

NEPHROLOGY, GHENT UNIVERSITY HOSPITAL, GENT, BELGIUM

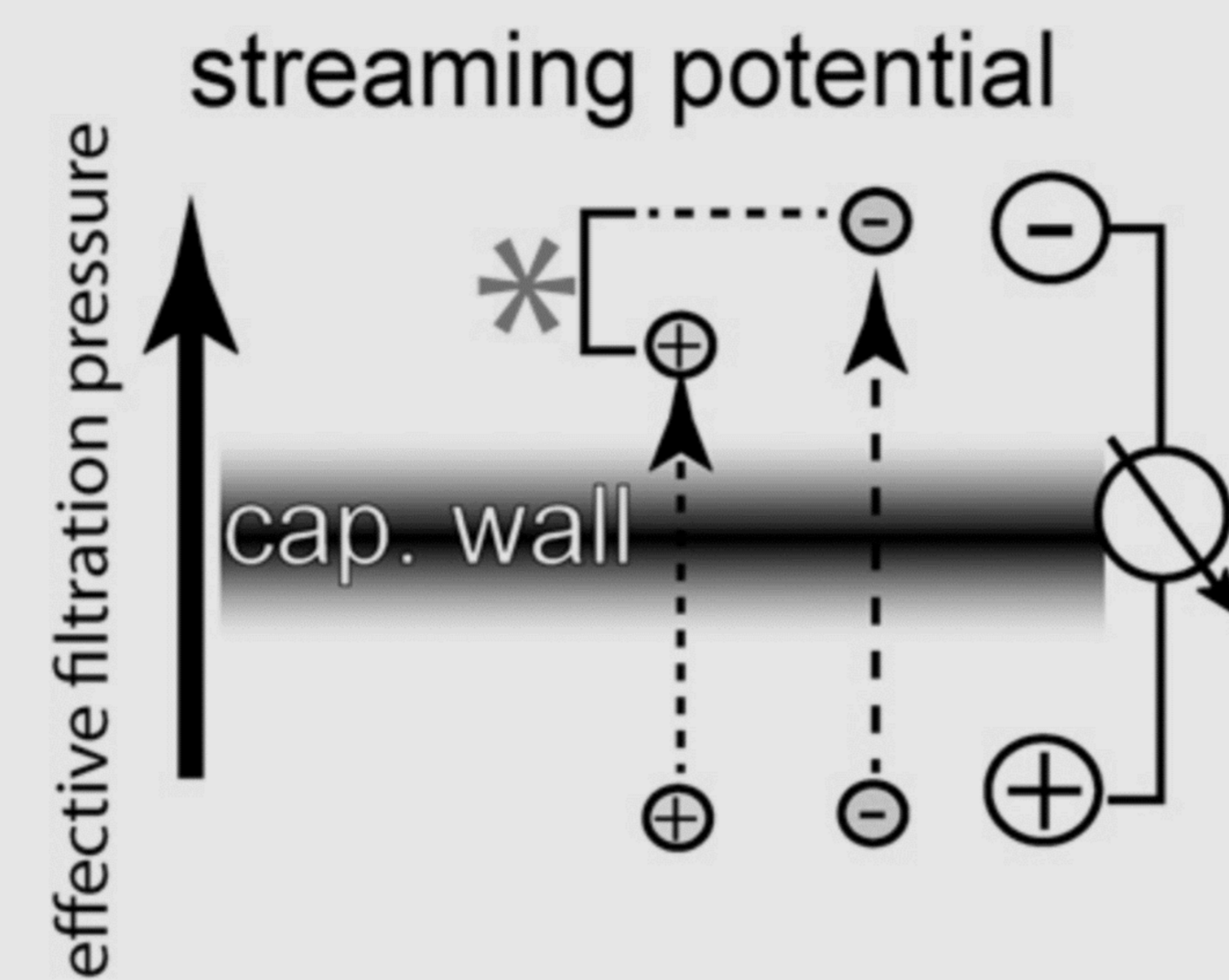
S. Eloot, A. Pletinck, W. Van Biesen

# Do Streaming Potentials affect Transport across the Peritoneal Membrane?

## Background & Aim

In peritoneal dialysis (PD), transport of solutes across the membrane takes place through fenestrated capillaries.

Can PD transport also be governed by the **electrokinetic model**, i.e. **streaming potentials** generated across a fenestrated capillary by forced filtration of an ionic solution?



