



# Terhesség és szívbetegség

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Kardiológiai Központ

# Epidemiológia

- Gyakoriság: 0.2-4%/összes terhesség

Jellemző, hogy:

- számuk nő,
  - egy-egy orvos kevés beteget lát,
  - kevés randomizált vizsgálat – „C” evidenciák
- 
- Hipertónia az összes terhesség 6-8%-ban
  - Nyugati világ: congenitális - 75- 82% (shunt 20-65%)
  - Fejlődő országok: 56-89% reumás billentyűbetegségek.

## Pregnancy and Heart Disease Registry

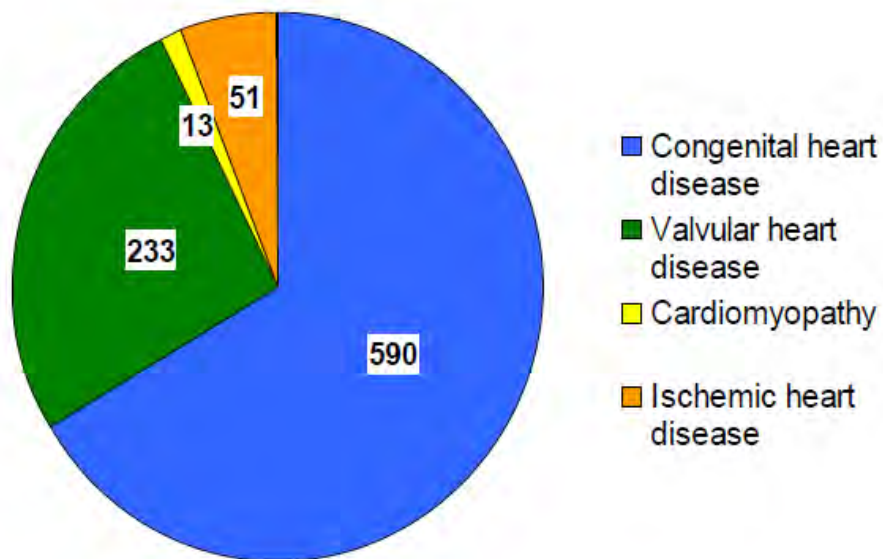
### Ongoing and planned studies

2009	2010	2011	2012
Heart Failure pilot	Heart Failure pilot	Heart Failure Long-term	Heart Failure long term
Pregnancy in Cardiac Diseases	Pregnancy in Cardiac Disease	Pregnancy in Cardiac Disease	Pregnancy in Cardiac Disease long term
	Atrial Fib. Ablation pilot	Atrial Fib. Ablation pilot	Atrial Fib.Ablation
		TransCatheter Valve Treatment pilot	TransCatheter Valve Treatment long term
			Angina/IHD long term
			Cardiomyopathies long term
			Atrial Fibrillation Pilot
			EUROASPIRE IV

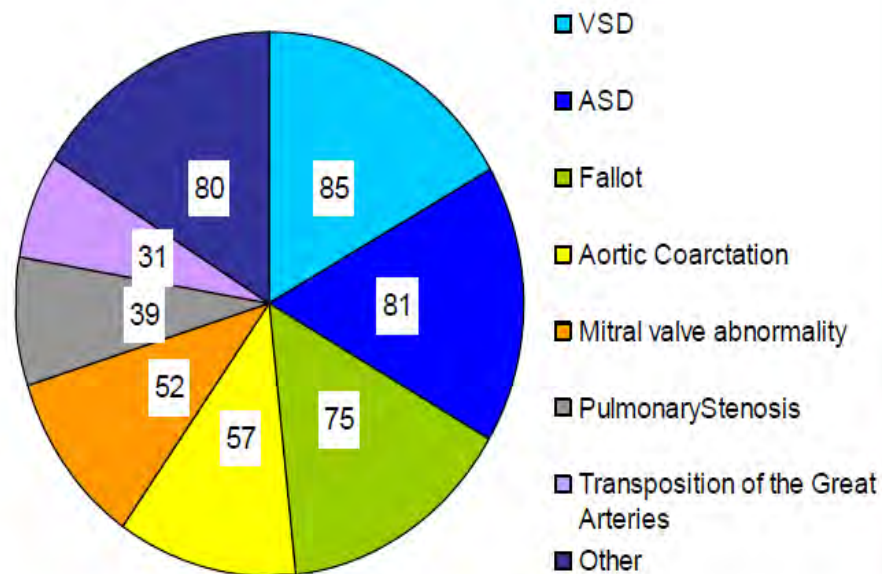
## Pregnancy and Heart Disease Registry

897 beteg\*

Fő diagnózisok:



