

**HEART FAILURE UPDATE**

## Ultrafiltration in Diuretic Resistant Congestive Heart Failure

Sotirios Xydonas, MD

*2<sup>nd</sup> Department of Cardiology,  
Evangelismos Hospital, Athens, Greece*

**KEY WORDS:** *heart failure; diuresis;  
diuretic resistance; ultrafiltration;  
cardiorenal syndrome; hemodialysis*

**ABBREVIATIONS**

ADHF = acutely decompensated heart failure  
CHF = congestive heart failure

*Correspondence to:*  
Sotirios Xydonas, MD,  
2<sup>nd</sup> Department of Cardiology,  
Evangelismos Hospital, Athens,  
Greece;  
E-mail: sxydonas@in.gr

Diuretic therapy has been the cornerstone of the medical treatment in patients with heart failure for the last fifty years. However, despite the fact that the majority of them are on diuretics, fluid balance remains a challenge for their physicians.<sup>1</sup>

Poor response, diuretic resistance, worsening of kidney function, electrolyte disturbances, and diuretic therapy associated morbidity and mortality have stimulated interest to develop effective and safe treatment strategies that improve decongestion and preserve kidney function. Ultrafiltration has been used to remove fluid from diuretic-refractory hypervolemic patients. Recently clinical studies have suggested that ultrafiltration may be highly effective for decongesting patients with either chronic or acutely decompensated heart failure (ADHF).

Most patients admitted for ADHF have signs and symptoms of fluid, including dyspnea, weight gain, jugular venous distension, and peripheral and pulmonary edema. Current guidelines recommend the use of diuretics as first-line therapy. However registry data show that more than 20% of patients with ADHF admitted to hospitals do not lose weight.<sup>1</sup>

During the last twenty years, ultrafiltration using hemodialysis membranes and peritoneal dialysis has been used in diuretic-refractory patients with heart failure.<sup>8,9</sup> Several recent studies of patients with heart failure (SAFE,<sup>6</sup> EUPHORIA,<sup>7</sup> RAPID-CHF,<sup>5</sup> UNLOAD<sup>4,10</sup>) have compared the efficacy and safety of ultrafiltration versus diuretics. Most of them included patients with some degree of decreased kidney function, but excluded patients with severe renal dysfunction, hemodynamic instability, or lack of response to an aggressive diuretic regimen.

The advantages of ultrafiltration appears to be the decreased rehospitalization rate, the relatively higher sodium removal per mL of fluid removed, the controlled removal of volume, the avoidance of electrolyte derangements, the effectiveness in patients with diuretic resistance, the diminished long-term neurohormonal activation compared to diuretics and the possible restoration of diuretic responsiveness after diuretic holiday. However there are disadvantages like the systemic anticoagulation that was recommended by the operators, access-related complications (infection, bleeding), intravascular volume depletion, worsening of kidney function, lack of cost/effectiveness studies and expertise in extracorporeal devices.<sup>3</sup>

The Task Force for the Diagnosis and Treatment of CHF of the European Society of Cardiology recommends the use of ultrafiltration in patients with coexisting kidney failure or hyponatremia and refractory to loop and thiazide diuretics. The ACC/AHA guidelines suggest the ultrafiltration in patients with acutely decompensated heart failure and decreased diuresis despite an increase in loop diuretic dose, addition of a second diuretic, or continuous infusion of a loop diuretic.<sup>2</sup> An ongoing randomized

**Conflict of Interest:** none declared

multicenter control trial, the Cardiorenal Rescue Study in Acute Decompensated Heart Failure (CARESS) will shed light to the riddle of the efficacy of ultrafiltration in patients with ADHF and cardiorenal syndrome.

## REFERENCES

1. Adams KF Jr, Fonarow GC, Emerman CL, et al. Characteristics and outcomes of patients hospitalized for heart failure in the United States: rationale, design, and preliminary observations from the first 100,000 cases in the Acute Decompensated Heart Failure National Registry (ADHERE). *Am Heart J* 2005; 149(2):209–216.
2. Jessup M, Abraham WT, Casey DE, et al. 2009 Focused update: ACCF/AHA Guidelines for the Diagnosis and Management of Heart Failure in Adults: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines: developed in collaboration with the International Society for Heart and Lung Transplantation. *Circulation* 2009; 119(14):1977–2016.
3. Freda BJ, Slawsky M, Mallidi J, Braden GL. Decongestive treatment of acute decompensated heart failure: cardiorenal implications of ultrafiltration and diuretics. *Am J Kidney Dis* 2011; 58(6):1005–1017.
4. Costanzo MR, Guglin ME, Saltzberg MT, et al. Ultrafiltration versus intravenous diuretics for patients hospitalized for acute decompensated heart failure. *J Am Coll Cardiol* 2007; 49(6):675–683.
5. Bart BA, Boyle A, Bank AJ, et al. Ultrafiltration versus usual care for hospitalized patients with heart failure: the Relief for Acutely Fluid-Overloaded Patients With Decompensated Congestive Heart Failure (RAPID-CHF) trial. *J Am Coll Cardiol* 2005; 46(11):2043–2046.
6. Jaski BE, Ha J, Denys BG, Lamba S, Trupp RJ, Abraham WT. Peripherally inserted veno-venous ultrafiltration for rapid treatment of volume overloaded patients. *J Card Fail* 2003; 9(3): 227–231.
7. Costanzo MR, Saltzberg M, O’Sullivan J, Sobotka P. Early ultrafiltration in patients with decompensated heart failure and diuretic resistance. *J Am Coll Cardiol* 2005; 46(11):2047–2051.
8. Dahle TG, Blake D, Ali SS, Olinger CC, Bunte MC, Boyle AJ. Large volume ultrafiltration for acute decompensated heart failure using standard peripheral intravenous catheters. *J Card Fail* 2006; 12(5):349–352.
9. Jaski BE, Romeo A, Ortiz B, et al. Outcomes of volume-overloaded cardiovascular patients treated with ultrafiltration. *J Card Fail* 2008; 14(6):515–520.
10. Rogers HL, Marshall J, Bock J, et al. A randomized, controlled trial of the renal effects of ultrafiltration as compared to furosemide in patients with acute decompensated heart failure. *J Card Fail* 2008; 14(1):1–5.