
Lecture Code : DS01-S3
Session Name : Dialysis Specialist Physician Course 1
Session Topic : Issues in Hemodialysis
Date & Time, Place : June 22 (Sun) / 08:30-10:30 / Room 3 (GBR 103)

---

# Hemodialysis-Induced Organ Ischemia: Cardiac to Cerebral Blood Flow

**Yongjin Yi**
*Dankook University Hospital, Republic of Korea*

---

Hemodialysis (HD) is an essential renal replacement therapy for patients with end-stage kidney disease (ESKD). Still, it imposes significant hemodynamic stress that can induce ischemic injury to vital organs, notably the heart and brain. Intradialytic hypotension, occurring in approximately 20–30% of dialysis sessions, results in transient reductions in organ perfusion. Repetitive myocardial ischemia during HD, characterized by regional wall motion abnormalities (myocardial stunning), leads to progressive cardiac dysfunction, increased incidence of heart failure, and elevated cardiovascular mortality. Similarly, cerebral hypoperfusion during HD, exacerbated by impaired cerebrovascular autoregulation in chronic kidney disease (CKD), is increasingly recognized as a key mechanism underlying the high prevalence of cognitive impairment among dialysis patients. Advanced cardiac imaging and biomarker studies demonstrate that myocardial stunning occurs in a majority of HD patients, independent of overt coronary artery disease, and correlates with subsequent left ventricular systolic dysfunction. Repeated episodes of cerebral hypoperfusion have been associated with white matter hyperintensities on brain MRI and declines in executive function and attention, contributing to poor quality of life and increased healthcare burden. Strategies to mitigate dialysis-induced ischemia include individualized dialysis prescriptions that minimize ultrafiltration rates, utilize sodium and ultrafiltration profiling, and apply cooler dialysate temperatures. Cooling the dialysate to 35–36°C has significantly reduced Intradialytic hypotension and myocardial injury without compromising dialysis adequacy. Pharmacological interventions, particularly midodrine, may be considered in refractory cases of Intradialytic hypotension, though caution is warranted given conflicting data on long-term outcomes. Non-pharmacological approaches, such as intradialytic exercise, have demonstrated promise in improving hemodynamic stability and reducing cardiovascular events. Emerging noninvasive monitoring techniques, including real-time transcranial Doppler ultrasonography and near-infrared spectroscopy, offer potential to detect early cerebral hypoperfusion during HD sessions, enabling

timely interventions. Recognizing and managing HD-induced organ ischemia requires a comprehensive, patient-centered approach that integrates preventive dialysis strategies, vigilant hemodynamic monitoring, and targeted therapies. Future research should aim to refine risk stratification tools, optimize individualized treatment protocols, and validate interventions that can preserve organ function and improve the long-term outcomes of the growing dialysis population.

**Keywords:** Hemodialysis, Intradialytic hypotension, Myocardial ischemia, Cerebral hypoperfusion, Cognitive impairment