

ANNE WARD PA-C

HEPATORENAL SYNDROME

WHAT IS HEPATORENAL SYNDROME

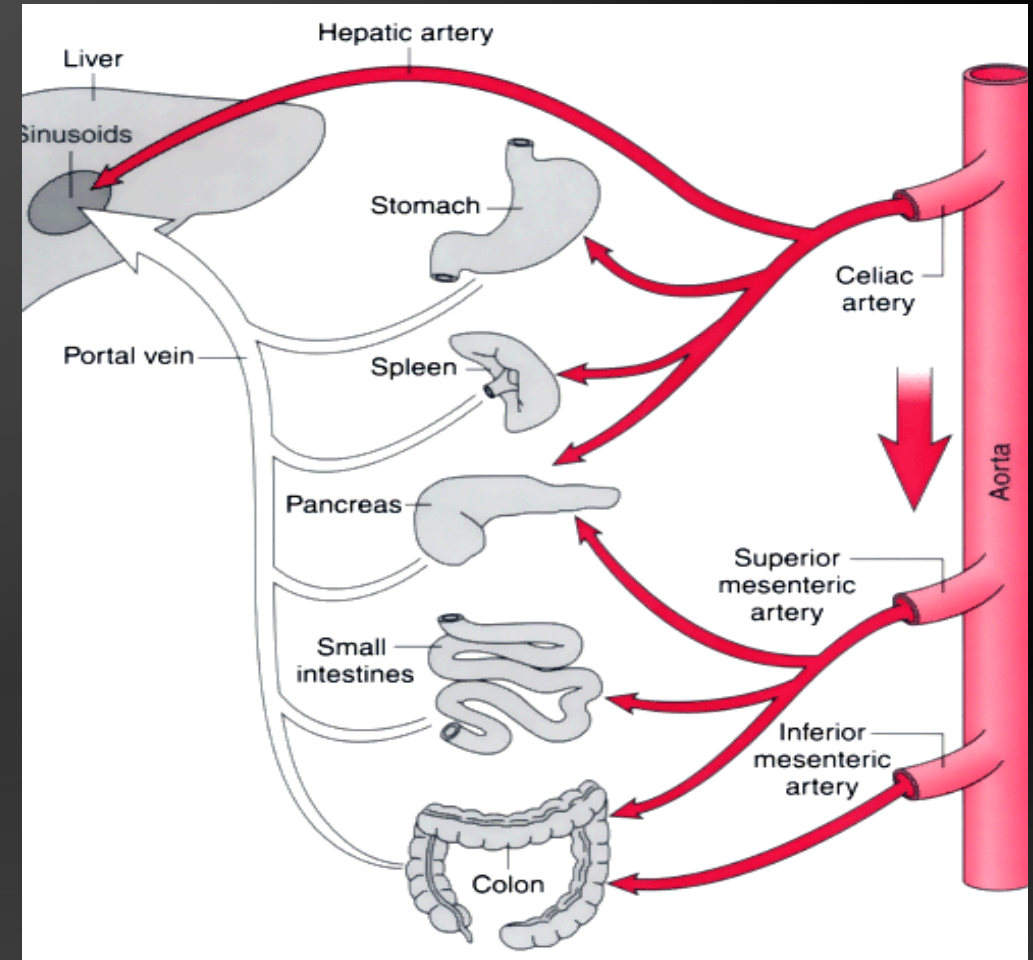
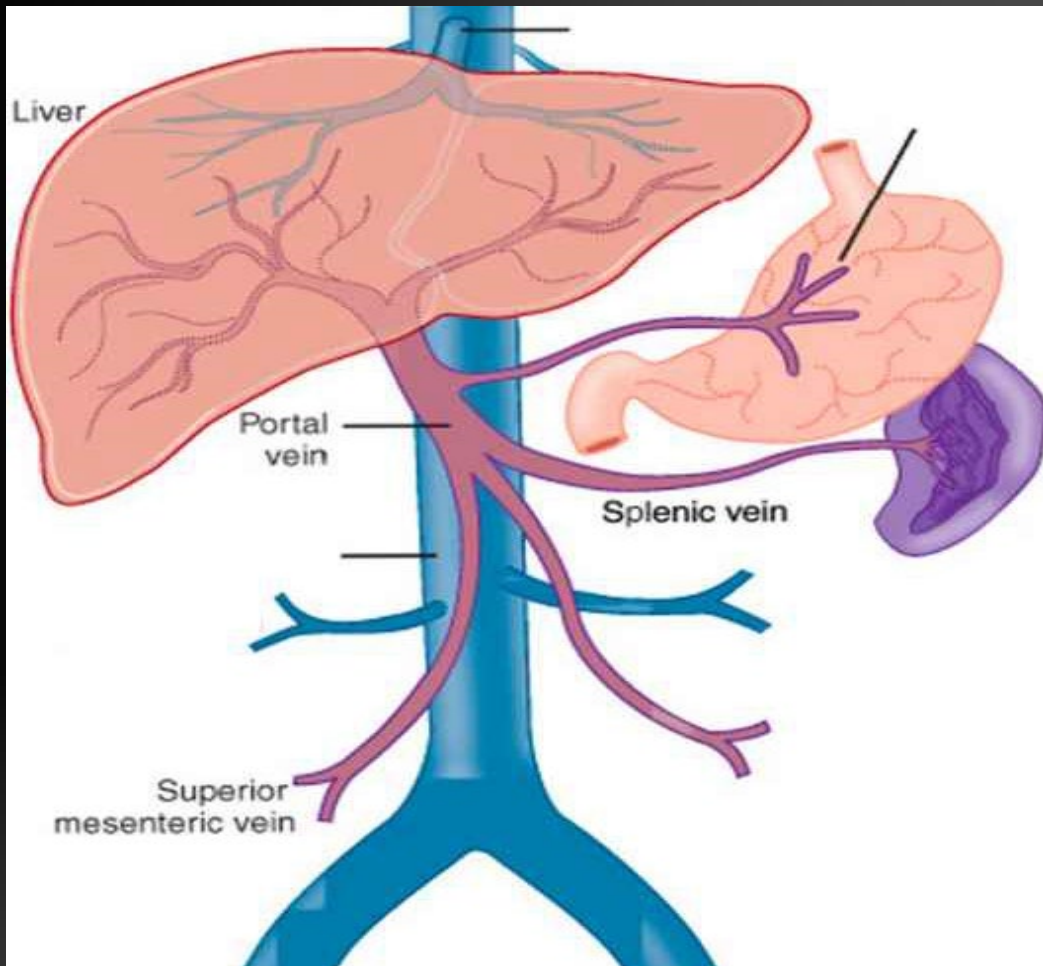
Life threatening condition in which rapid kidney failure occurs due to cirrhosis or fulminant liver failure.



HOW DOES A
SICK LIVER
CAUSE RENAL
FAILURE??



