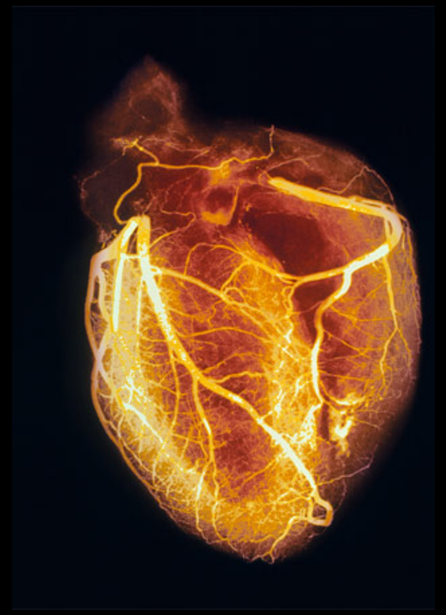
EVERYBODY'S MOST FEARED TOPIC....

PREGNANCY AND HEART FAILURE



WHAT KIND OF QUESTIONS TO EXPECT??

- “If I were a Royal College Examiner, what questions would I ask?”
- “What types of questions have been asked before?”
- “How might this year be different given the lack of an OSCE exam?”

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CARDIOVASCULAR MANAGEMENT IN PREGNANCY

Cardiovascular Physiology of Pregnancy

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Key Words: cardiovascular system ■ physiology ■ pregnancy

LIST 5 NORMAL CARDIOVASCULAR CHANGES IN PREGNANCY

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- Systemic vasodilation resulting in a drop in SVR
- Increase in cardiac output
- Decreased blood pressure
- Increased heart rate
- Dilated cardiac chambers

Table. Interrelationships of Changes in the Major Variables That Contribute to the Cardiovascular Changes in Pregnancy Compared With Preconception Values (Table view)

Preconception		Pregnancy			Labor
Baseline		First Trimester	Second Trimester	Third Trimester	
Hemodynamic	CO	↑	↑↑	↑↑	↑↑↑↑
	SVR	↓	↓↓	↓↓	
	HR	↑	↑↑	↑↑↑	↑↑↑↑
	BP	↓	↓	↔	(Pain)
Neurohumoral		↑ Sympathetic activity			
		↑ Estrogen/progesterone/relaxin			
Renin/angiotensin	Plasma volume*	↑↑	↑↑↑	↑↑↑↑	↑↑↑↑↑
RBC changes	RBC mass	↑	↑↑	↑↑	(Autotransfusion)
Structural changes	LV wall mass	↑	↑	↑	
	Chamber sizes	4-Chamber enlargement			
	Aorta	Increased distensibility			

BP indicates blood pressure; CO, cardiac output; HR, heart rate; LV, left ventricular; RBC, red blood cell; and SVR systemic vascular resistance. ↑ and ↓ reflect relative changes in parameters from preconception values.

* The greater increase in plasma volume relative to the increase in RBC mass results in the physiological anemia of pregnancy.

LIST 7 NORMAL ECHO FINDINGS IN PREGNANCY

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- Dilated LV
- Dilated RV
- Dilated LA
- Dilated RA
- Increased LV mass
- Increased cardiac output
- Increased stroke volume

Increased aortic distensibility
Trivial physiologic MR
Trivial physiologic TR

6 NORMAL CARDIAC PHYSICAL EXAM FINDINGS IN PREGNANCY

6 NORMAL PHYSICAL EXAM FINDINGS IN PREGNANCY

- Low-normal blood pressure
- Sinus tachycardia
- Systolic flow murmur
- Displaced Apex
- Elevated JVP
- S3

(Edema)

HEART FAILURE IN PREGNANCY

- What kind of questions??