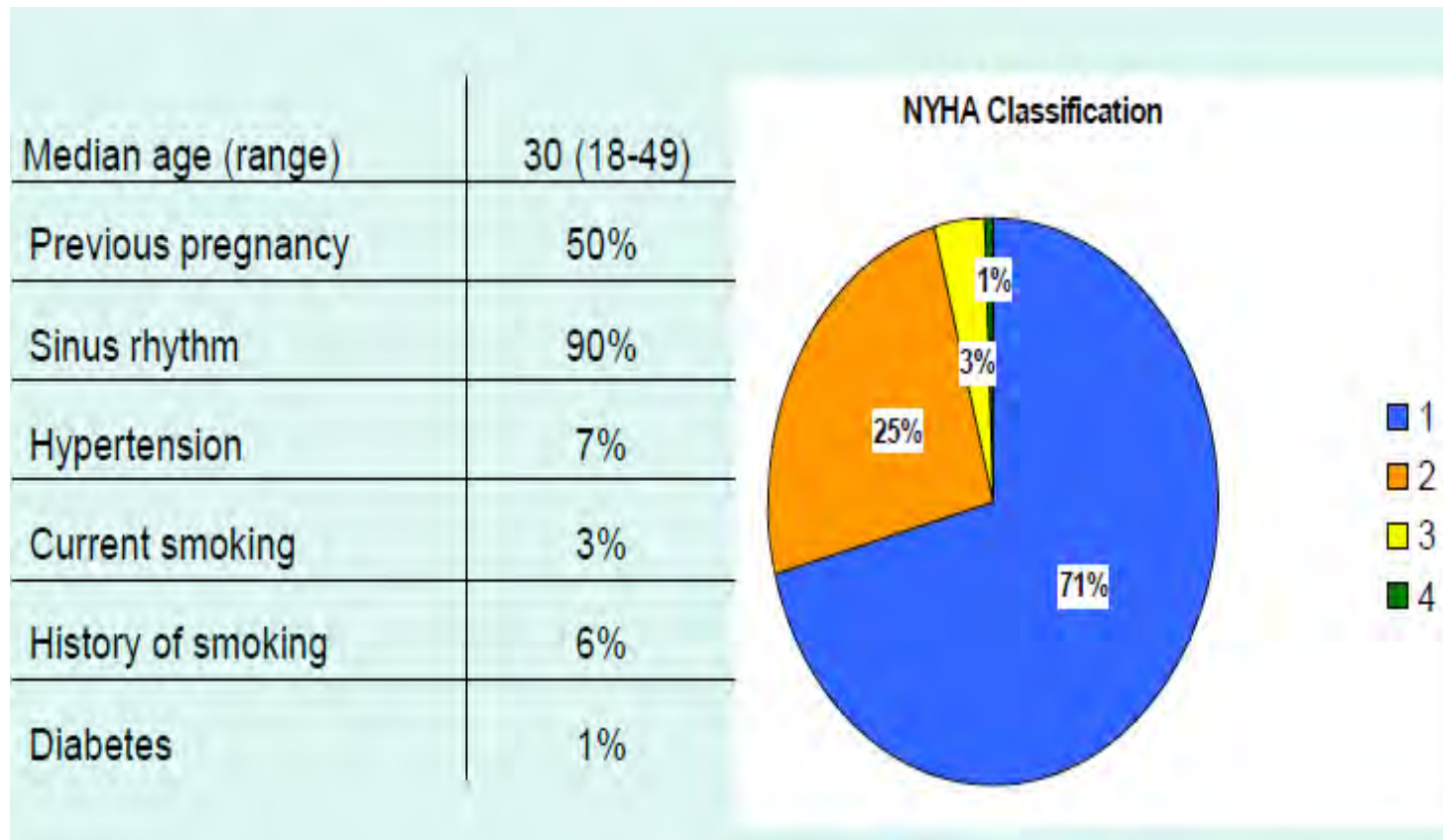
Congenitalis szívbetegség:  
590 beteg



\* 2010 augusztusi adatok

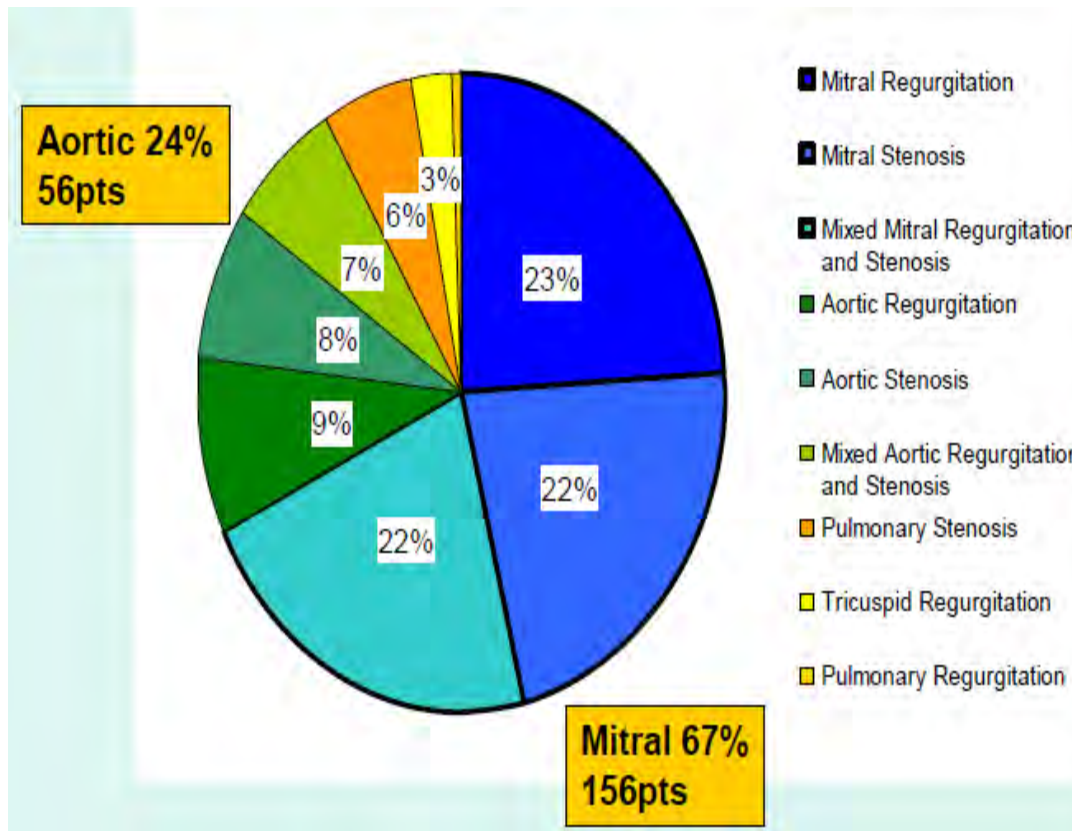