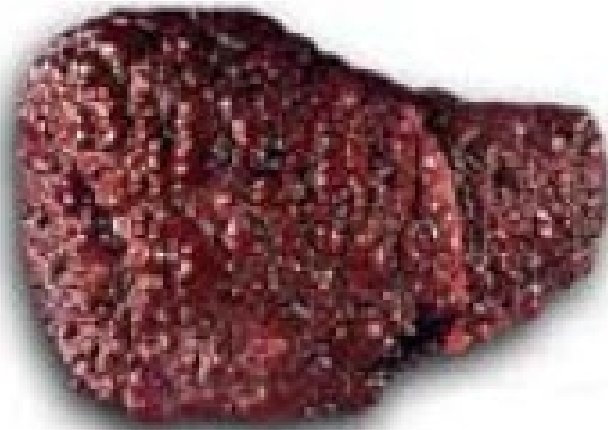




BLOOD SUPPLY REVIEW

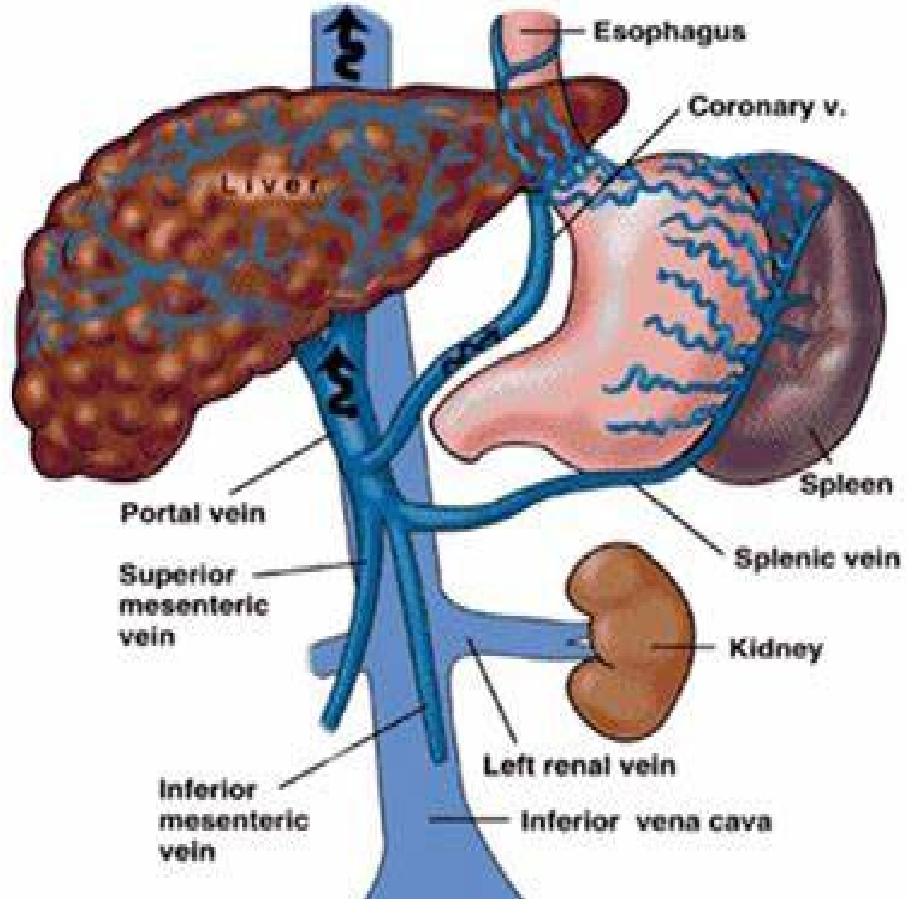


Healthy liver



Cirrhosis

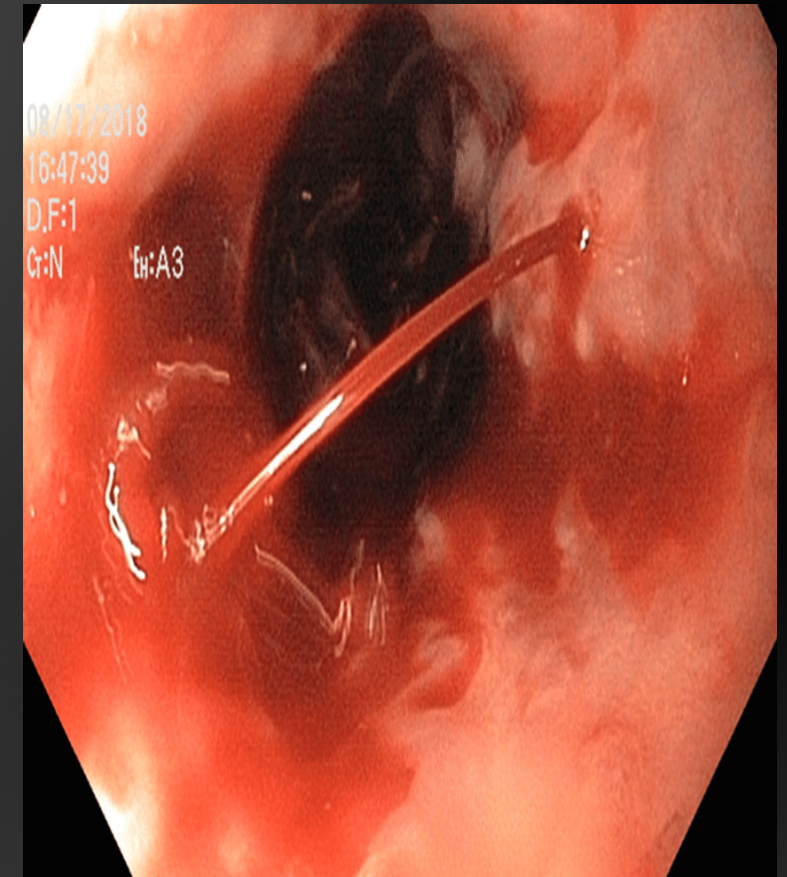
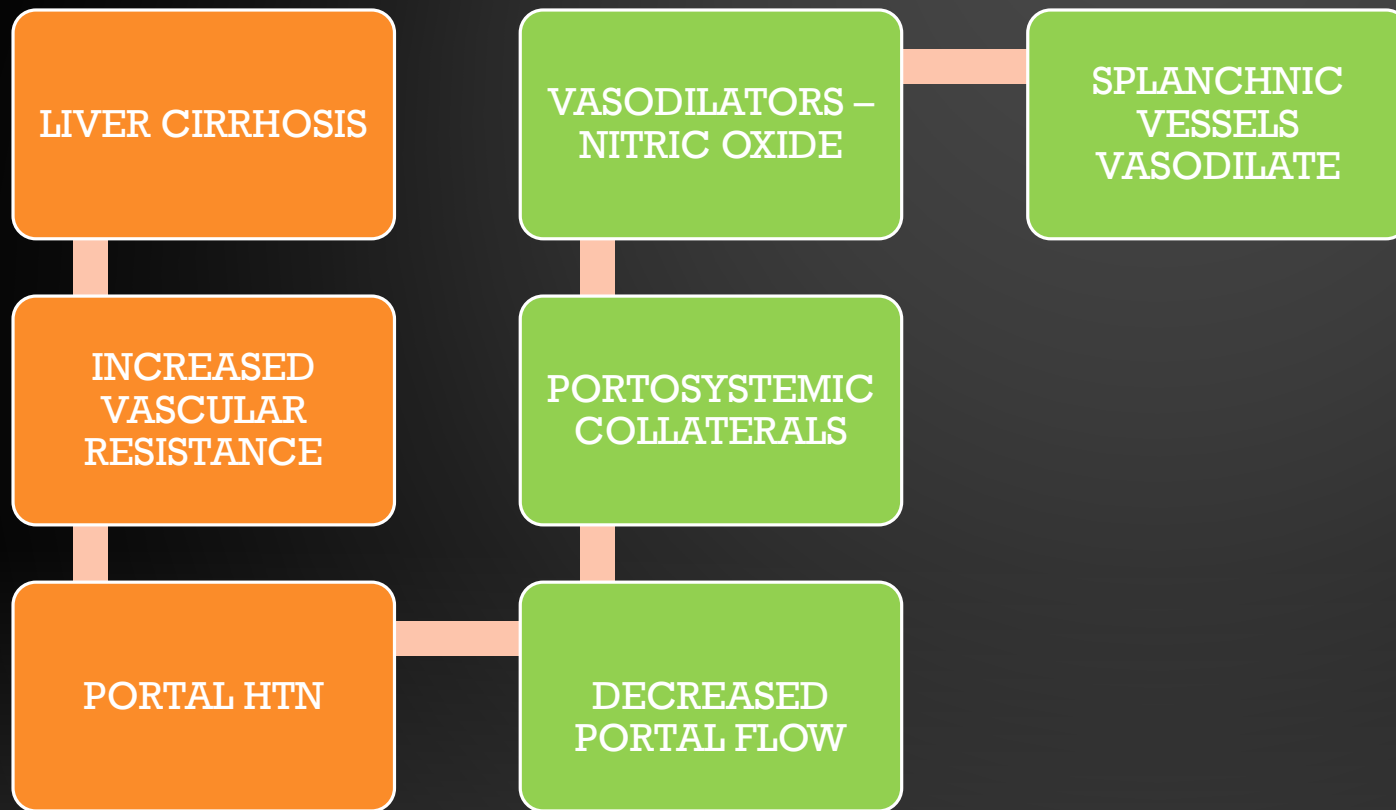
Portal Hypertension

