

MOG et cardiovasculaire: mise à jour

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Société des Sciences Vasculaires du Québec

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Congrès Annuel



Centre universitaire
de santé McGill
Institut de recherche



McGill University
Health Centre
Research Institute



Divulgations / conflits d'intérêt

Institut de Recherche en Santé Canadienne (CIHR/IRSC)

Fondation de Recherche Santé Québec (FRQ-S)

Heart and Stroke Foundation of Canada (HSFC)

Honoraires: Htaq biomedical, sex differences in cardiovascular health, GEMOQ/ASMIQ, congrès société cardiovasculaire Canadienne

Aucune conflit d'intérêt

Objectifs d'apprentissage

- Comprendre le modèle multidisciplinaire “Cardio-Obstétrique”.
- Reconnaître les algorithmes (WHO, CARPREG) qui peuvent aider à stratifier les femmes selon leur risque de morbidité cardiovasculaire durant la grossesse.
- Revoir les médicaments cardiaques et leurs doses sécuritaires durant la grossesse et l'allaitement.
- Avoir une approche pour le counseling des femmes ayant subi une issue cardiovasculaire durant la grossesse.

Canadian Journal of Cardiology 37 (2021) 1886–1901

General Clinical Practice Update

Canadian Cardiovascular Society: Clinical Practice Update on Cardiovascular Management of the Pregnant Patient

Jonathan Windram, MBChB, MRCP, (Co-chair),^a Jasmine Grewal, MD, (Co-chair),^b

Natalie Bottega, MD,^c Mathew Sermer, MD,^d Danna Spears, MD,^e Lorna Swan, MBChB, MD,^{e,f}

Samuel C. Siu, MD, SM, MBA,^{f,g} and Candice Silversides, MD^{e,f}

Question

Quel déclaration est vrai?

- a) Le débit cardiaque reste constant pendant la grossesse
- b) Le débit cardiaque augmente au début de la grossesse puis se stabilise au deuxième trimestre
- c) Le débit cardiaque augmente pendant la grossesse en raison d'une augmentation de la fréquence cardiaque mais pas du volume d'éjection systolique
- d) Le débit cardiaque est le plus haut au travail et à l'accouchement

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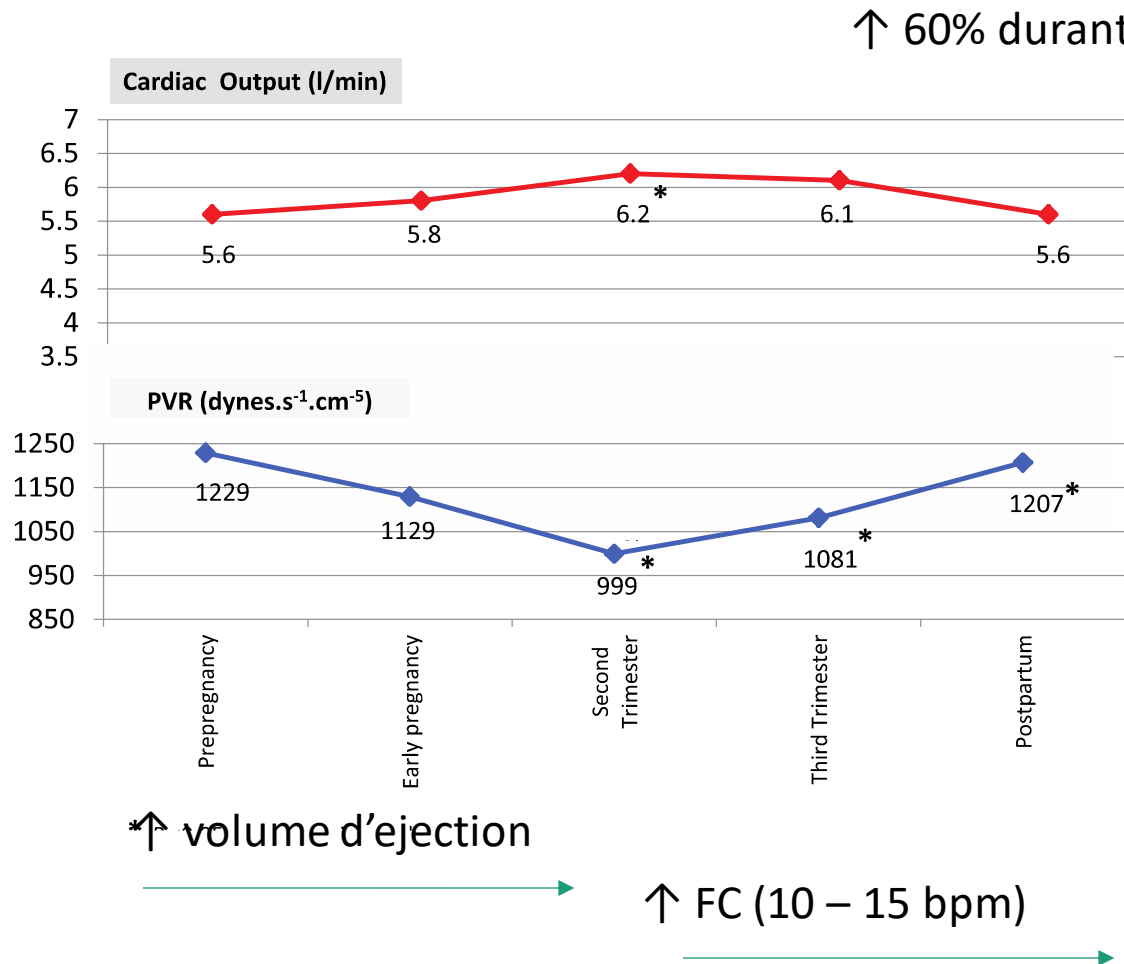
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Épreuve effort qui dure 9 mois

