

## Bioartificial kidney 장착을 위한 지속유량복막투석 동물 모델

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### Animal Model of Continuous Flow Peritoneal Dialysis for Bioartificial Kidney

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The bioartificial renal epithelial cell system (BRECS) has been proven to provide metabolic and immunologic benefits and improve survival in renal failure patients in clinical phase II studies. An extracorporeal circuit system is the first step towards a fully implantable BRECS. Continuous flow peritoneal dialysis (CFPD) has the advantage as a possible wearable dialysis system in terms of requiring no extracorporeal blood circulation. A large animal model of CFPD-based extracorporeal circuit implanted with BRECS was developed for both uremic control and supplying oxygen and vital nutriment to the BRECS.

**Methods** : 24-hour CFPD using two in- and out-flow PD catheters was tested in non-uremic (n=5) and uremic sheep (n=7) (female, 40kg). CFPD was started one week after PD catheter placement with intraperitoneal dwelling volume (Vip) of 2L commercial PD solution. Dialysate was continuously infused at the rates of 400–450 ml/hour (DFRi) and spent dialysate was drained at the rate 450~470 ml/hour (DFRo) setting net ultrafiltration balance at 20–50 ml/hour (480–1,200 ml/day). Once CFPD was maintained for more than 24 hr, BRECS was implanted and hemodynamic and chemistry profiles of animal and viability of cells in BRECS based on O<sub>2</sub> consumption and glucose consumption test were followed. Follow up period was limited by animal experiment regulation by protocol.

**Results** : In animals in which CFPD could be started without infectious or mechanical complications associated with PD catheter implantation, CFPD consistently provided PD flow at the rate of more than 80mL/hr without interruption, which was essential condition to keep BRECS device viable. BRECS kept viability during the CFPD period. The CFPD provided acceptable electrolyte and fluid control in both uremic and non-uremic sheep models and provided adequate uremic control in uremic sheep.

**Conclusion** : The present CFPD-based extracorporeal circuit model provided acceptable fluid, electrolytes, and uremic control with keeping cells in the BRECS device viable and functional for up to 7 days. The present 24 hour-miniature CFPD can be applied to peritoneal-based wearable bioartificial kidney in the future.

**Key Words** : 지속성유량복막투석, 바이오인조 신장, 말기 신부전  
CFPD, Bioartificial kidney, ESRD