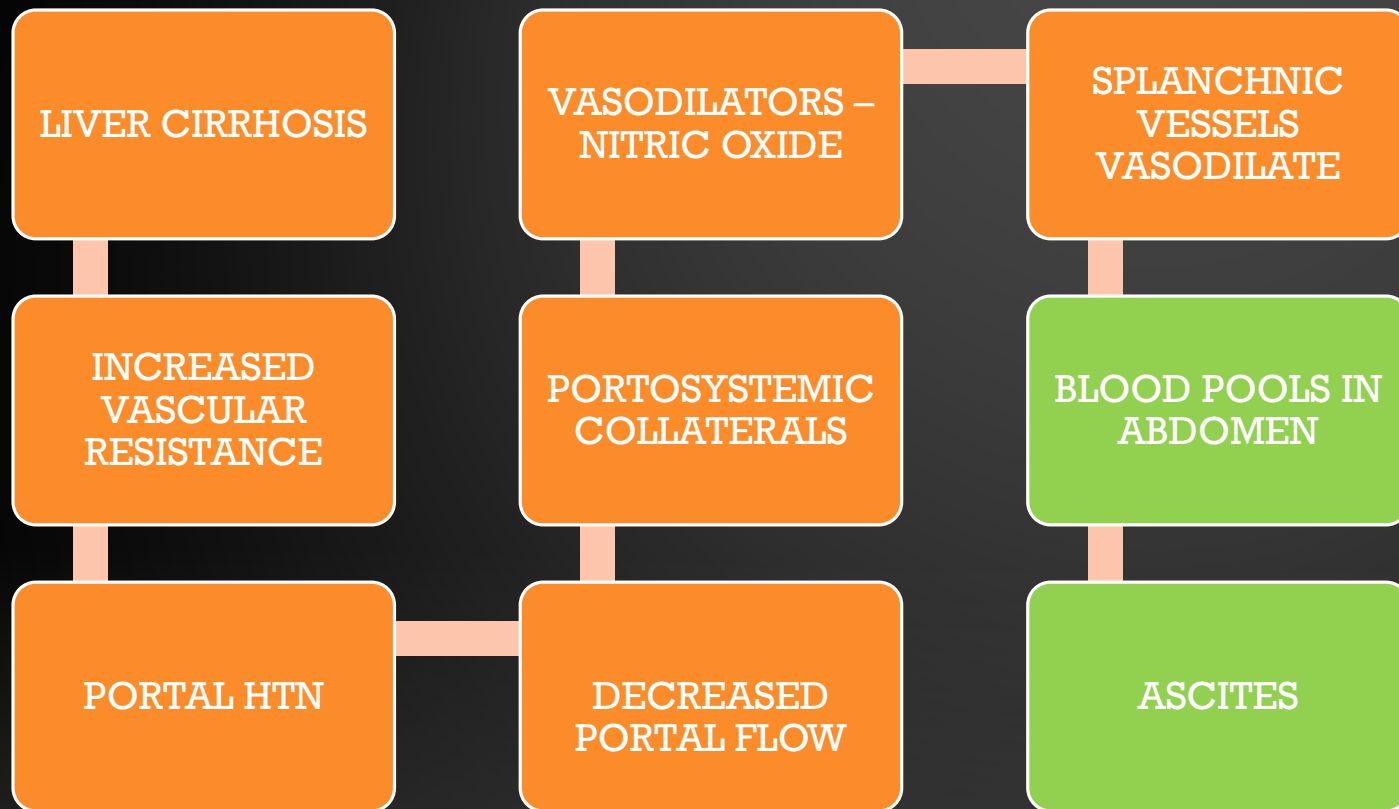


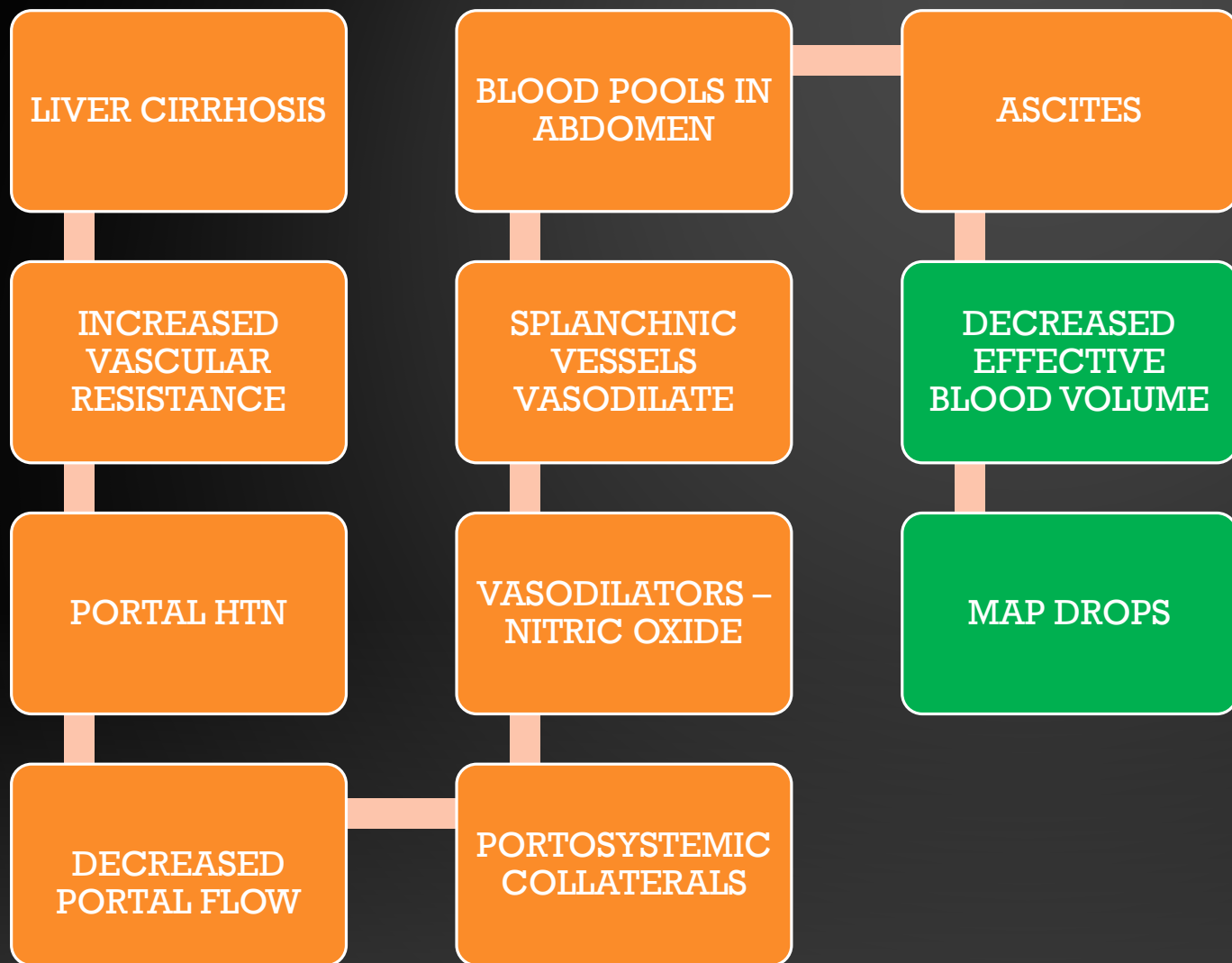
**LIVER
CIRRHOSIS**

**INCREASED
VASCULAR