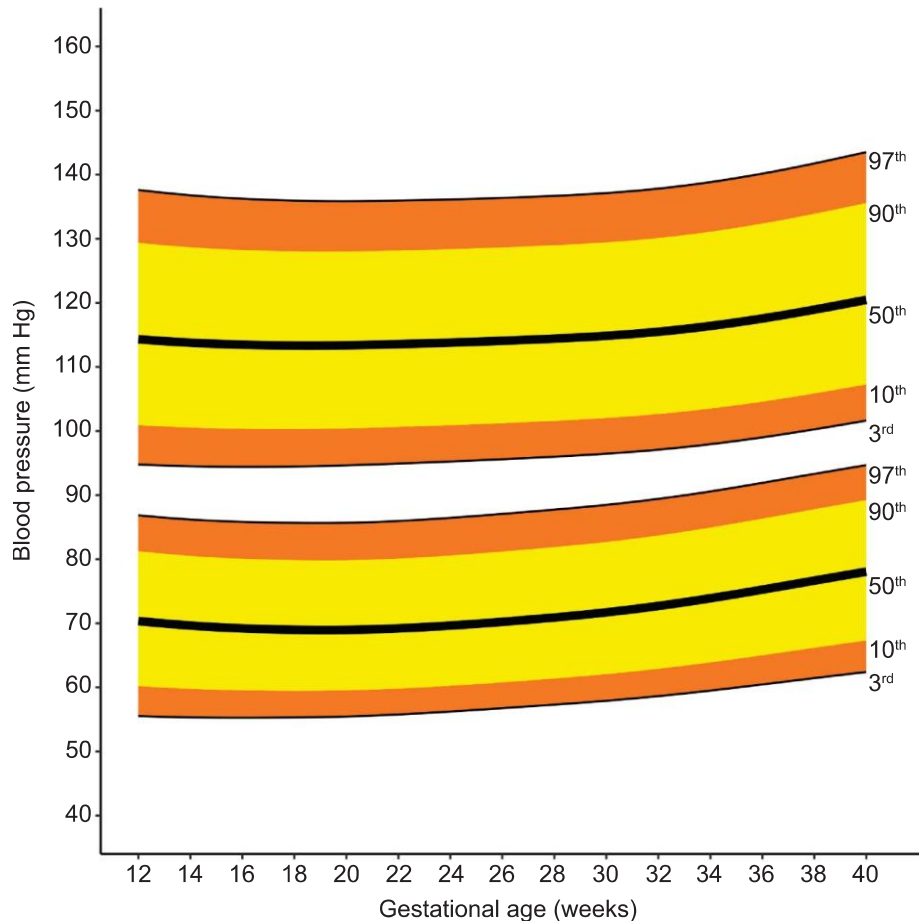


- ↑ Débit cardiaque
- ↓ resistance syst
- ↑ volume sanguin
- ↑ ventilation
- Hypercoagulabilité
- Résistance insulín

Débit cardiaque durant la grossesse



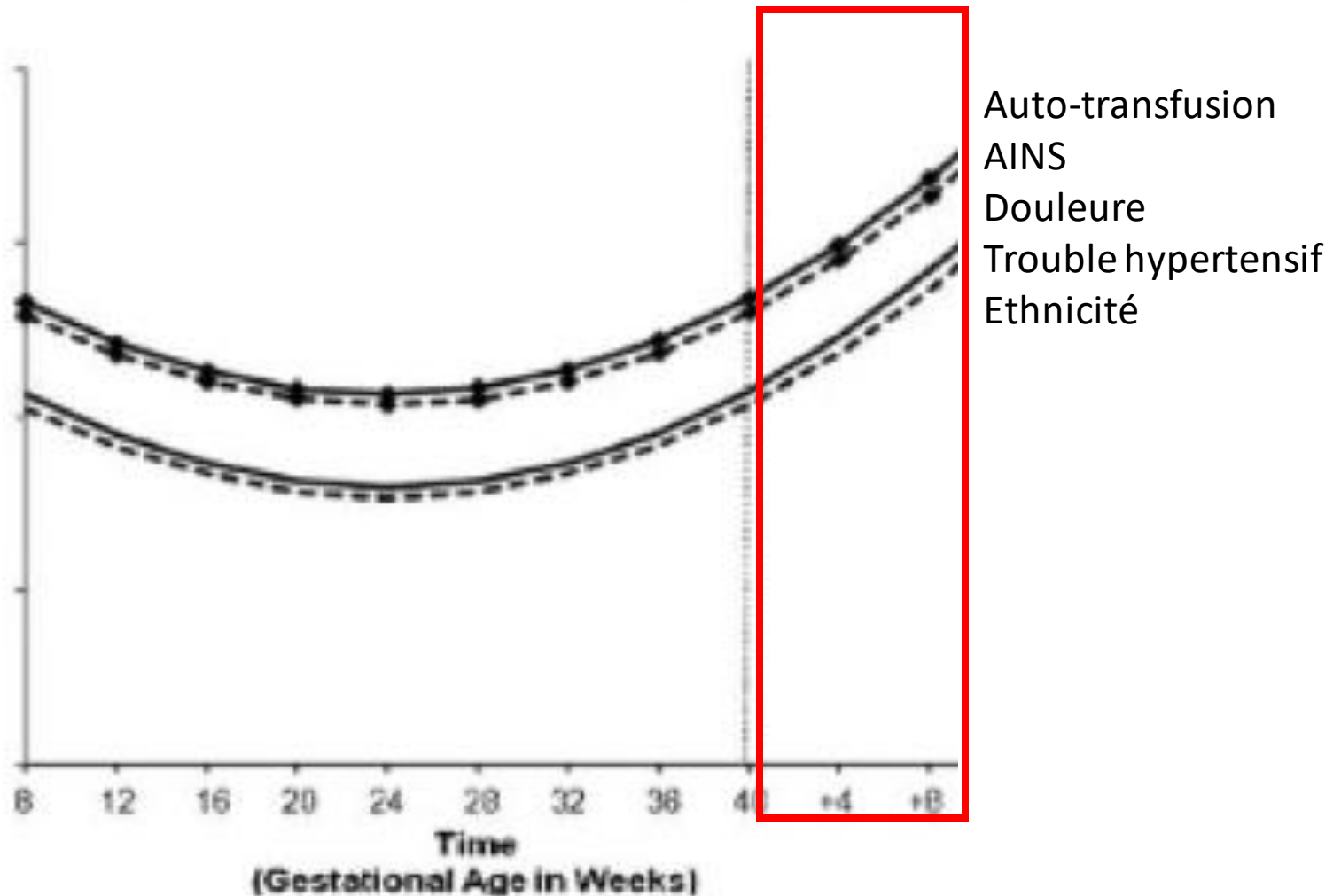
Trajectoire T.A. durant la grossesse normale



