**Objectives:** Randomized trials in adults have shown reduced all-cause and cardiovascular mortality on haemodiafiltration (HDF) compared to high-flux hemodialysis (HD), but the mechanisms for improved outcomes are not clear.

**Methods:** We studied cardiovascular risk factors for inflammation, oxidative stress, anti-oxidant capacity and endothelial function in 22 children (13 female, age 8.9-15.5 years). All children received HD for at least 3 months, and were then switched to HDF, keeping all dialysis related parameters (including vascular access type, blood flow rate, dialyser size and type and the water quality) constant on both dialysis modalities. Biochemical measures were performed after ≥3 months each on HD and HDF.

**Results:** None of the markers were different between incident and prevalent patients on HD, suggesting that even a short dialysis vintage of 3 months on HD increases inflammatory and endothelial markers. After 3-months of HDF therapy there was a significant reduction in ß2 microglobulin (p<0.001), Interleukin-10 (p<0.05), high sensitivity CRP (hsCRP), asymmetric dimethylarginine, symmetric dimethylarginine (SDMA), advanced glycation end-products, oxidized low density lipoprotein (ox-LDL; p<0.01 for all) and an increase in total antioxidant capacity (p<0.001) compared to levels on HD. All children were maintained on the same dialyser, dialysis water quality, and blood flow speeds suggesting that improved clearances on HDF led to an improved biomarker profile. Even in children with residual renal function there was a significant reduction in ß2 microglobulin, hs-CRP, SDMA, ox-LDL and AGE on HDF compared to HD. Children with a lower blood flow had higher inflammatory status (higher IL-6/IL-10 ratio; p=0.04, r=-0.43). Children with a higher convective volume (≥median 12.8L/m2) had lower ox-LDL (p=0.02).

**Conclusion:** We have shown that a significant improvement in inflammation, antioxidant capacity and endothelial risk profile is achieved even within a short time (3 months) on HDF compared to HD.