**St Peter’s Institute of Pharmaceutical Sciences**

**Course: Bachelor of Pharmacy**

**Subject: PATHOPHYSIOLOGY (THEORY)**

**Subject Code:** BP 204T

**CONGESTIVE HEART FAILURE**

Congestive Heart failure is a syndrome which causes functional and structural cardiac disorders which ultimately leads to decreases the ability of the ventricle to fill or eject blood.

Congestive heart failure describes a condition where the heart muscle is weekend and cannot pump blood as strongly as before; this leads to insufficient oxygen to organs and muscles causes tired and shortness of breath.

**TYPES OF HEART FAILURE**

1. Low-output heart failure

* Systolic heart failure: decreased cardiac output and decreased left ventricular ejection fraction.
* Diastolic heart failure: elevated left and right ventricular end diastolic pressures and may have normal left ventricular ejection fraction.

2. High-output heart failure

Seen with peripheral shunting, low-systemic vascular resistance, hyperthyroidism, beriberi, characinoid, anemia.

3. Right ventricular Failure: seen with pulmonary hypertension.

4. Systolic Dysfunction: coronary heart failure, hypertension, valvular heart Disease.

5. Diastolic Dysfunction: hypertension, coronary artery disease, hypertrophic obstructive cardiomyopathy, restrictive cardiomyopathy.

**EPIDEMIOLOGY**

Five millions Americans have CHF. 550,000 New cases every year. 800,000 Patients with CHF hospitalized every year. 250,000 die every year. 50% Patients die with in five years. 150% increase in the last 20 year. 2.6% total population has this disease.

**RISK FACTORS**

Hypotension

Fluid retention & worsening CHF

Bradycardia & heart block

Contraindication in patients with CHF exacerbation

**PATHOPHYSIOLOGY**

**Compensatory Mechanisms**

• Sympathetic nervous system stimulation

• Renin-angiotensin system activation

• Myocardial hypertrophy

• Altered cardiac Rhythm

**Left ventricular failure Right ventricular failure**

Ischemic heart disease cor pulmonale

Myocarditis Right-sided valvular disease

Vavular heart disease Right-sided myocardial disease

Restrictive pericariditis pulmonary hypertension

**Compensatory Mechanisms**

Norepinephrine Activation Renin-angiotensin Activation Increased myocardial

atrial natrouretic peptide aldosterone mechanism contractility

Tachycardia Na+ and water retension Increased cardiac

Workload

Further stress on myocardium cell streching

Congestive heart failure compensatory hypertrophy

And dilation

**Renin-angiotensin system activation**

Renin + Angiotensinogen

Angiotensin I

Angiotensin II

Peripheral Vasoconstriction Aldosterone Secretion

↑ Afterload Salt & Water Retention Edema

↓ Cardiac Output ↑ Plasma Volume

Heart failure ↑ Preload

↑ Cardiac Workload

Heart failure

**Signs and symptoms**

Shortness of breath, Weakness and fatigue, Awakening short of breath at night, Coughing or wheezing, Swelling of feet and legs, Anorexia/loss of appetite, Weight gain

**Symptoms of Heart failure**

Weakness

Cough

Edema

Shortness of Breath

**Complications**

Cardiac arrhythmia, Hypotension, Thrombocytopenia, Bone marrow suppression, liver toxicity,

**GI:** vomiting, diarrhea, abdominal pain, constipation

**Neurologic:** Headache, fatigue, insomnia, vertigo

**Miscellaneous:** Allergic, thrombocytopenia, necrosis

**Heart:** SA node and AV node suppression, atrial arrhythmia, Ventricular arrhythmia.

**Diagnosis**

Electrocardiogram

Chest x-ray,

Echocardiography

Blood tests

**DRUGS USED TO TREAT CONGESTIVE HEART FAILURE**

**VASODILATORS** –captopril, enalapril, fosinopril, lisinopril, quinapril, hydralazine, isosorbide, minoxidil, sodium niitroprusside

**INOTROPIC** **AGENTS**: digoxin, digitoxin, dobutamine, amrinone, milrinone

**DIURETICS** –bumetanide, furosemide -hydrochlorothiazide , metalazone

**BETA BLOCKERS:** Metoprolol, Carvidilol, Bisoprolol

**CALCIUM CHANNEL BLOCKERS**: Nifedipine, Verapamil.

**PATIENT COUNSELING LIFESTYLE CHANGES**

Stop smoking,

Reduce your Weight

Avoid or limit alcohol and caffeine

Eat a low-fat, low-sodium diet

Exercise,and reduce stress.

**References:**

1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins &Cotran. (2014) Pathologic Basis of Disease; South Asia edition; India; Elsevier.
2. Harsh Mohan; Text book of Pathology; 6 th edition; India; Jaypee Publications; 2010.
3. Laurence B, Bruce C, Bjorn K. ; Goodman Gilman’s (2011). The Pharmacological Basis of Therapeutics; 12 th edition; New York; McGraw-Hill;
4. Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston; Davidson’s Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.