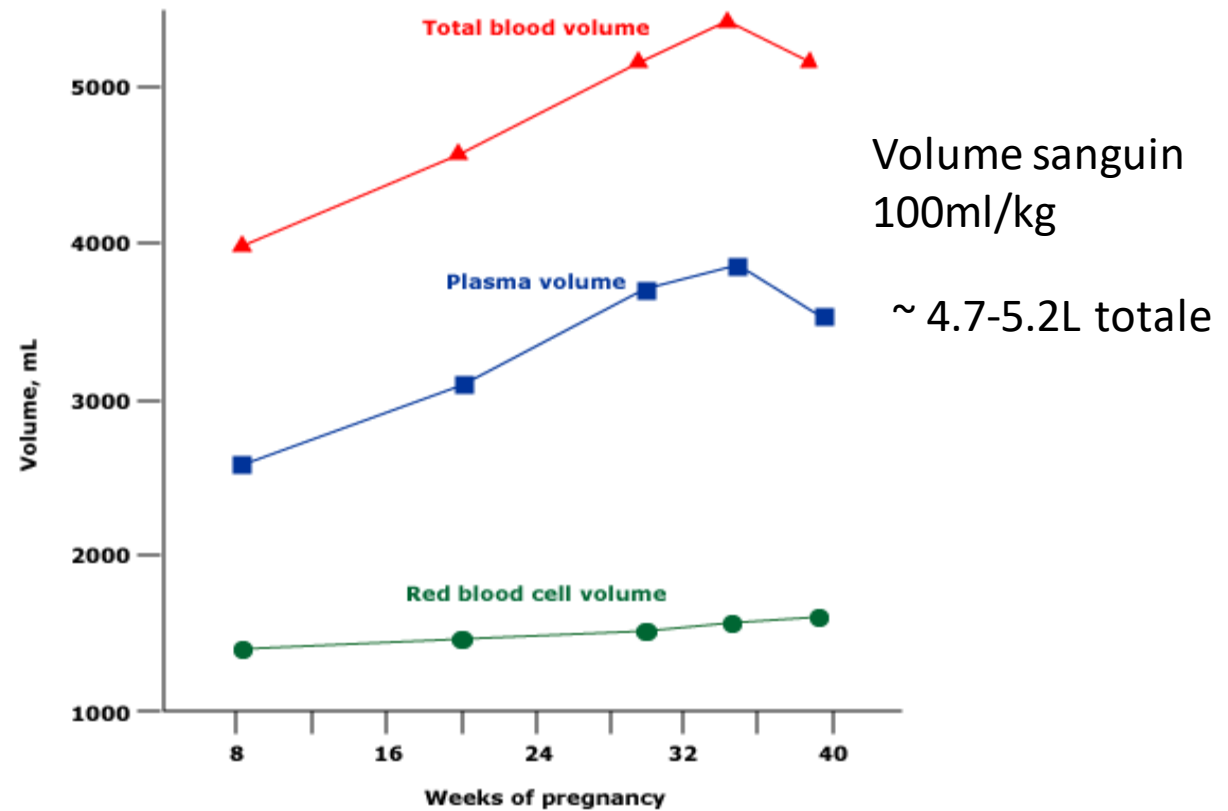
T.A. Systolique

T.A. Diastolique

Tension artérielle au période postpartum



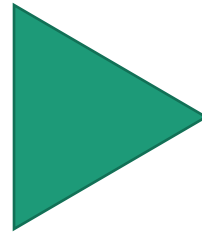
Volume sanguin durant la grossesse



Profil maternel

Increased incidence in reproductive age women:

- Congenital heart disease
- Acquired CVD
- CVD risk factors



Higher risk:

- Heart failure
- Arrhythmia
- Cardiac arrest
- Urgent cardiac intervention
- Pre-term birth/low birthweight
- Congenital anomalies
- Preeclampsia



~15%

Question et cas

34 F, G1P1 pré-conception.

Antécédent: Oédème pulmonaire en T3 durant sa première grossesse antérieure il ya 1 an. Admise au soins. Dx: cardiopathie peripartum. FEVG 35%, et elle prend: saccubril-valsartan, bisoprolol, spironolactone. Votre recommandation:

- a) Cesser entresto et spironolactone et poursuivre la grossesse
- b) Éviter la grossesse
- c) Continuer BB et ajoutons AAS
- d) Réferer dans un centre cardio-obstétrique
- e) B et D
- f) Tous les options sont correcte