HEART FAILURE IN PREGNANCY

- Pre-existing heart failure and pregnancy (ie DCM)
- Peri-partum cardiomyopathy
- Safety of heart failure medications in pregnancy
- Risk of recurrent peri-partum cardiomyopathy in those with a history thereof
- Counselling of risk (canmeds non medical expert roles still need to be tested even though no oral exam!!)
- Safety of cardiac tests in pregnancy

OTHER PREGNANCY ISSUES NOT COVERED HERE:

- What to do with warfarin (ie mechanical heart valves)
- Congenital heart disease - contraindications to pregnancy
- Conditions with maternal mortality >50% (Read and study the modified WHO criteria)
- What valvular lesions or conditions are tolerated well in pregnancy
- Different choices in women of child bearing age (meds, valves) eg. statins
- Management of common cardiac conditions in pregnancy (pericarditis for example)
- SCAD
- Aortic aneurysm risk.

RESOURCE:

Canadian Journal of Cardiology 33 (2017) 1342–1433

Society Guidelines

2017 Comprehensive Update of the Canadian Cardiovascular Society Guidelines for the Management of Heart Failure

Primary Panel: Justin A. Ezekowitz, MBBCh (Chair),[a] Eileen O'Meara, MD (Co-chair),[b] Michael A. McDonald, MD,[c] Howard Abrams, MD,[c] Michael Chan, MBBS,[d] Anique Ducharme, MD,[b] Nadia Giannetti, MD,[e] Adam Grzeslo, MD,[f] Peter G. Hamilton, MBBCh,[a] George A. Heckman, MD,[g] Jonathan G. Howlett, MD,[h] Sheri L. Koshman, Pharm D,[a] Serge Lepage, MD,[i] Robert S. McKelvie, MD,[j] Gordon W. Moe, MD,[k] Miroslaw Rajda, MD,[l] Elizabeth Swiggum, MD,[m] Sean A. Virani, MD,[n]

*There were no pregnancy related updates in 2021 guideline

POTENTIAL QUESTIONS:

- List 5 classes of medications which are safe to use to treat HFrEF in a pregnant patient.

Ezekowitz et al.
2017 CCS HF Guidelines Update

Table 35. Medications that might be useful for pregnant women with HF

Medication	Use in pregnancy*
β-Blockers	Should be continued or initiated during pregnancy Requires close fetal monitoring for growth retardation B-1 selective antagonists preferred to avoid potential increased uterine tone and decreased uterine perfusion
Digoxin	May be used if volume overload symptoms persist despite vasodilator and diuretic therapy
Diuretics	May be used, but with caution regarding excessive volume contraction leading to reduced placental perfusion
Hydralazine	May be used for management of HF symptoms or elevated blood pressure
Nitrates	May be used to treat decompensated HF pregnancy

HF, heart failure.

*Avoid all renin-angiotensin-aldosterone system inhibitors (angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, mineralocorticoid receptor antagonists, angiotensin receptor neprilysin inhibitors, renin inhibitors).

Metoprolol OK
Avoid Atenolol

VARIATIONS:

- Heart failure medications NOT safe in pregnancy
  - Renal anomalies with ACE/ARB/ARNI
  - SGLT-2 renal anomalies in animals
- A patient with DCM (FC I, EF >30, well compensated etc) on the following medications wants to conceive. What are you going to do? (stop the bad stuff, put her on the OK stuff, counsel her about risks etc)

PERIPARTUM CARDIOMYOPATHY

- What kind of questions do you think the RC might ask?

DEFINITION OF PPCM (3)

- Development of heart failure with EF <45% within 1 month of delivery or 5 months post partum. No obvious other cause of LV dysfunction.

LIST SIX RISK FACTORS FOR THE DEVELOPMENT OF PPCM(6)

- Multiparity
- Multiple fetal gestation
- Advanced maternal age
- Family history
- Diabetes
- HTN

Preeclampsia
Smoking
Ethnicity
Prolonged tocolytic therapy

PROGNOSIS AND RISK OF RECURRENCE

- EF returns to normal in 23 - 72% of patients (almost exclusively in first 6 months)
- Risk of recurrence about 1/3 in those whose EF has returned to normal
- Women should be advised against future pregnancy if EF does not return to normal.