RESISTANCE**

PORTAL HTN

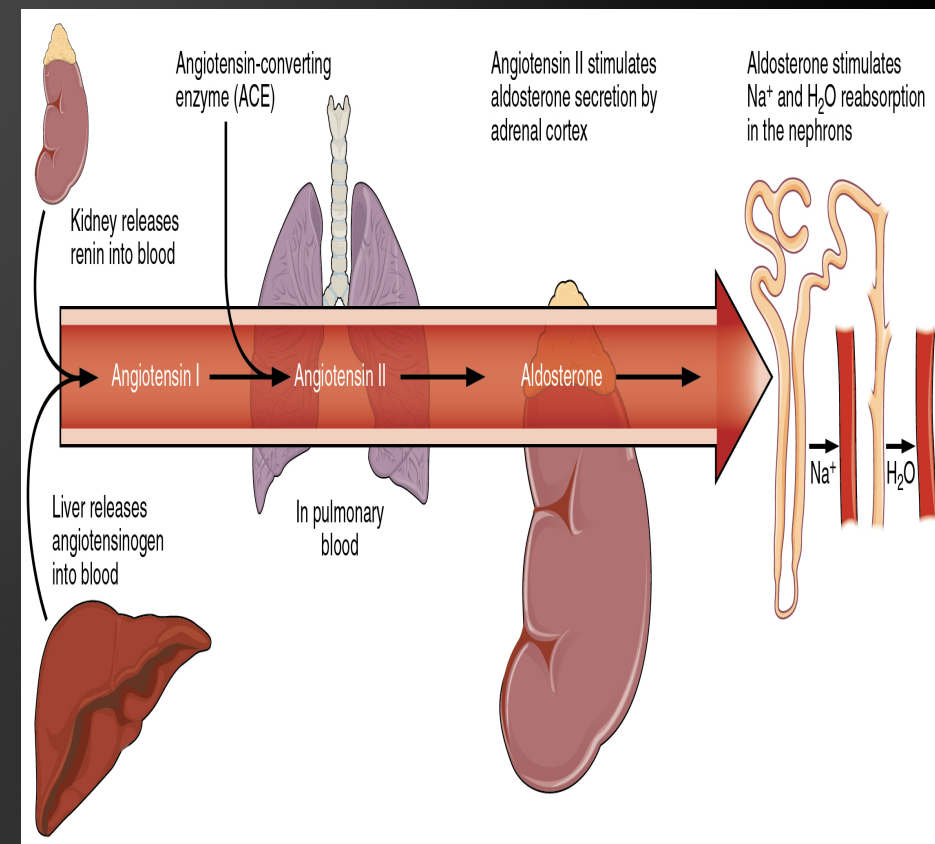
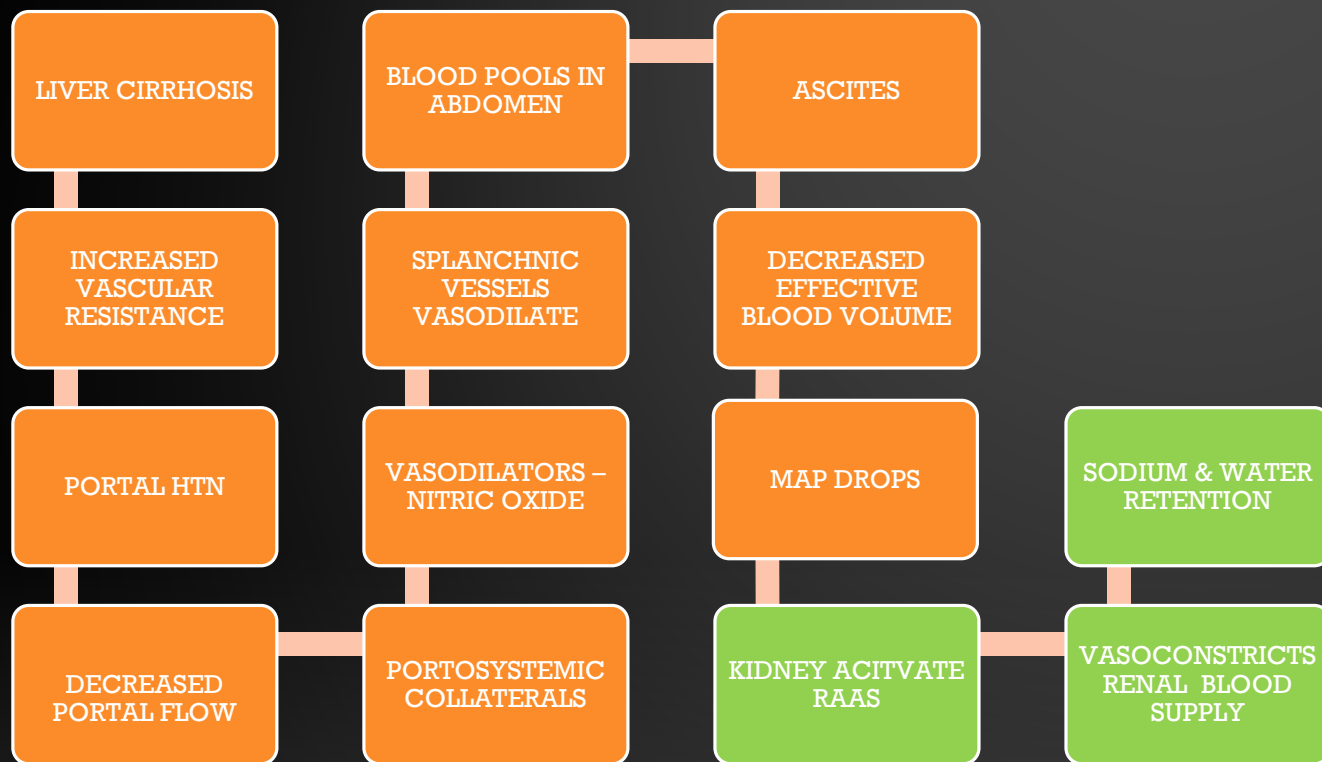