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Modèle cardio-obstétrique

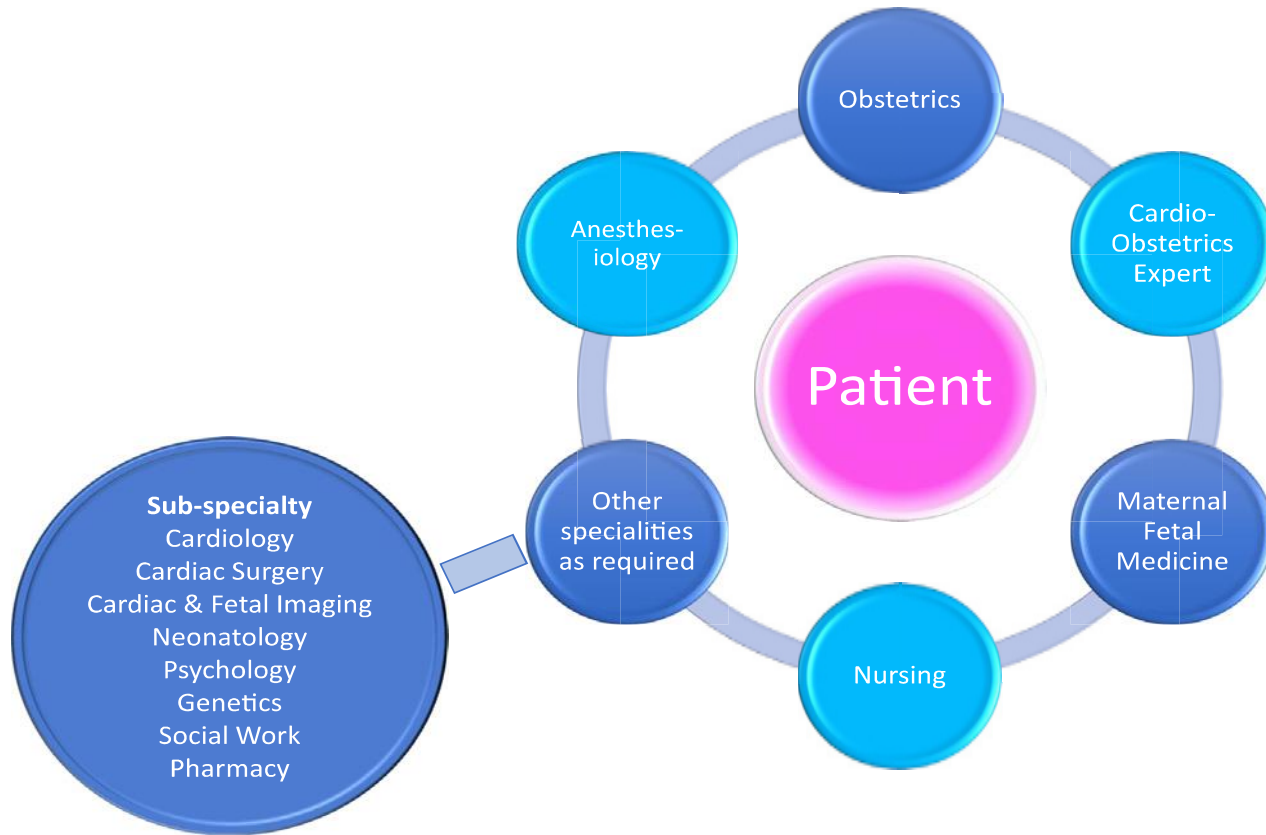


Figure 1. Multidisciplinary cardio-obstetrics team.

Modèle cardio-obstétrique



Pré-conception

- Scores/outils
- Grossesse contre-indiquée
- Gestion pharmaco

Modèle cardio-obstétrique



Pré-conception



**Surveillance
antepartum**

- Echo mat/fetal
- Examen physique T3
- Gestion pharmaco

Modèle cardio-obstétrique



Pré-conception



**Surveillance
antépartum**



**Planification pour
l'accouchement**

- Moniteur cardiaque
- Mode d'accouchement
- Valves intraveineux

Modèle cardio-obstétrique



Pré-conception



**Surveillance
antépartum**



**Planification pour
l'accouchement**



**Postpartum/
allaitement**

- Rx et allaitement
- Changements hémodynamique
- Dépistage facteurs de risque CV

Programmes cardio-obstétrique



Québec:

CUSM

CHUM

CHU-Ste Justine

Stratification des risques: CARPREG II

	CARPREG II (Points in Brackets)
Functional predictors	- Cardiac event (heart failure, transient ischemic attack, stroke, or arrhythmia requiring treatment) before current pregnancy* (3) - Baseline NYHA III or IV or cyanosis (3) - Systemic ventricular ejection fraction < 55% (2) - Left heart obstruction (mitral valve area < 2 cm² or aortic valve area < 1.5 cm², or peak left ventricular outflow tract gradient > 30 mm Hg) or at least moderate-severe mitral regurgitation (2)
Lesion specific predictors	- Mechanical valve (3) - Pulmonary hypertension[†] (2) - Coronary artery disease[‡] (2) - High-risk aortopathy[§] (2)
Process predictor	- No prior cardiac interventions (1) - Late pregnancy assessment[¶] (1)
Sum of points and corresponding cardiac risk	0 to 1 point = 5% 2 points = 10% 3 points = 15% 4 points = 22% > 4 points = 41%

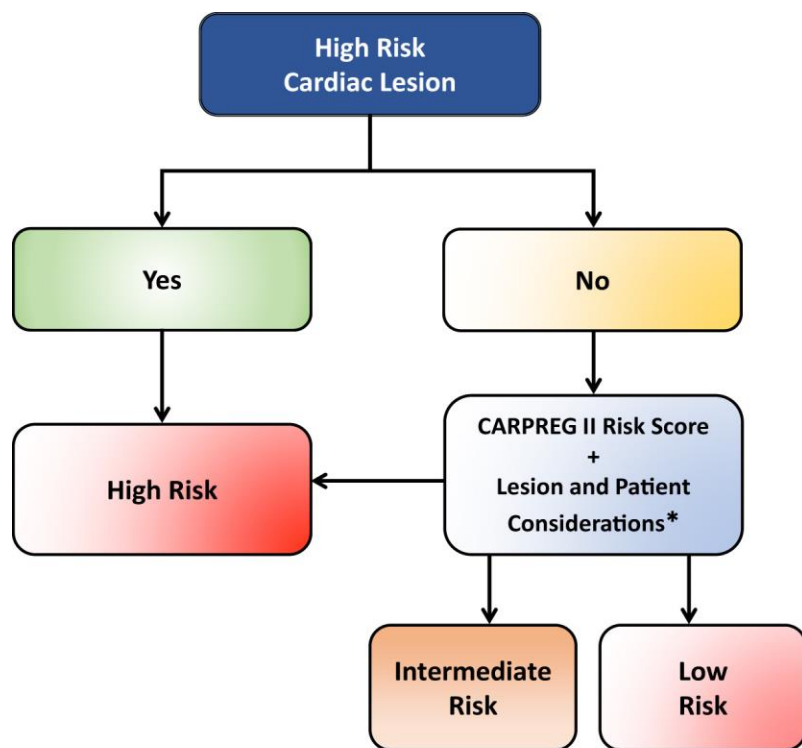
Autres outils:

ZAHARA score

Khairy score

ROPAC

mWHO



High Risk Cardiac Lesion
Eisenmenger syndrome or severe pulmonary hypertension
Prior peripartum cardiomyopathy with reduced left ventricular ejection fraction
Severe hereditary thoracic aortopathy • Marfan syndrome with aorta > 45 mm or prior aortic replacement • Vascular Ehlers-Danlos syndrome • Turner syndrome with index aortic dimension > 25 mm/m² or high-risk features • Loeys-Dietz syndrome • Bicuspid aortopathy with aorta >50 mm
Symptomatic severe aortic or mitral stenosis
LV ejection fraction < 30% or ventricular assist device
Fontan procedure with arrhythmia, ventricular systolic dysfunction, or other complications
Coronary artery dissection

WHO comprehensive risk stratification

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	Significantly 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

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

If woman does become pregnant:
Bimonthly cardio surveillance
Delivery in high risk centre/monitored setting

Médicaments CV & Grossesse



CONDITION



GROSSESSE

Médicaments CV & Grossesse

Est-un médicament **nécessaire** pour
traiter la mère?

