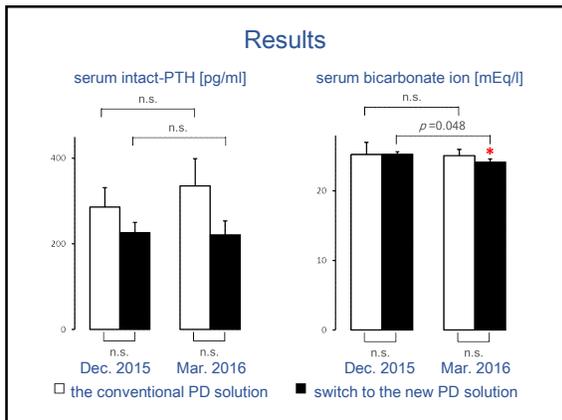
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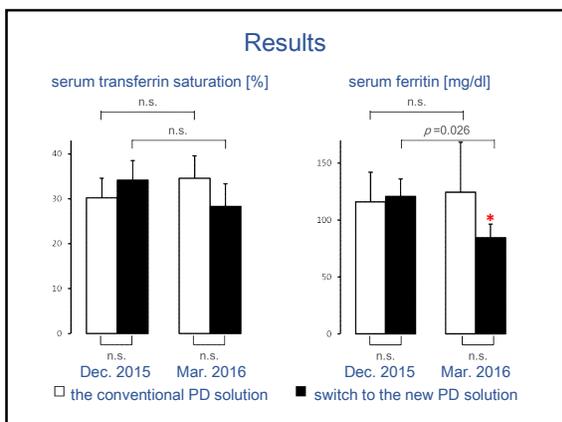
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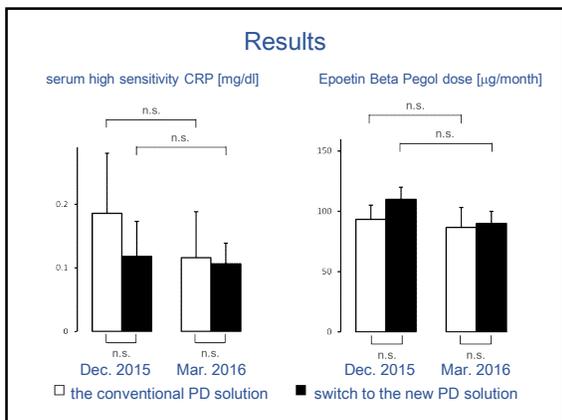
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### Discussion

- In this study, the new bicarbonate/lactate-buffered PD solution reduced **serum bicarbonate ion levels** and **serum ferritin levels**.
- Serum bicarbonate ion levels were decreased by the smaller amount of alkali ions contained in the new solution.
- Serum ferritin levels were decreased by ???

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### Ferritin and Serum Ferritin



- Ferritin: Ferritin consists of two types of subunits (subunit H and subunit L), and total of 24 subunits form 440 kDa ferritin molecule.
  - Subunit H: Ferroxidation (detoxification)
  - Subunit L: Storage of the detoxified iron molecules  
(Biochim Biophys Acta 2009 1790 589, Biochim Biophys Acta 2010 1800 783)
- Serum ferritin: Serum ferritin is the subunit L and its glycosylated form (subunit G). Serum ferritin is secreted by unknown organ or tissue. The amount of serum ferritin is very small part of total body ferritin.  
(Biochim Biophys Acta 1981 199 565)

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### Serum Ferritin and Inflammation

- Serum ferritin level reflects...
  - 1) status of iron storage
  - 2) status of **inflammation**, infection, malignancy, oxidative stress, etc.  
(Clin J Am Soc Nephrol 2006 1 54, Biochim Biophys Acta 2009 1790 589)
- It has been reported that increased serum ferritin level is...
  - > related to increased mortality, frequency and duration of admission in patients receiving hemodialysis (HD).  
(Nephrol Dial Transplant 2002 17 25)
  - > related to increased serum level of advanced oxidation protein products (AOPP) causing arteriosclerosis in patients receiving HD.  
(Circulation 2002 106 2212)
  - > NOT related to mortality in patients receiving PD. Wide variety of clinical features, including residual renal function and dialysis prescription, may make the relationship between serum ferritin level and mortality unclear.  
(PLoS One 2015 10 e0143430)

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### Discussion

- Serum ferritin level would reflect chronic inflammation caused by MIA syndrome and MIC syndrome in patients with end-stage renal disease (ESRD).

(Nephrol Dial Transplant 2002 17 25)

- In our study, the improved biocompatibility of the new bicarbonate/lactate-buffered PD solution may ameliorate the status of chronic inflammation resulting in the decrease of serum ferritin levels in our PD patients.

\*Although hsCRP is a well-established marker of inflammation, serum hsCRP level was unchanged in our study. A recent report showed that there was poor correlation between serum ferritin levels and serum CRP levels in patients with HD, suggesting that serum ferritin levels and serum CRP (including hsCRP) levels may reflect different aspect of inflammation in ESRD patients.

(Int J Nephrol 2017 5490963)

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### Conclusions

- The new bicarbonate/lactate-buffered PD solution reduced serum bicarbonate ion levels and serum ferritin levels in our study.

- The decrease of serum ferritin levels suggests that the improved biocompatibility of the new PD solution may ameliorate chronic inflammation in the patients.

- This study is limited; data collection with larger number of patients and with wider variety of indexes (ex. inflammatory cytokines), and basic research about serum ferritin are desired.

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