

## Heart Failure

- a) Discuss the underlying pathophysiological mechanisms of your assigned disease process. Which clinical manifestations observed in Janessa's case could be explained by the pathophysiological mechanisms?

Heart failure (HF) is a clinical syndrome in which the heart is unable to pump blood effectively to meet the metabolic demands of the body, or it can only do so at elevated filling pressures. This condition arises from structural or functional cardiac abnormalities that impair ventricular filling or ejection of blood, leading to reduced cardiac output and compensatory neurohormonal responses (Shams et al, 2025). The underlying pathophysiology of heart failure involves both systolic dysfunction (reduced contractile ability of the heart) and diastolic dysfunction (impaired relaxation and filling), which lead to inadequate perfusion of tissues and organs. When cardiac output declines, baroreceptors trigger activation of the sympathetic nervous system (SNS) and the renin–angiotensin–aldosterone system (RAAS) to maintain perfusion pressure. This neurohormonal activation increases heart rate, systemic vascular resistance, and fluid retention, initially helping maintain perfusion but ultimately contributing to ventricular remodeling and worsening HF over time (Maryam & Varghese, 2024). Compensatory mechanisms, such as increased SNS activity and RAAS stimulation, lead to vasoconstriction and retention of sodium and water, which increase preload and afterload. While these mechanisms temporarily preserve blood pressure and perfusion, chronic activation results in myocardial hypertrophy, fibrosis, and increased cardiac workload, worsening heart function. Heart failure can be classified in several ways based on ventricular function, side of the heart affected, and clinical presentation. Once we look at Janessa's symptoms more in depth, we will have a better understanding of what disease process she is experiencing. However, for now, her symptoms indicate a strong suspicion of heart failure. Janessa's clinical manifestations, including dyspnea, weakness, and dizziness, are consistent with the key pathophysiological mechanisms of heart failure: impaired cardiac pumping ability and the maladaptive effects of chronic neurohormonal activation leading to reduced tissue perfusion and congestion (Shams et al, 2025). Recognizing how these mechanisms produce specific symptoms helps guide comprehensive