

Seasonal variations in clinical and laboratory parameters – a global perspective

Background

In hemodialysis (HD) patients, body temperature, interdialytic weight gain and pre-dialysis systolic blood pressure follow seasonal rhythms¹. We aim to determine whether these and other clinical and laboratory parameters follow seasonal patterns in a world-wide dialysis population.

Methods

The MONitoring Dialysis Outcomes (MONDO) consortium consists of HD databases from Renal Research Institute (RRI) clinics in the US; Fresenius Medical Care (FMC) clinics in Europe, Asia Pacific (AP), Latin America (LA); KfH clinics in Germany; Imperial College, London, UK; Hadassah Medical Center, Jerusalem, Israel; and University of Maastricht, The Netherlands².

Databases from RRI, FMC Europe (17 countries), FMC AP (9 countries), and FMC LA (5 countries) were queried to identify HD patients who had in-center HD treatments for at least 1 year.

Seasons were defined based on the treatment date:

Season 1: December-February

Season 2: March-May

Season 3: June-August

Season 4: September-November

Averages of pre-dialysis systolic blood pressure (preSBP), C-reactive protein (CRP) and interdialytic weight gain (IDWG) were computed per patient per season between Jan 1, 2000 and Sep 30, 2012.

Patients were stratified into one of four groups based on the clinic location: northern or southern hemisphere and temperate or tropical climate based on Tropic of Cancer / Tropic of Capricorn, respectively.