Si OUI:

Quel est l'agent le plus **sécuritaire** et le
dose le plus efficace?

Médicaments & Grossesse



Data from observational studies are often conflicting regarding the safety of medication in pregnancy and lactation. Therefore, the **risks vs benefits** of treatment should be discussed with the patient on an individual basis. Potential adverse events should be anticipated and screened for (eg, growth restriction).

Drugs that are considered safe	Drugs with limited/conflicting data/use with caution	Drugs that are considered contraindicated	Drugs that are considered contraindicated when breast feeding
Arrhythmia Adenosine, Bisoprolol, Digoxin*, Lidocaine, Metoprolol, Nadolol, Propranolol	Arrhythmia Diltiazem, Flecainide, Procainamide, Propafenone, Sotalol, Verapamil	Arrhythmia Amiodarone**, Atenolol, Ivabradine	Arrhythmia Amiodarone, Ivabradine
Hypertension/Heart failure Labetalol, Methyl-dopa, Metoprolol, Nifedipine, Bumetanide, Carvedilol, Furosemide, Dobutamine, Dopamine, Norepinephrine	Hypertension/Heart failure Amlodipine, Hydralazine, Nitrates, Nitroprusside, Hydrochlorothiazide, Metolazone, Milrinone, Torsemide	Hypertension/Heart failure ACE-inhibitors, Aldosterone antagonists, ARBs, ARNi, SGLT-2 inhibitors	Hypertension/Heart failure ACE-inhibitors other than Captopril, Lisinopril or Enalapril, Aldosterone antagonists, ARBs, ARNi, SGLT-2 Inhibitors
Anticoagulation/Antiplatelets/Thrombolytics Aspirin, Low molecular weight heparin, Unfractionated heparin	Anticoagulation/Antiplatelets/Thrombolytics Clopidogrel, Ticagrelor, Warfarin, Argatroban, Bivalirudin, Fondaparinux, Alteplase, Streptokinase, Tenecteplase	Anticoagulation/Antiplatelets/Thrombolytics Direct oral anticoagulants	Anticoagulation/Antiplatelets/Thrombolytics Direct oral anticoagulants
	Pulmonary Hypertension/Others Epoprostenol, Iloprost, Sildenafil, Treprostinil	Pulmonary Hypertension/Others Bosentan and other ERAs, Statins	Pulmonary Hypertension/Others Statins, Bosentan & other ERAs

*Digoxin serum levels are unreliable during pregnancy. ** May be used if other therapies have failed.

Cas/question

45F G1P1 3 mois postpartum. La première grossesse FIV a été compliqué par la prééclampsie sévère avec hta sévère (200/115) et saignement cérébrale.

Maintenant sa TA est 134/87, elle prend aucune médicament, et elle viens pour la rassurance. Lequel des déclarations est vrai?

- a) Prééclampsie est associé avec un risque élevé x2 de MCAS 10 à 15 ans postpartum
- b) Prééclampsie se résolu toujours avec l'accouchement
- c) La complication la plus fréquente relié à la prééclampsie est l'insuffisance renal
- d) Aucune declaration est vrai

Cas/question

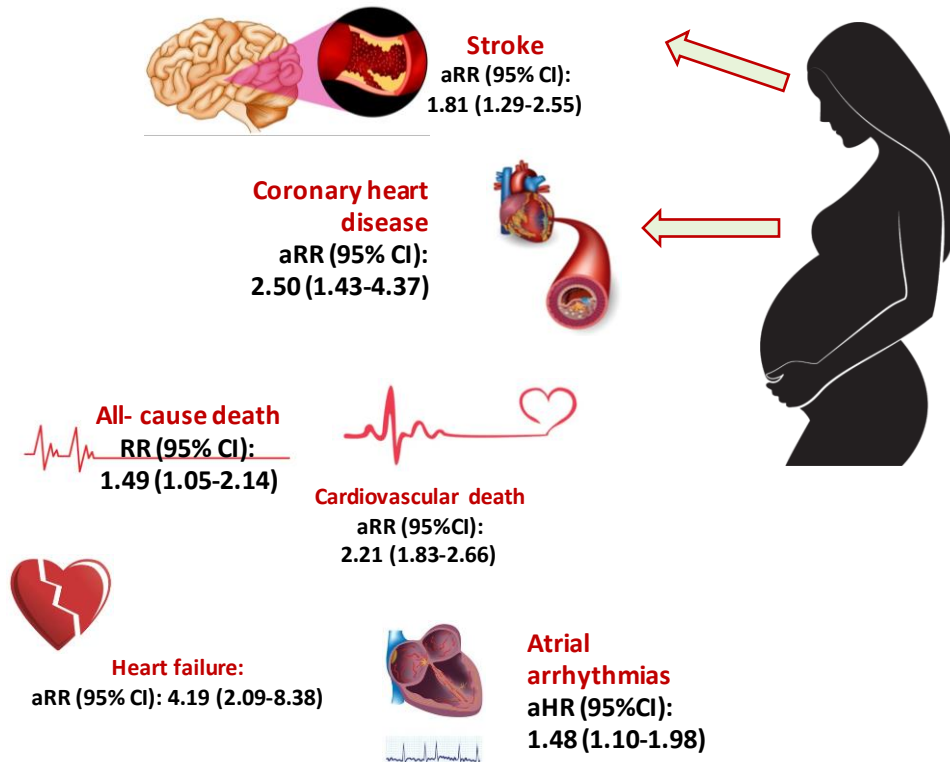
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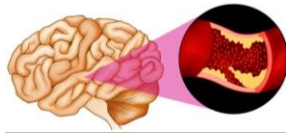
LES CONSÉQUENCES À LONG-TERME SUITE À UN TROUBLE HYPERTENSIF