### Hypothesis

Transcapillary (water) flux across the membrane is different:

- at different time points during the dwell
- when using dialysis fluids with different osmolarity

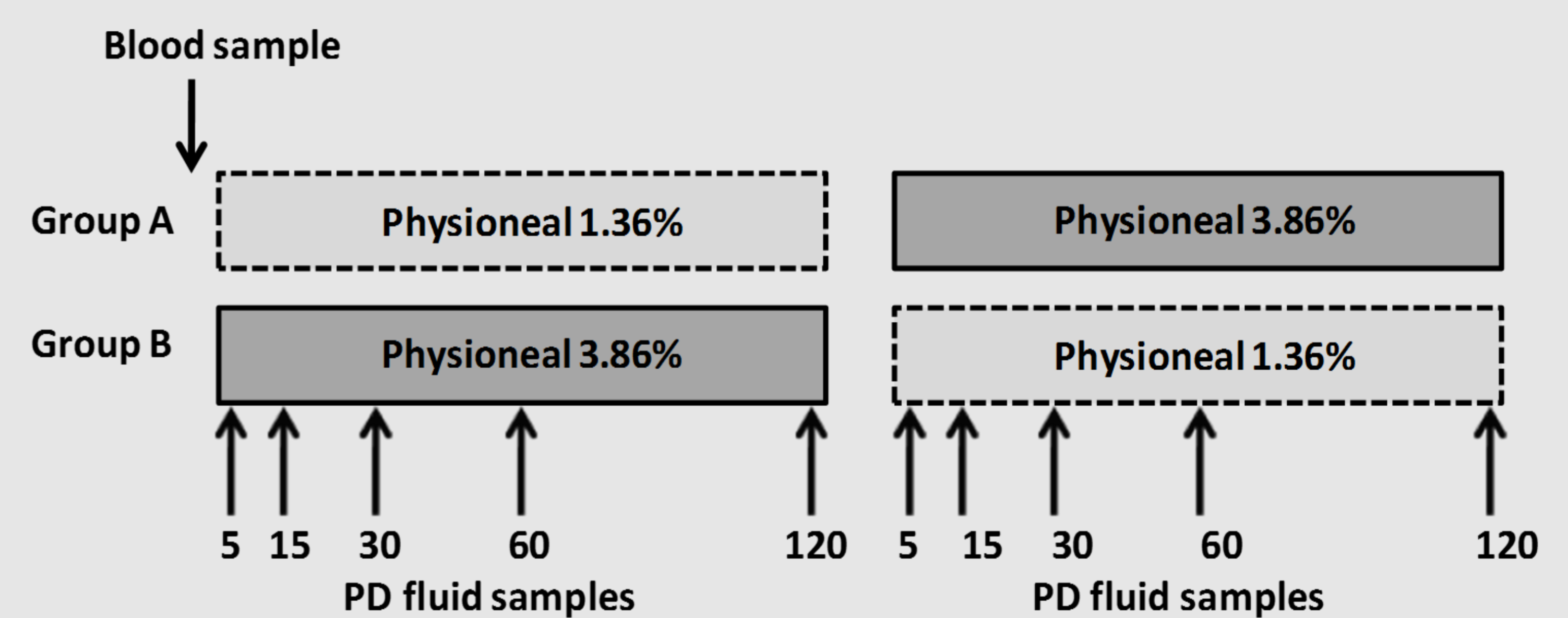
Transport of solutes with equal molecular weight but different charge is different at different time points during the dwell

### Study Aim

To investigate the hypothesis of presence of (reverse) streaming potentials in the process of transperitoneal transport in PD patients by measuring **ratios of dialysate concentrations of IgG2 (neutral) and IgG4 (negative), both 150kD.**