RECOMMENDATION

150. We recommend that patients with PPCM who do not recover normal LV function should be advised against future pregnancies because of the high risk of worsening HF and death (Strong Recommendation; Moderate-Quality Evidence).
151. We recommend that patients with PPCM who recover normal LV function should be advised regarding the potential for recurrent LV dysfunction in subsequent pregnancies (Strong Recommendation; Moderate-Quality Evidence).

RECOMMENDATIONS FOR MONITORING AND AROUND DELIVERY

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- Should be followed by cardiologist/heart function clinic in a tertiary care centre with access to mechanical support/transplant if possible (and co-managed by high risk obstetrics/MFM)

- Echocardiography and BNP for monitoring (new symptoms, change in chronic symptoms)

- Bromocriptine not recommended CCS 2017 (not enough evidence). Is recommended as 'may be considered' ESC 2018.

- Vaginal delivery is preferred in women with stable heart conditions.

DISCUSSION

- Management of SCAD in pregnancy
- Antiarrhythmics safety in pregnancy
- Genetic counselling for patients with inherited heart disease wanting to conceive

MAY 2020

Circulation

AHA SCIENTIFIC STATEMENT

Cardiovascular Considerations in Caring for Pregnant Patients

A Scientific Statement From the American Heart Association

MODIFIED WHO CRITERIA

Table 6 **Modified WHO classification of maternal cardiovascular risk: principles**

Risk class	Risk of pregnancy by medical condition
I	No detectable increased risk of maternal mortality and no/mild increase in morbidity.
II	Small increased risk of maternal mortality or moderate increase in morbidity.
III	Signi cantly increased risk of maternal mortality or severe morbidity. Expert counselling required. If pregnancy is decided upon, intensive specialist cardiac and obstetric monitoring needed throughout pregnancy, childbirth, and the puerperium.
IV	Extremely high risk of maternal mortality or severe morbidity; pregnancy contraindicated. If pregnancy occurs termination should be discussed. If pregnancy continues, care as for class III.

Modified from Thorne *et al.*[72]
WHO = World Health Organization

Table 7 Modified WHO classification of maternal cardiovascular risk: application

Conditions in which pregnancy risk is WHO I
Uncomplicated, small or mild - pulmonary stenosis - patent ductus arteriosus - mitral valve prolapse
Successfully repaired simple lesions (atrial or ventricular septal defect, patent ductus arteriosus, anomalous pulmonary venous drainage).
Atrial or ventricular ectopic beats, isolated
Conditions in which pregnancy risk is WHO II or III
WHO II *(if otherwise well and uncomplicated)*
Unoperated atrial or ventricular septal defect
Repaired tetralogy of Fallot
Most arrhythmias
WHO II–III *(depending on individual)*
Mild left ventricular impairment
Hypertrophic cardiomyopathy
Native or tissue valvular heart disease not considered WHO I or IV
Marfan syndrome without aortic dilatation Aorta <45 mm in aortic disease associated with bicuspid aortic valve
Repaired coarctation
WHO III
Mechanical valve
Systemic right ventricle
Fontan circulation
Cyanotic heart disease (unrepaired)
Other complex congenital heart disease
Aortic dilatation 40 45 mm in Marfan syndrome Aortic dilatation 45 50 mm in aortic disease associated with bicuspid aortic valve

PREGNANCY CONTRAINDICATED

- Important to know

Conditions in which pregnancy risk is WHO IV (pregnancy contraindicated)
Pulmonary arterial hypertension of any cause
Severe systemic ventricular dysfunction (LVEF <30%, NYHA III IV)
Previous peripartum cardiomyopathy with any residual impairment of left ventricular function
Severe mitral stenosis, severe symptomatic aortic stenosis
Marfan syndrome with aorta dilated >45 mm Aortic dilatation >50 mm in aortic disease associated with bicuspid aortic valve
Native severe coarctation

Adapted from Thorne *et al.*[73]
LVEF = left ventricular ejection fraction; NYHA = New York Heart Association; WHO = World Health Organization.