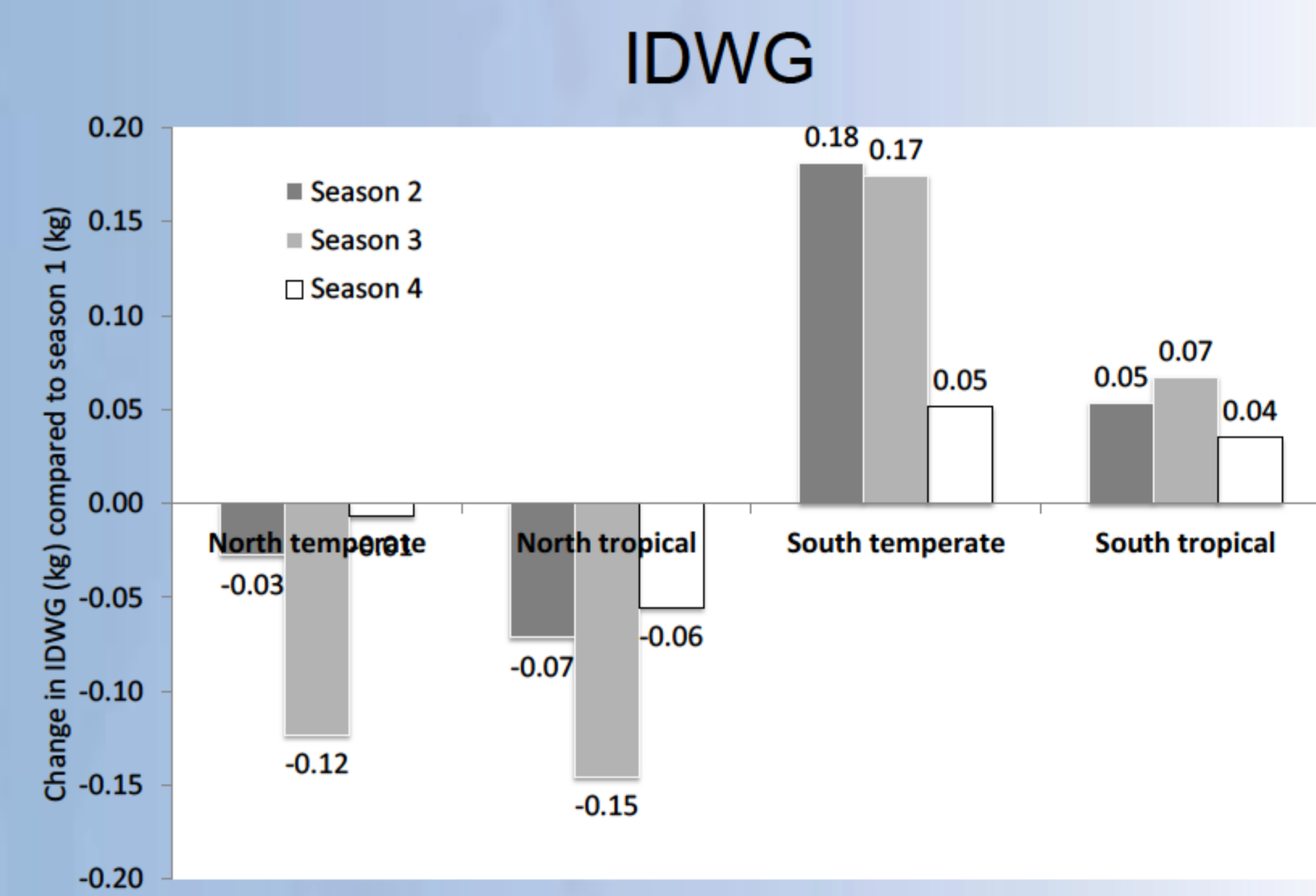
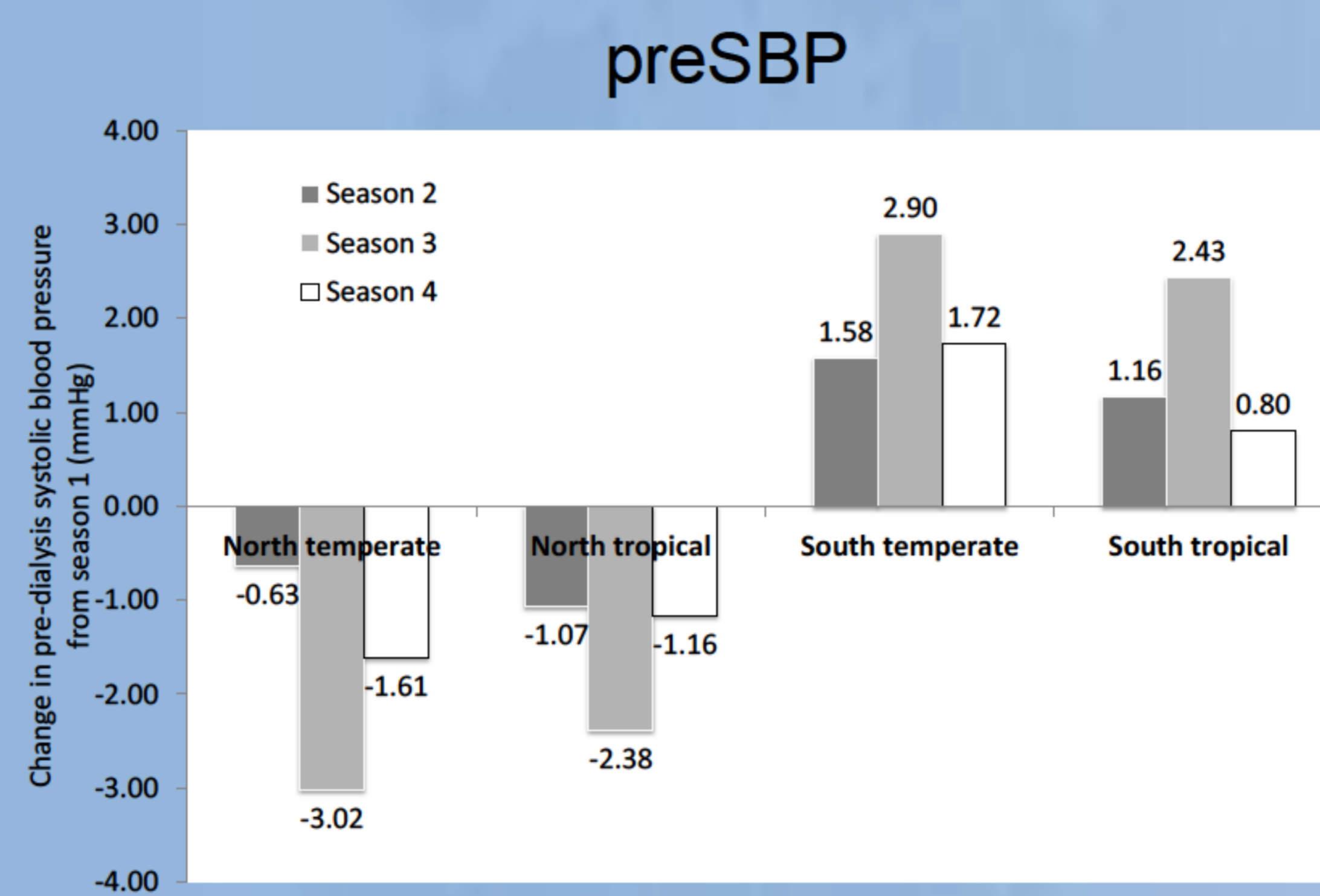
Linear mixed models were constructed to determine whether seasons played a significant role in those four groups.