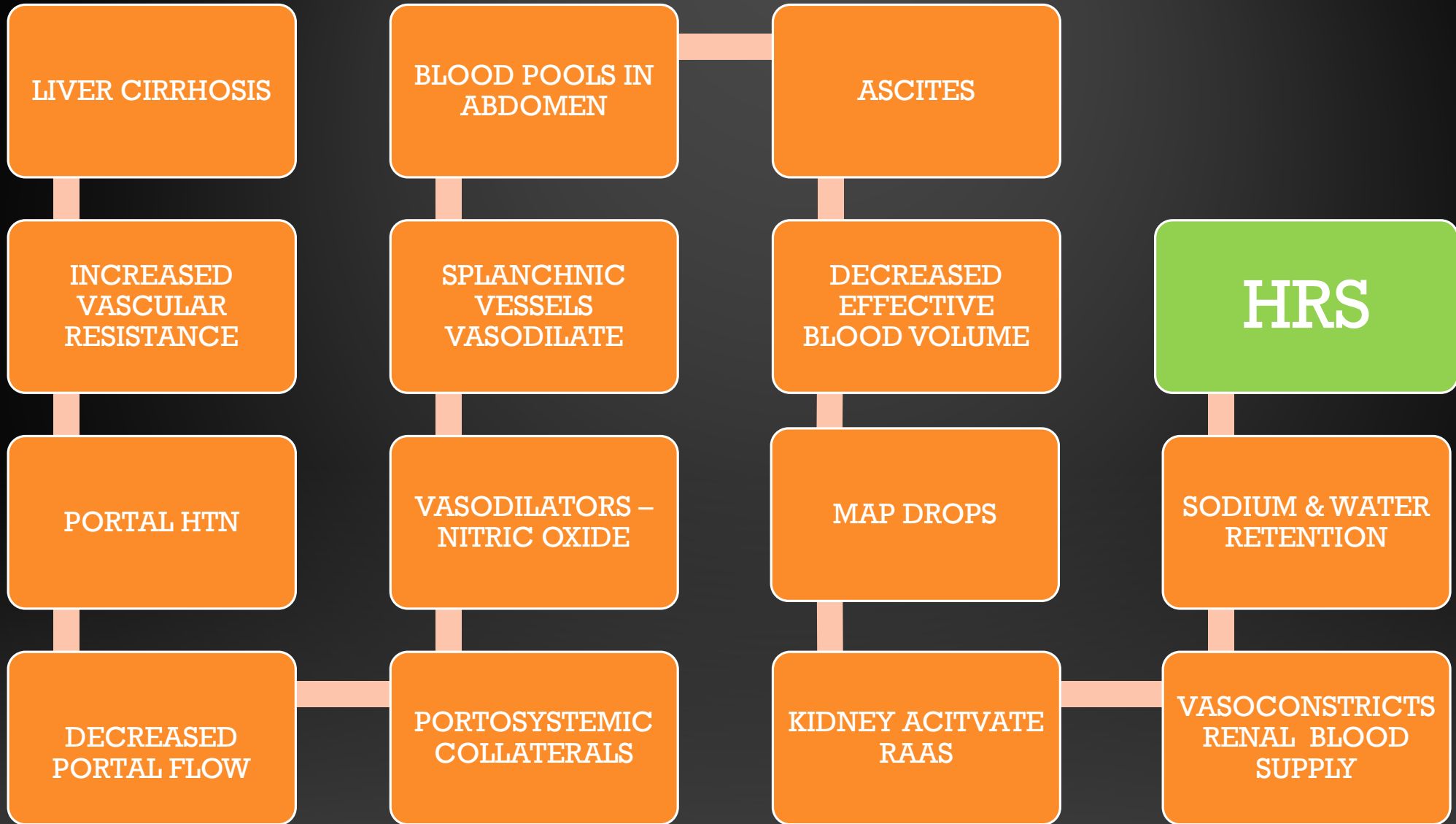




MAP'' needs to be at least 60-65 mmHg to perfuse organs, if low for an extended period it will cause ischemic injury

$$MAP = \frac{2 * DBP + SBP}{3}$$





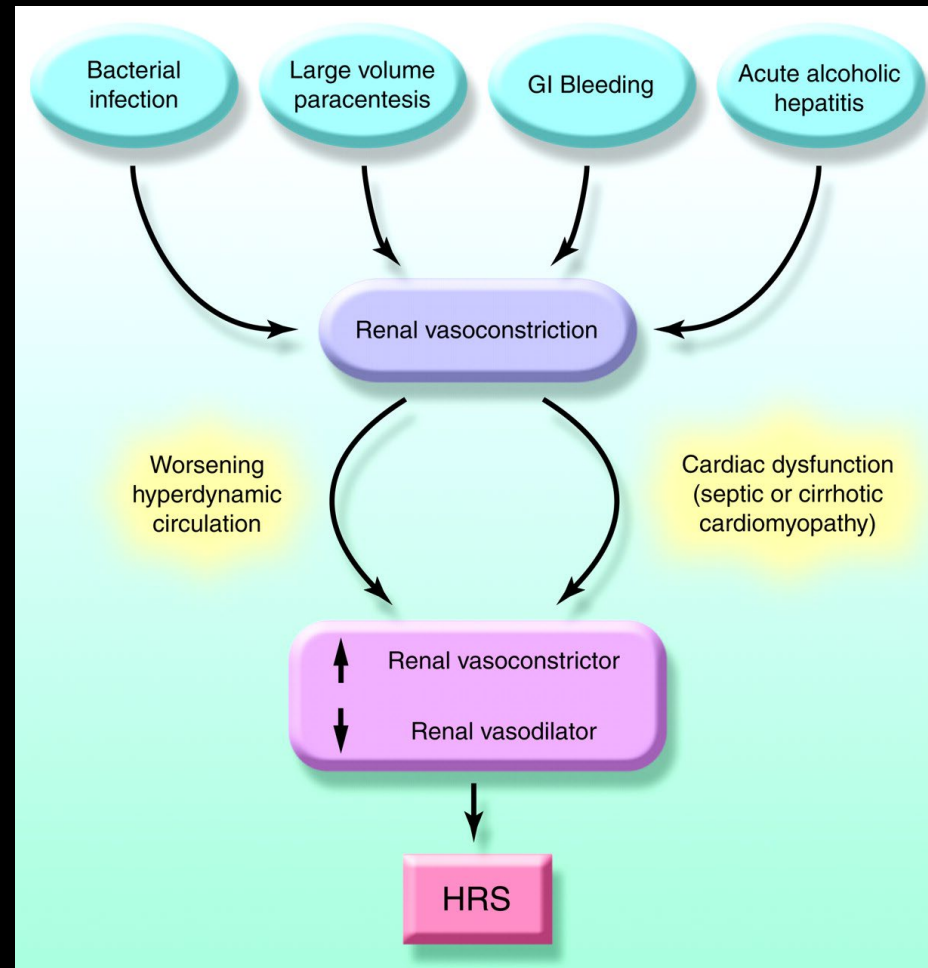
PRECIPITATING FACTORS



SBP

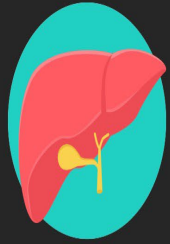
UTI

PNEUMONIA





HRS is a diagnosis of **EXCLUSION**



HEPATORENAL SYNDROME



HRS-AKI

(Acute: previously known as HRS Type 1)

- * ↑ Creatinine:
 - ◆ ↑ by 0.3mg/dL (27μmol/L 🇬🇧) in 48h **or**
 - ◆ ↑ by 50% in 3 months
- * Cirrhosis + ascites
- * No response to 1g/kg/d of HAS x 48h 💧
(60kg patient: 3x 100ml 20% HAS)
- * No shock 🩸
- * No nephrotoxics (e.g. diuretics, NSAIDs) 💊
- * No structural kidney injury
 - ◆ 🚫 proteinuria (>500mg/d)
 - ◆ 🚫 haematuria
 - ◆ Normal renal ultrasound

HRS-NAKI

(Non-Acute: previously known as HRS Type 2)

HRS-AKD

- * ↑ Creatinine by 50% in 3 months
- * eGFR < 60ml/min/1.73m²
- * No other cause of kidney disease
- * Cirrhosis + ascites

HRS-CKD

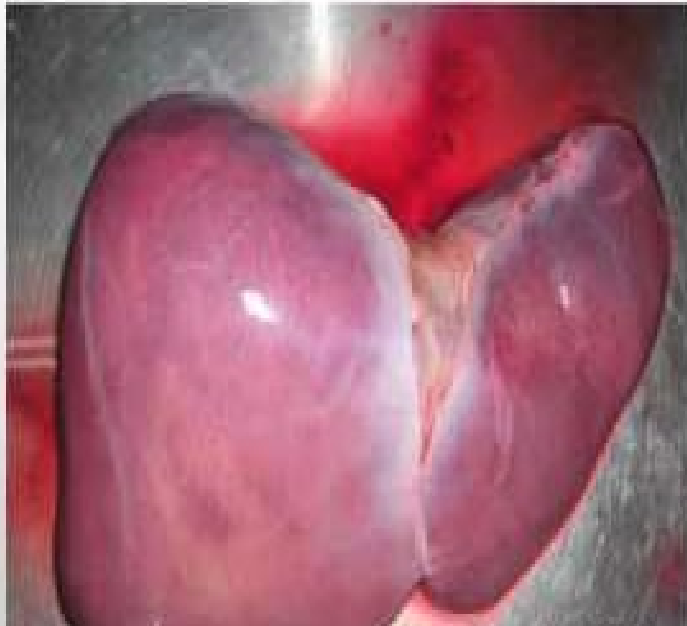
- * eGFR < 60ml/min/1.73m²
- * No other cause of kidney disease
- * Cirrhosis + ascites

LOW BP/MAP
AKI
ASCITES
URINE SODIUM <5



TREATMENT????