MALADIES CARDIOVASCULAIRES



LES CONSÉQUENCES À LONG-TERME SUITE À UN TROUBLE HYPERTENSIF

MALADIES CARDIOVASCULAIRES

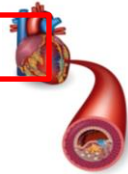


Stroke

aRR (95% CI):
1.81 (1.29-2.55)

Coronary heart disease

aRR (95% CI):
2.50 (1.43-4.37)



All- cause death
RR (95% CI):
1.49 (1.05-2.14)



Cardiovascular death

aRR (95%CI):
2.21 (1.83-2.66)



Heart failure:

aRR (95% CI): 4.19 (2.09-8.38)



Atrial arrhythmias

aHR (95%CI):
1.48 (1.10-1.98)

FACTEURS DE RISQUE

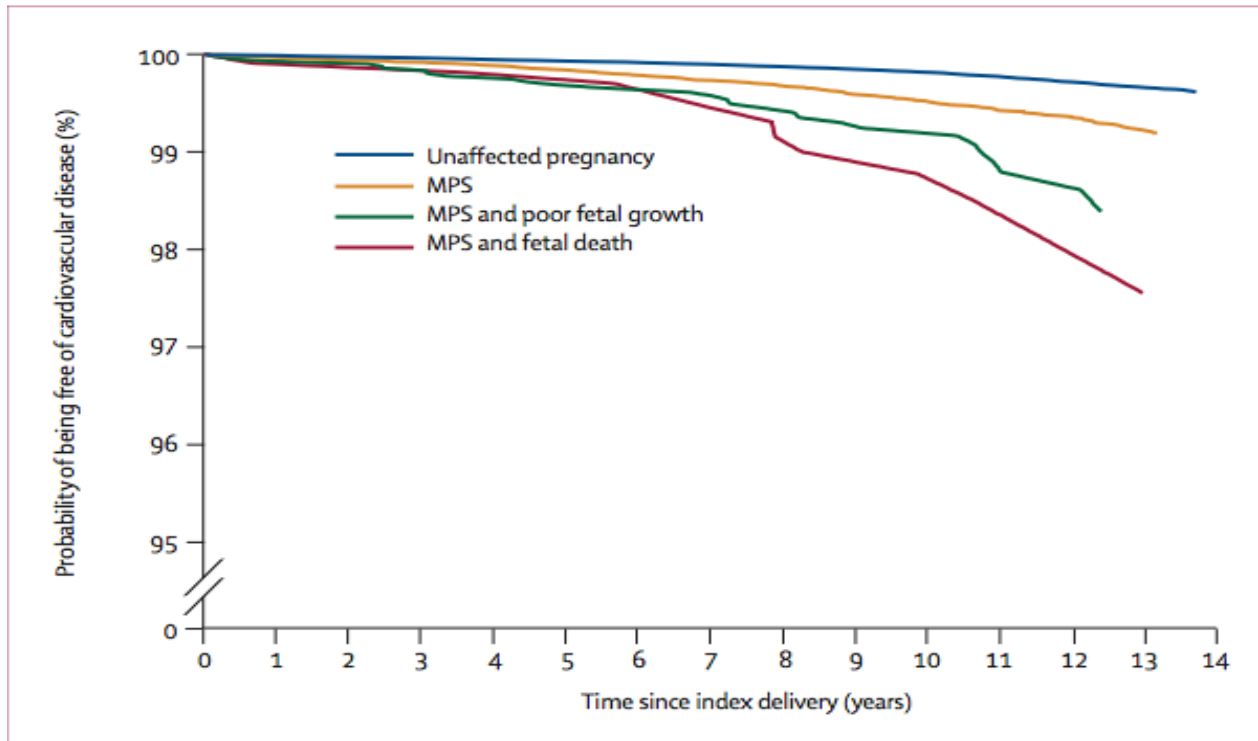


Hypertension

RR (95% CI):
3.7 (2.7-5.1)

Kidney disease: RR~2-10
Type 2 DM: RR 2-4
Dyslipidemia: RR 2-4

Une association “dose response”



MPS = “maternal placental syndrome” (Prééclampsie)

Figure 1: Risk of premature cardiovascular disease associated with a maternal placental syndrome (MPS) or an affected fetus, or both

Ray JG et al. Lancet 2005

Une association “dose response”

	Cumulative incidence 25 years after delivery per 1000 (95% CI)		
	Recurrent (N=6066)	Non-recurrent (N=33 493)	No pre-eclampsia (N=567 261)
Cardiovascular	281.4 (224.1 to 341.3)	167.7 (158.2 to 177.4)	72.6 (70.9 to 74.2)

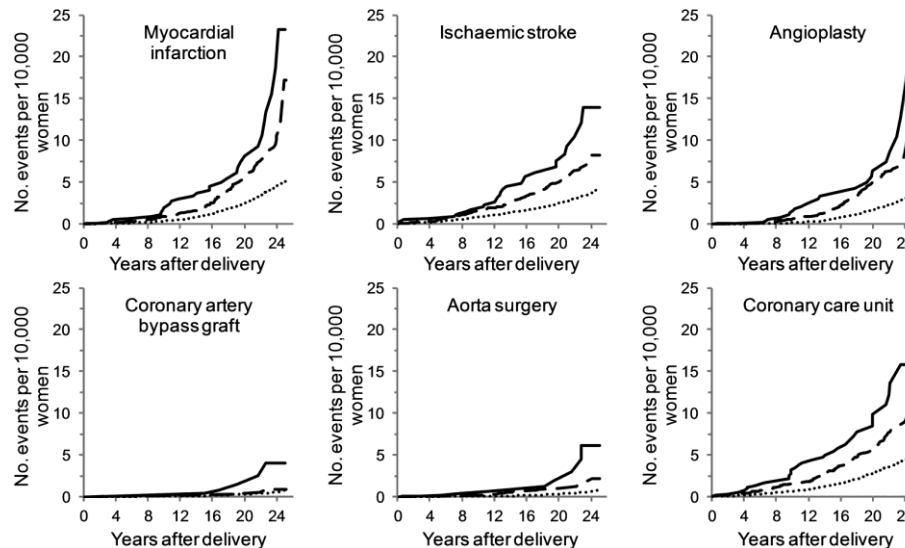
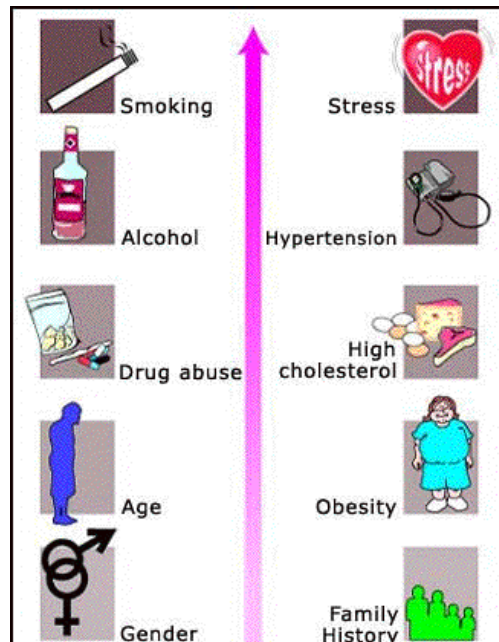