## Patients and Methods

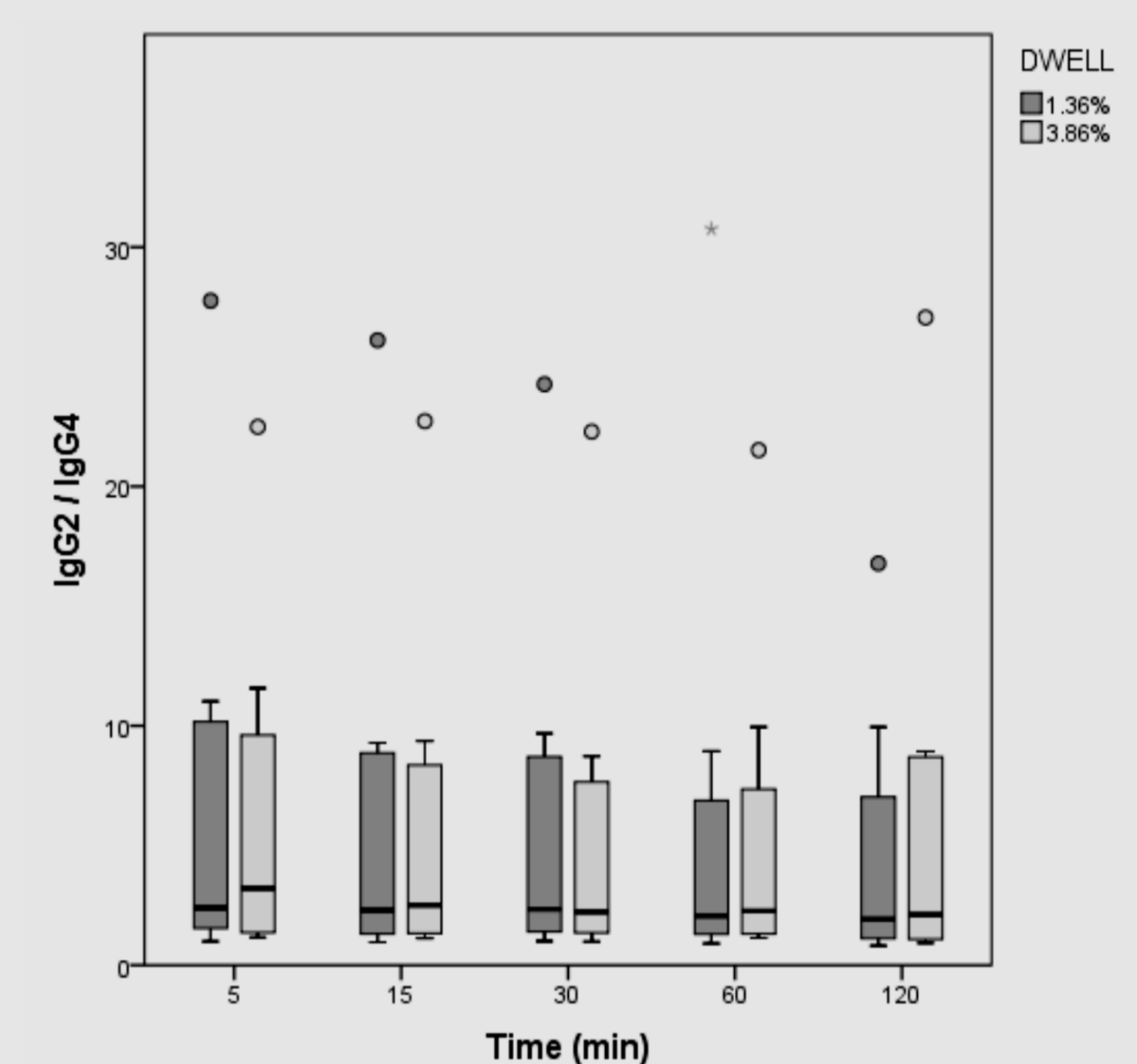
- **10 stable PD patients:** age 65±17; 20±17 months on dialysis; RRF 9.7±5.6mL/min/1.73m<sup>2</sup>
- **Randomised cross-over study:**
  - 120min dwell either with 1.36% or 3.86% PD fluid
  - Predialysis blood sample
  - PD fluid samples at 5, 15, 30, 60, 120min for each dwell
- **Laboratory:** IgG2 and IgG4 (platinum ELISA, eBioscience, USA)
- **Calculations:** ratio IgG2 / IgG4



## Results & Discussion

- **Drained volume after 120min was different (P=0.007):**
  - 1947 [1913;2022] mL (1,36%)
  - 2541 [2380;2794] mL (3,86%)
- **Serum concentrations:**
  - 1.66 [0.76;2.88] mg/mL (IgG2)
  - 1.28 [0.16;2.43] mg/mL (IgG4)
- At each time point: **no difference in ratio** between 1.36% and 3.86%

Time (min)	IgG2/IgG4		P-value
	Physioneal 1.36%	Physioneal 3.86%	
5	2.39 [1.54; 10.6]	3.21 [1.34; 10.6]	1.00
15	2.30 [1.30; 9.08]	2.51 [1.23; 8.86]	1.00
30	2.34 [1.35; 9.19]	2.22 [1.29; 8.19]	0.13
60	2.06 [1.23; 7.91]	2.27 [1.28; 8.65]	1.00
120	1.92 [1.09; 8.49]	2.11 [1.08; 8.81]	0.73



**No difference in transport ratios of neutral IgG2 and negatively charged IgG4 (both 150kD) → Absence of electrokinetic forces across the peritoneal membrane?**

**Other possible explanations for our negative findings?**

- IgG2 and IgG4 might not be suitable molecules:
  - they have a molecular weight around 3 fold higher than that of albumin
  - they have a more tube-like shape, while albumin is a globulous structure → sterical hindrance might be >>> electrokinetic forces.
- Insufficient gradient of solute drag and transcapillary ultrafiltration?

*However:* we achieved a difference in ultrafiltration of 500mL/2h dwell  
~ transcapillary ultrafiltration of around 4mL/min

## Conclusion

**Our data failed to provide support for the electrokinetic hypothesis governing transport across the peritoneal membrane.**

### Contact

Wim.VanBiesen@ugent.be

Universiteit Gent

@ugent

Ghent University