Liver transplantation



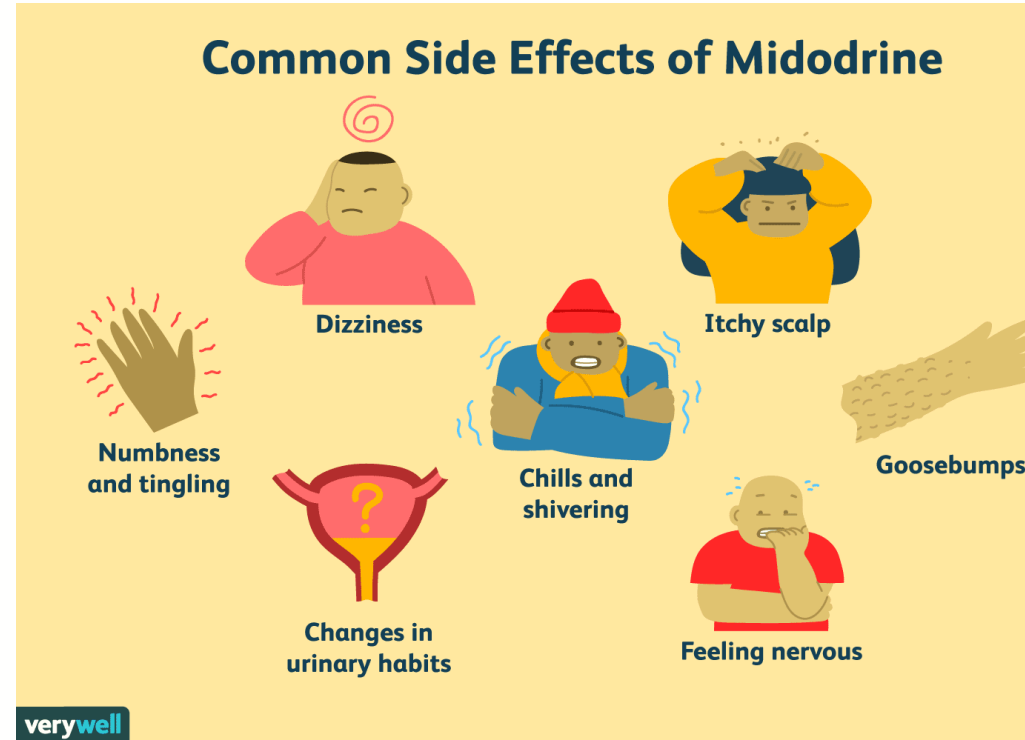
HRS COCKTAIL

- ALBUMIN
- MIDODRINE
- OCTREOTIDE

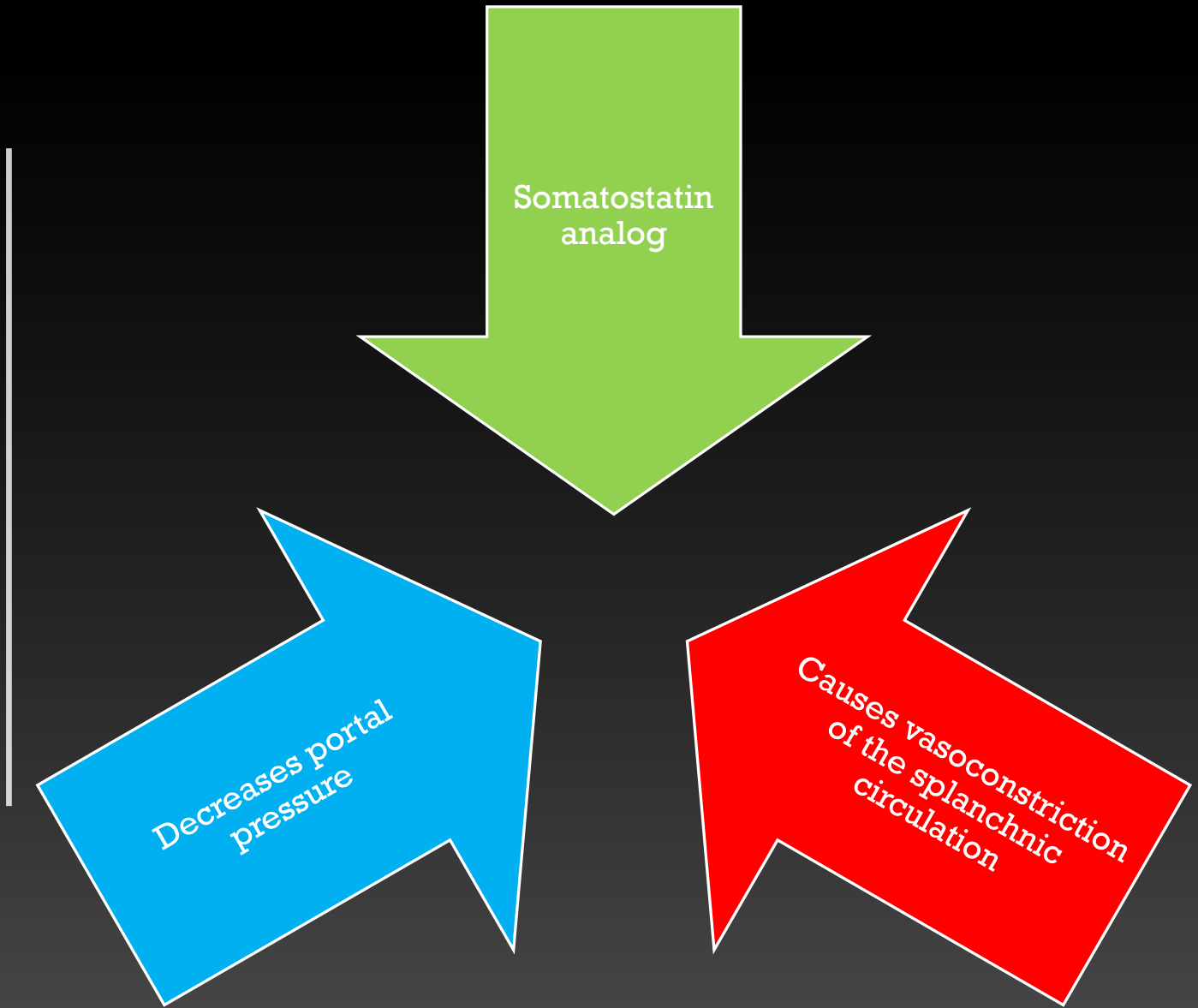


MIDODRINE

- Alpha -1 agonist
- Activates alpha-receptors in arteries and veins which will increase vascular tone and increase blood pressure
- Dose: 2.5-15 mg TID
- Side Effect: Bradycardia