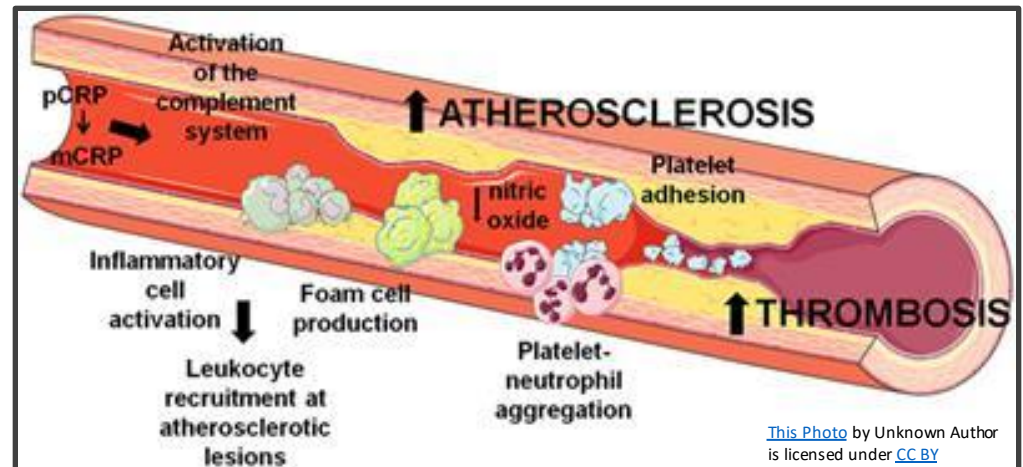
Figure 1 Cumulative incidence of cardiovascular events for recurrent, non-recurrent and no pre-eclampsia among women with two deliveries or more. Solid line, recurrent pre-eclampsia; dashed line, non-recurrent pre-eclampsia; dotted line, no pre-eclampsia.

Le mécanisme?

Prédisposition



Vieillessement vasculaire accéléré



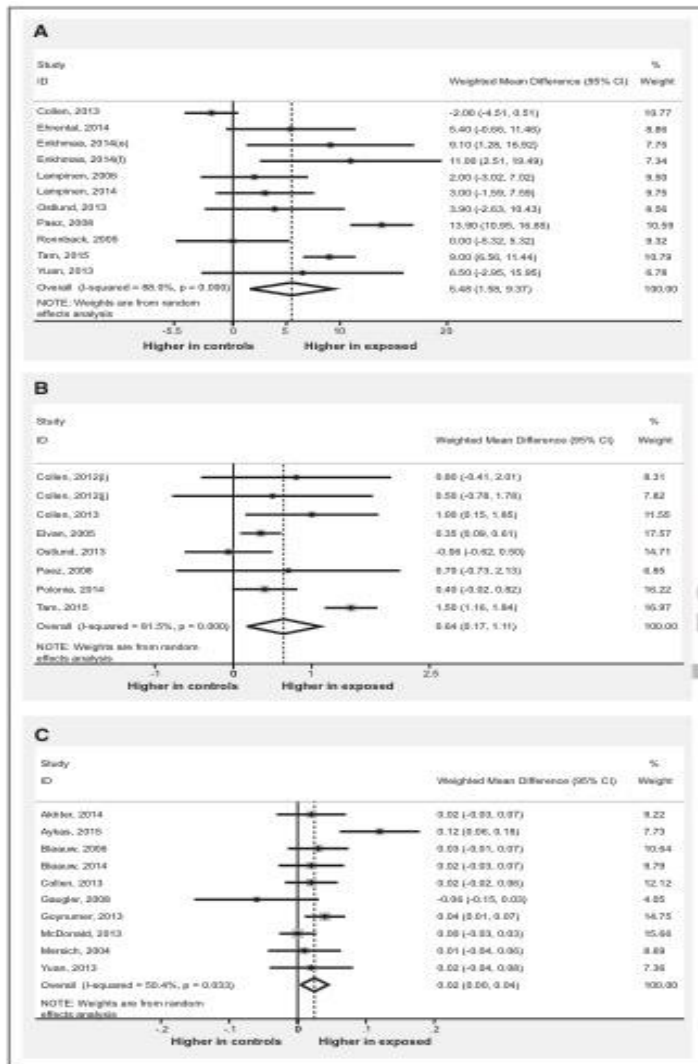
ATTEINTE VASCULAIRE SUITE AUX TROUBLES HYPERTENSIFS DE LA GROSSESSE

PE vs grossesse normotensive:

↑Rigidité artérielle

↑ Athérosclerose sub-clinique

Figure 2. Results of weighted mean difference (WMD) between women with and without prior hypertensive disorders of pregnancy (HDP) of pooled imaging modalities. Augmentation index (AIx, %; **A**); carotid-femoral pulse wave velocity (cfPWV, m/s; **B**); and carotid intima-media thickness (cIMT, mm; **C**). *Higher values of AIx, cIMT, and cfPWV means more vascular impairment.



