On-line hemodiafiltration: What's new?

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To date, the diverse forms of uremic toxin have been found to be involved in the pathogenetic process of chronic kidney disease. Conventional hemodialysis (HD) is based on diffusive clearance of small solutes and has made substantial contributions to the life-saving for end-stage renal disease (ESRD) patients, but this improvement, unfortunately, falls short of perfection and limited. Growing evidences have suggested that, besides small uremic toxins as major targets of conventional HD, middle to large sized molecules that are not readily removed by conventional HD have important roles in the pathogenesis of uremia-related complications. To effectively remove these toxins, convective extracorporeal therapies were introduced in the 1970s and had been further developed into hemodiafiltration (HDF), which is a dialysis modality combining diffusive and convective solute transport. During recent years, several landmark studies to explore the survival benefit of HDF over conventional HD have been published. These studies revealed some common findings that on-line post-dilution HDF might confer a survival advantage over conventional HD, but this is true only under the specific condition of using large convective volumes. For this to be achieved, some prerequisites must be met In terms of safety and efficacy. First of all, as large volumes are administered directly into the patients' circulation during each HDF session, delivery of sterile and non-pyrogenic replacement (substitution) fluids should be guaranteed. In line with this, the standards of water quality required in the guidelines are becoming increasingly strict. Second, blood flow rate should be high enough to enable large convective volume to be used (at least 300-350 ml/min). If this is not possible, the use of pre-dilution HDF should be considered as an alternative that can allow a relatively low blood flow rate but can reach an equivalent effective convective dose compared to post-dilution HDF. In addition, it should be reminded that the molecules to be effectively removed by HDF are not limited to uremic toxins but also include some essentials to the patients' health. Therefore, the development of a significant amount of protein loss (2.5 g to 25 g per session) or nutrient deficiency syndrome should be cautiously monitored. In conclusion, while recent findings suggest that dialysis therapy with on-line HDF may confer survival benefit compared to conventional diffusion-only HD, its long-term prognosis and related modifiable practical factors that can lead to better outcome remain to be further elucidated.