OCTREOTIDE



ALBUMIN

- COLLOID
- INCREASES ONCOTIC PRESSURE
- INCREASES BP
- DOSE: 12.5-25 MG IV Q 6 HOURS

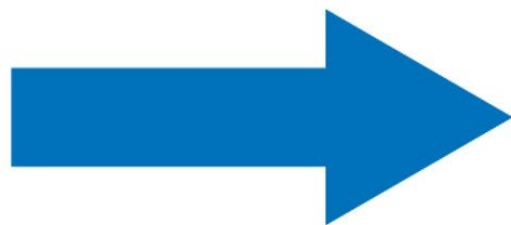


WHEN THE HRS
COCKTAIL
FAILS





ICU



VASOPRESSOR THERAPY

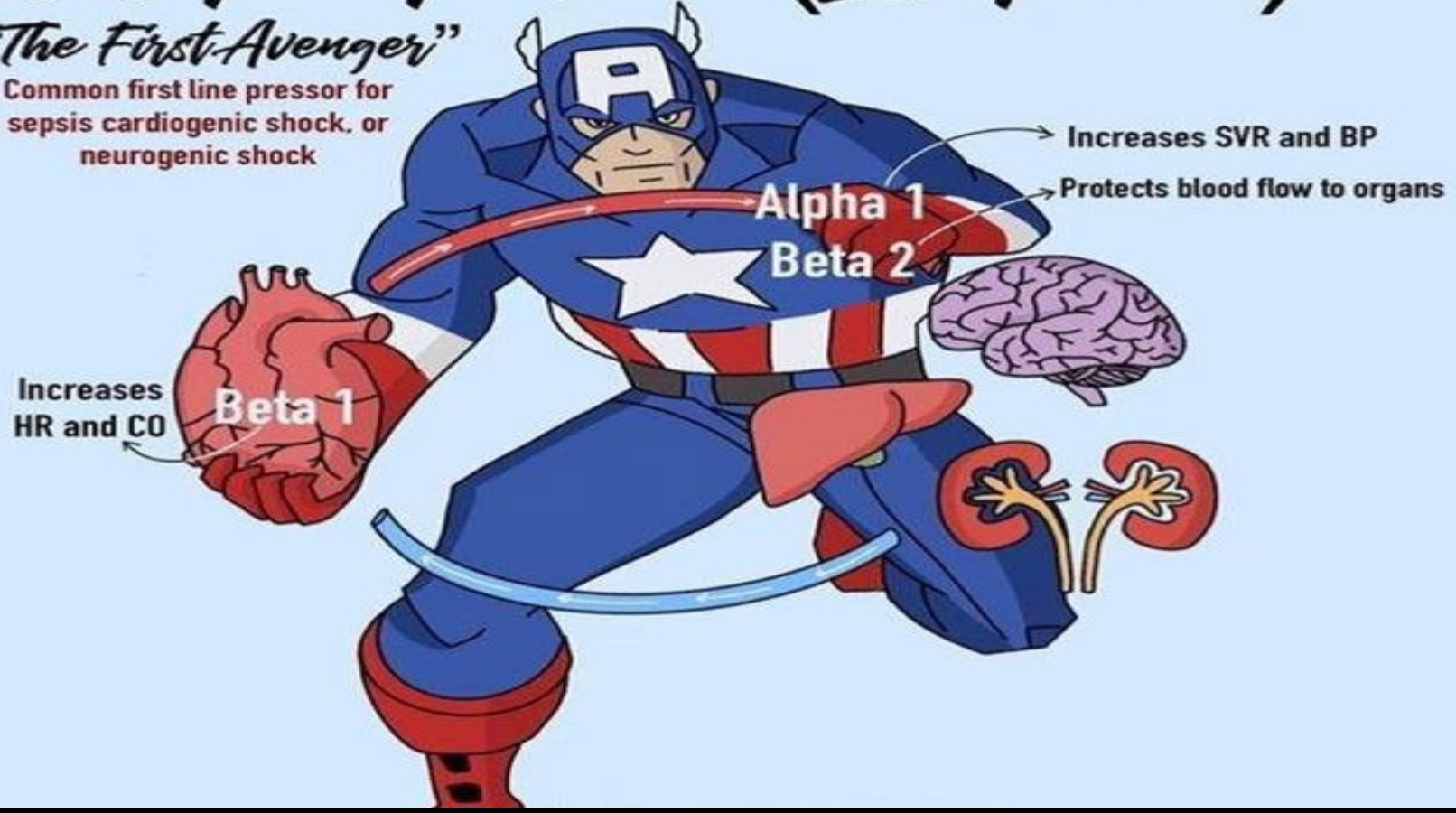
- CAUSE SMOOTH MUSCLE CONTRACTION OF VESSELS
- VASOCONSTRICTION
- INCREASE BP



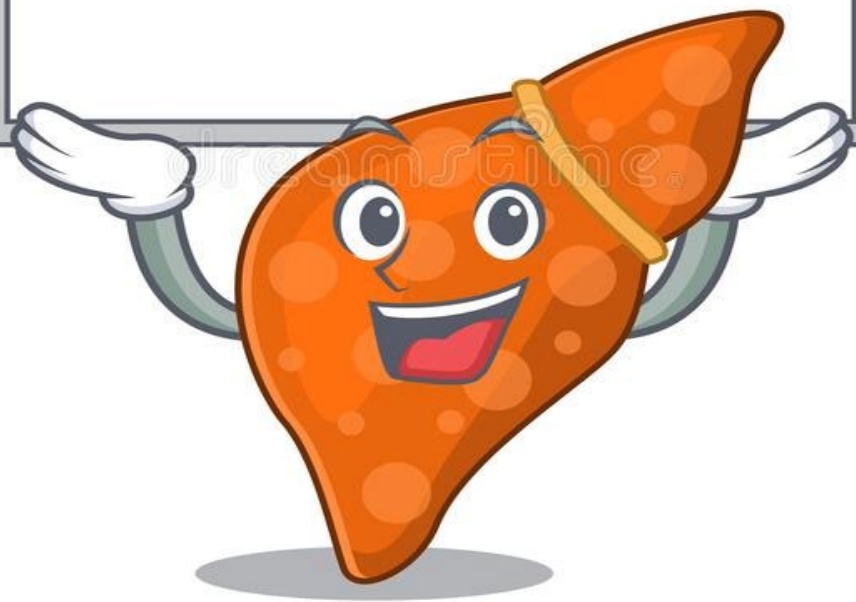
Norepinephrine (Levophed)

"The First Avenger"