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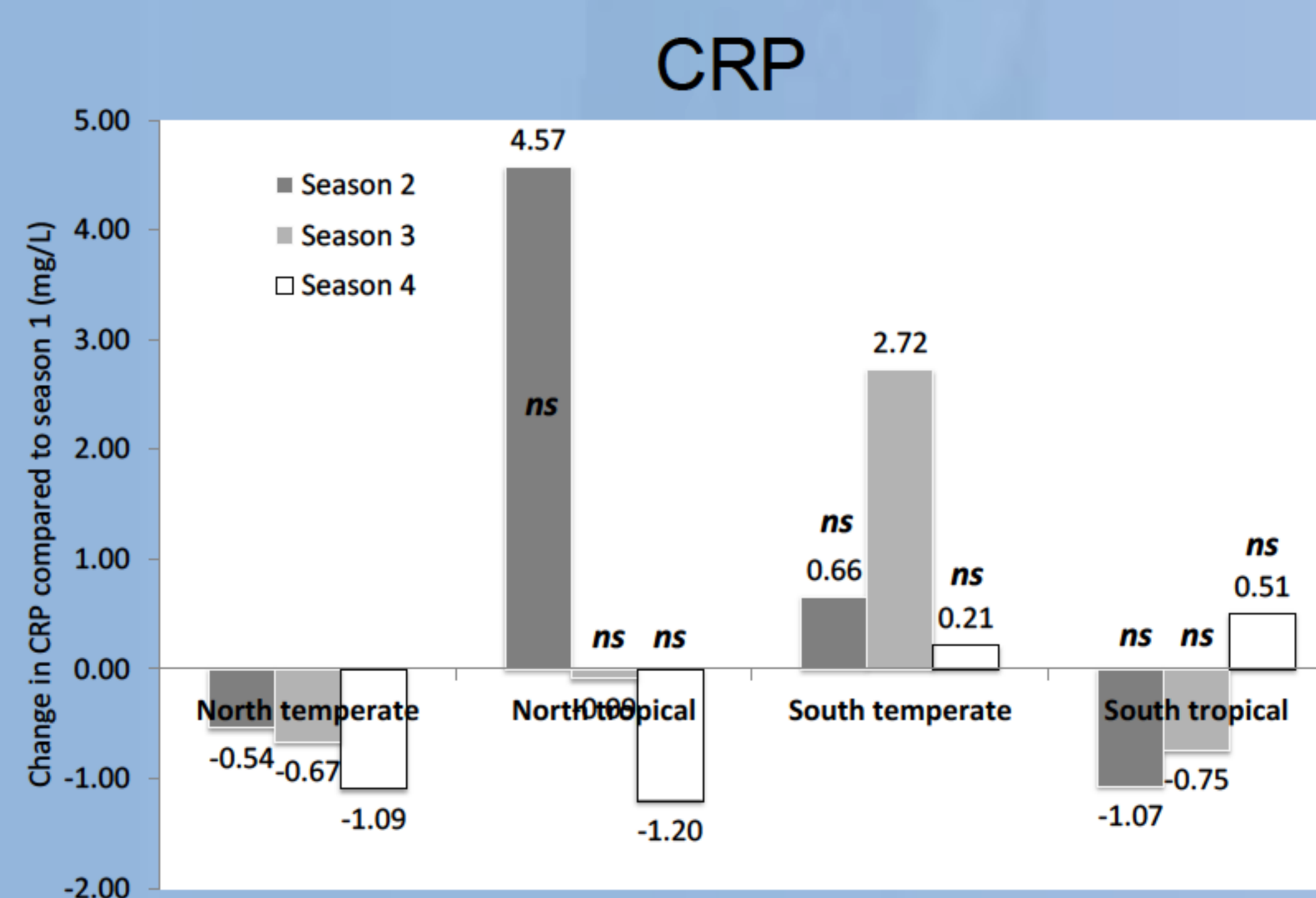
Results

We studied 87,399 patients: FMC AP 14,871; FMC Europe 45,282; FMC LA 19,725; RRI 7,521.



In all 4 regions preSBP appeared significantly different between all four seasons. In the northern hemisphere, highest preSBP was observed in season 1 while lowest preSBP was observed in season 3. The observations were reversed for southern hemisphere with lowest preSBP in season 1. Seasonal differences were observed in both temperate and tropical climates.

IDWG was highest in season 1 in the northern hemisphere and season 3 in the southern hemisphere. Southern temperate climates had highest IDWG in both seasons 2 and 3.



There were no significant differences in CRP in the tropical climates in both northern and southern hemispheres. In temperate climates, CRP appeared highest in season 1 in the northern hemisphere and in season 3 in the southern hemisphere.

Conclusion

This study demonstrates a significant seasonal influence on preSBP, IDWG, and CRP. PreSBP and IDWG appear to have highest levels in winter for both hemispheres (season 1 in the northern hemisphere; season 3 in southern hemisphere). CRP did not differ between seasons in tropical climates, but was higher in winter in temperate climates.

Seasonality needs to be considered in studies involving these parameters.

¹Usvyat L, Clin J Am Soc Nephrol 7: 108–115, 2012

²Usvyat L, Blood Purif 2013;35:37–48