Suivi postpartum: Recommendation

Table 2 Cardiovascular follow-up after a hypertensive disorder of pregnancy

Guideline	Year	Follow-up CVD risk
Guidelines with no recommendations regarding cardiovascular follow-up		
WHO*	2011	None
ISSHP	-	None
Guidelines with no specific timeline recommendations regarding cardiovascular follow-up		
ACOG	2013 and 2018	Women with preterm delivery (<37 weeks) or recurrent pre-eclampsia: annual blood pressure, lipids, fasting glucose and BMI. No recommendation on starting time and which healthcare provider.
RCOG ⁴⁴	2006	Inform about increased CVD risk in the future.
SOGC ⁴⁵	2014	Assessment of traditional cardiovascular risk markers may be beneficial. Encourage a healthy diet and lifestyle, especially, for overweight women.
Guidelines with timeline recommendations regarding cardiovascular follow-up		
NICE†	2017	Discuss future CVD risk 6–8 weeks after pregnancy with healthcare provider.
ASA ⁴³	2014	Consider to evaluate and treat all women with a history of pre-eclampsia for cardiovascular risk factors such as hypertension, obesity, smoking and dyslipidemia, starting 6 months to 1 year post partum.
ESC/ESH ^{42 46}	2018	Annual check of blood pressure and metabolic factors by primary care physician.
SOMANZ ⁴⁷	2014	Cardiovascular risk assessment every 5 years.
AHA ^{39 49}	2011/2018	Postpartum referral by the obstetrician to a primary care physician or cardiologist to monitor and control cardiovascular risk factors. Consider statin therapy in women with 10-year ASCVD risk of 5%–7.5%.
NVOG ⁵⁰	2014	Cardiovascular risk assessment at the age of 50 years.

OBSTETRICS

The maternal health clinic: an initiative for cardiovascular risk identification in women with pregnancy-related complications

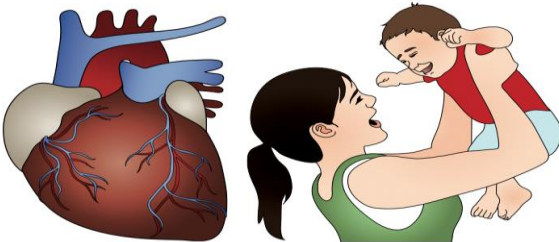
Maria C. Cusimano, BHSc; Jessica Pudwell, MPH; Michelle Roddy, RN, BScN; Chan-Kyung Jane Cho, PhD;
Graeme N. Smith, MD, PhD

The Maternal Cardiovascular Health Clinic (**MatCH**)

- PE/hta gest

Healthy Heart Habits after Pregnancy:

Taking good care of yourself so you can
take care of your family



- Suivi 1-2 semaines après congé pour évaluation T.A.
- 3 à 6 mois postpartum, clinique 2 x / mois, 8-10 ptes/clinique, ~150 consultes/ann
- Infirmière clinicienne, assistant clinique
- TA, IMC, santé mentale, profile metabol, +/- ABPM +/- recherche causes 2aire
- ~ 30% "anormale" ; ~ 50% obésité classe II, III

CANADIAN
POST PREGNANCY
CLINICAL
NETWORK

- K Nerenberg, U Calgary

Society Guidelines

2021 Canadian Cardiovascular Society Guidelines for the Management of Dyslipidemia for the Prevention of Cardiovascular Disease in Adults

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Arden R. Barry, PharmD,^d Patrick Couture, MD, PhD,^e Natalie Dayan, MD,^f

Gordon A. Francis, MD,^g Jacques Genest, MD,^b Jean Grégoire, MD,^h Steven A. Grover, MD,^f

Milan Gupta, MD,ⁱ Robert A. Hegele, MD,^j David Lau, MD, PhD,^k Lawrence A. Leiter, MD,^l

Alexander A. Leung, MD,^m Eva Lonn, MD,ⁿ G.B. John Mancini, MD,^o Priya Manjoo, MD,^p

Ruth McPherson, MD, PhD,^q Daniel Ngui, MD,^r Marie-Eve Piché, MD, PhD,^s

Paul Poirier, MD, PhD,^s John Sievenpiper, MD, PhD,^t James Stone, MD, PhD,^u

Rick Ward, MD,^v and Wendy Wray, RN, MScN^w

Recommendations:

1. Profile lipidique suite à hta gest/PE, MIU/RCIU, DG
2. Counseling sur le risque CV augmenté, habitudes de vie
3. Utilisation calculatrice 30 ans (long-terme) > Framingham/10 ans

Discussion avec la patiente:

- Traitement anti-lipidique à considérer selon risque individuel, incluant les facteurs reproductive (PE sévère/précoce, PE à répétition)
- Utilisation des statins hydrophiliques (pravastatin) > lipophiliques (atorvastatin) chez la patiente age reproductive

Table 1. Who to screen for dyslipidemia in adults at risk

Who to screen

Men 40 years of age or older; women 40 years of age or older (or postmenopausal)

- Consider earlier in ethnic groups at increased risk such as South Asian or indigenous individuals

All patients with any of the following conditions, regardless of age

- Clinical evidence of atherosclerosis
- Abdominal aortic aneurysm
- Diabetes mellitus
- Arterial hypertension
- Current cigarette smoking
- Stigmata of dyslipidemia (corneal arcus, xanthelasma, xanthoma)
- Family history of premature CVD*
- Family history of dyslipidemia
- CKD (eGFR ≤ 60 mL/min/1.73 m² or ACR ≥ 3 mg/mmol)
- Obesity (BMI ≥ 30)
- Inflammatory diseases (RA, SLE, PsA, AS, IBD)
- HIV infection
- Erectile dysfunction
- COPD
- History of hypertensive disorder of pregnancy

ACR, albumin-to-creatinine ratio; AS, ankylosing spondylitis; BMI, body mass index; CKD, chronic kidney disease; COPD, chronic obstructive pulmonary disease; CVD, cardiovascular disease; eGFR, estimated glomerular filtration rate; IBD, inflammatory bowel disease; PsA, psoriatic arthritis; RA, rheumatoid arthritis; SLE, systemic lupus erythematosus.

*Men younger than 55 years of age and women younger than 65 years of age in first-degree relatives. Data from Anderson et al.¹

Conclusion

- Les issues cardiovasculaire chez la patiente enceinte est de plus en plus fréquente
- Des programs cardio-obstétriques aident avec le soin des patientes atteintes des maladies CV qui sont enceinte ou qui veulent tomber enceinte
- Plusieurs médicaments peuvent être prescrit durant la grossesse et l'allaitement
- La prééclampsie touche le système cardiovasculaire danss le future immédiat et à long terme

Merci!

- Questions?