Common first line pressor for
sepsis cardiogenic shock, or
neurogenic shock



CENTRAL LINE
TACHYCARDIA
PERIPHERAL ISCHEMIA

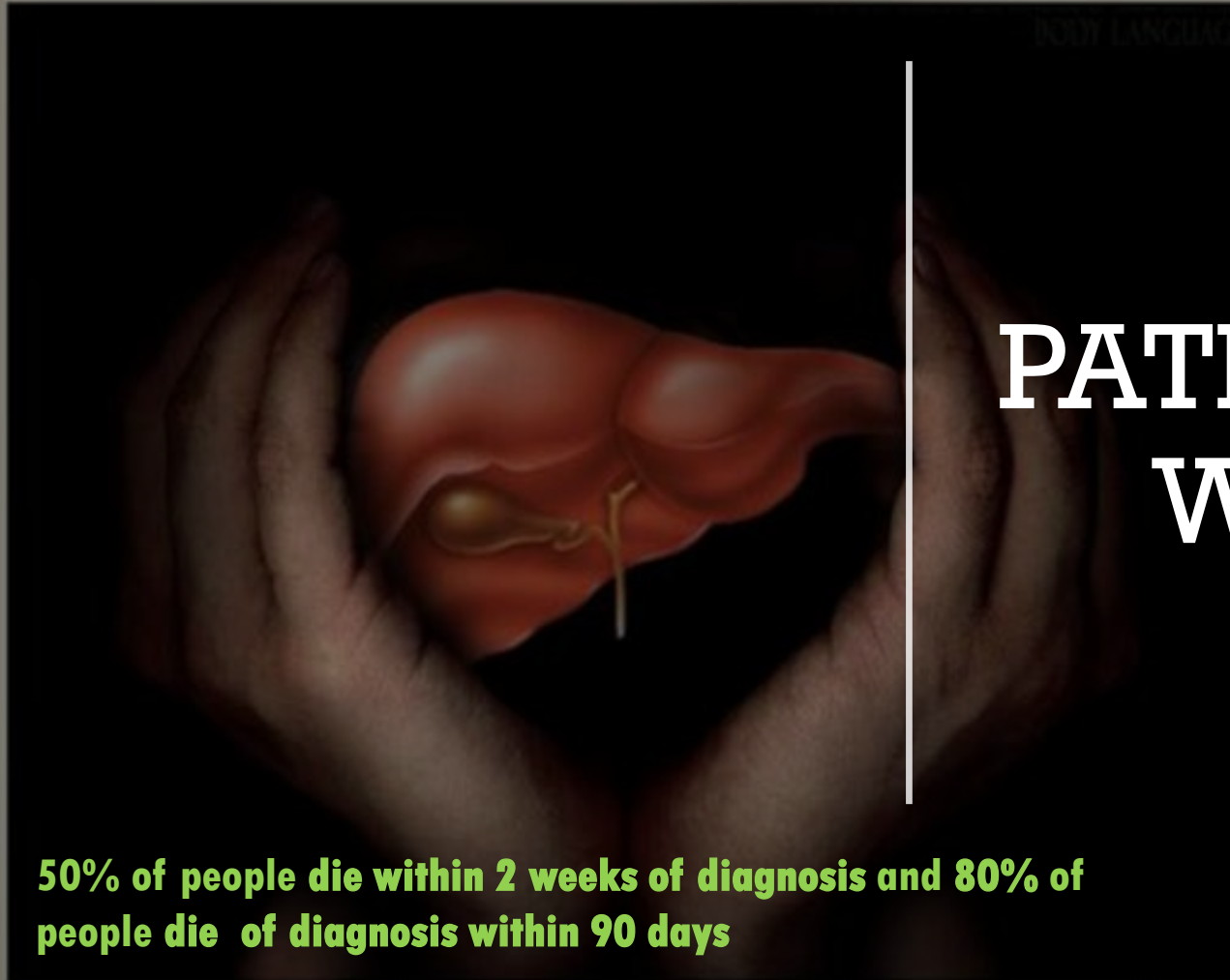




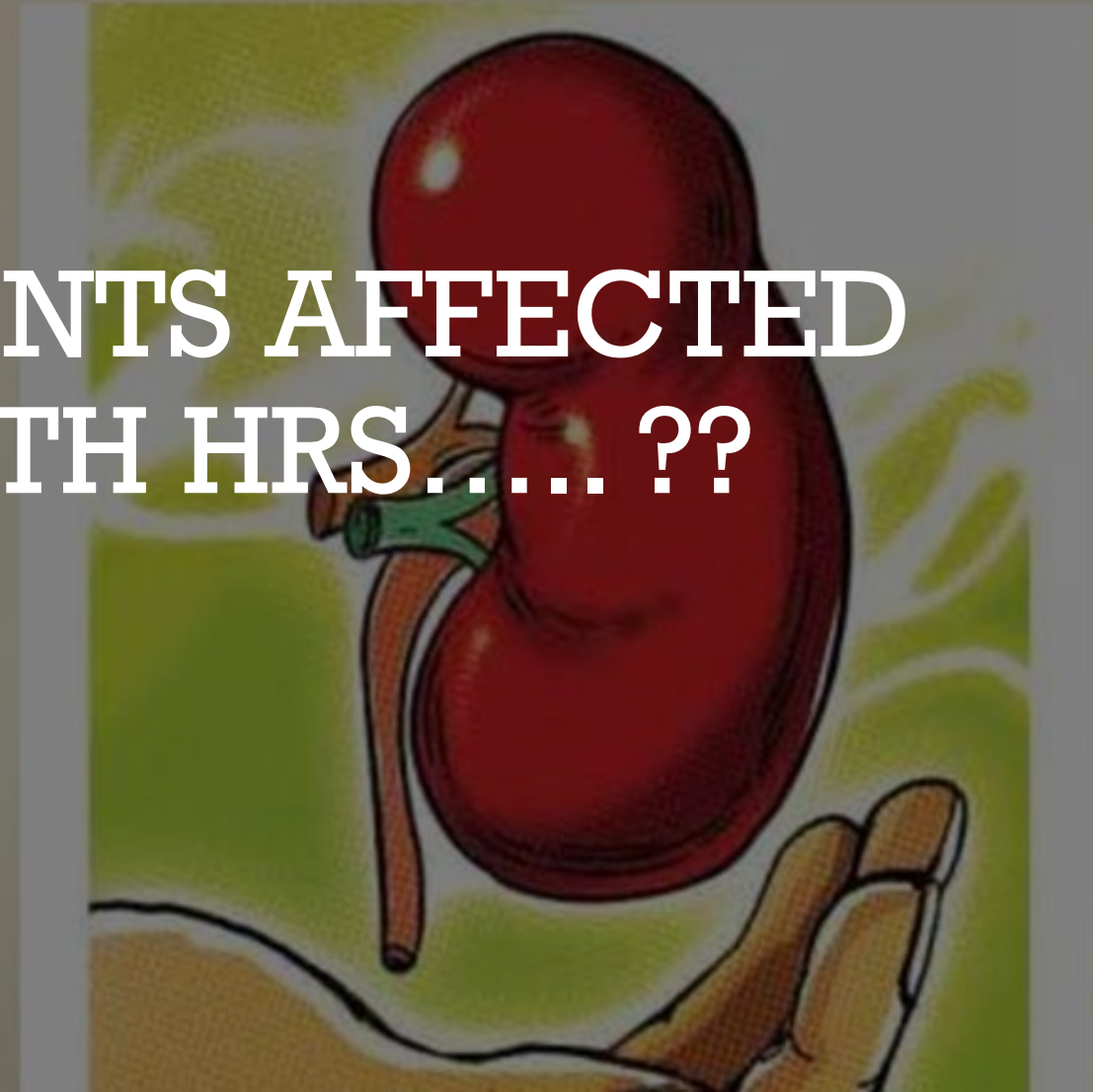
What is CRRT

- Continuous Dialysis of Critically Ill Patients in the ICU
 - ◆ The concept behind CRRT is to dialyse patients in a more physiologic way, slowly over 24 hours, just like the kidney. Intensive care patients are particularly suited to the techniques as they are by definition, bed bound and when acutely sick, intolerant of fluid swings associated with IHD
- What is the difference between CRRT and IHD
 - ◆ Slow continuous natural like the kidneys vs rapid/qod

HEPATORENAL SYNDROME



**PATIENTS AFFECTED
WITH HRS..... ??**



49 y.o. F, PMHx of HTN, Depression, hypothyroidism hx of gastric bypass 2018, chronic alcohol use, recently diagnosed with alcoholic hepatitis who presents with abdominal pain x 2 days, worsening ascites and decreased urinary output. Pt was recently admitted on 3/1/2023 for nausea and abdominal distention and was diagnosed at that time with alcoholic hepatitis.



Admission Labs:

Creatinine 5.4 (1.5)

Bilirubin 24 (14.8)

WBC 32.2

Vitals:

BP 88/58– MAP 68

HR 103

RR 22 94% RA

Afebrile

Physical exam

Jaundiced

Tachy rate, reg

Diminished breath sounds

Large ascites, ttp

AAOX3, slow to respond, + asterixis



- NEPHROTOXIC MEDS
- DEHYDRATED
- UA??? INFECTION, PROTEIN, BLOOD
- OBSTRUCTIVE CAUSE??
- INFECTION? **** MUST GET PARA



OLIGURIC/ANURIC
URINE SODIUM <5
LOW BP
Cr >0.3 -48 HOURS



HRS

- FLUID CHALLENGE
- D/C ANY DIURETICS
- KEEP MAP >70- 75
- START HRS COCKTAIL



- NO IMPROVEMENT IN 48 HOURS
 - UNABLE TO MAINTAIN MAP
 - CREATININE WORSENING



- VASOPRESSOR
- RENAL REPLACEMENT
- *** TRANSPLANT



HEPATORENAL SYNDROME



HRS-1

HRS-AKI

OLD

NEW

- ✓ $\uparrow$ in sCr ≥ 0.3 mg/dl ($\geq 26.5 \mu\text{mol/L}$) in 48h; or $\uparrow \geq 50\%$ in 3 months
- ✓ No response after volume expansion with albumin 1g/kg/d x48H
- ✓ Cirrhosis with ascites
- ✓ Absence of shock
- ✓ No current or recent use of nephrotoxic drugs (diuretics, NSAIDs)
- ✓ Absence of parenchymal kidney disease
 - No Proteinuria (>500 mg/d)
 - No Hematuria (>50 RBC/HPF)
 - Normal kidney ultrasonography

CRITERIA

HRS-2

HRS-NAKI

HRS-AKD

- ✓ $\uparrow$ in sCr $< 50\%$ in 3 months
- ✓ eGFR < 60 ml/min/1.73 m²
- ✓ No other cause of kidney disease
- ✓ Cirrhosis with ascites

HRS-CKD

- ✓ eGFR < 60 ml/min/1.73 m²
- ✓ No other cause of kidney disease
- ✓ Cirrhosis with ascites

Interpretation of MELD score

Score	3 month mortality
≥ 40	100%
30 – 39	83%
20 – 29	76%
10 – 19	27%
< 10	4%

The maximum score given for MELD is 40

All values > 40 are given a score of 40

www.unos.org/resources/MeldPeldCalculator

MELD 3.0

New MELD calculation which includes sex to account for disparity between males and females