## Pregnancy and Heart Disease Registry

### Anyai jellemzők a terhesség kezdetén

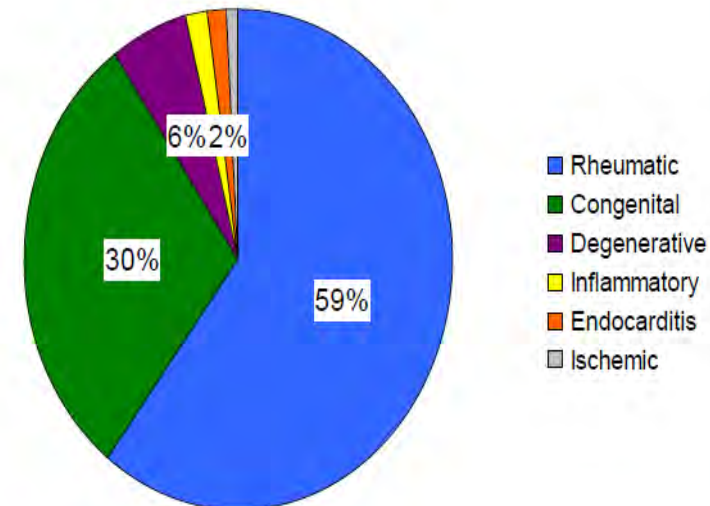


## Pregnancy and Heart Disease Registry

Billentyű betegségek: 233 beteg

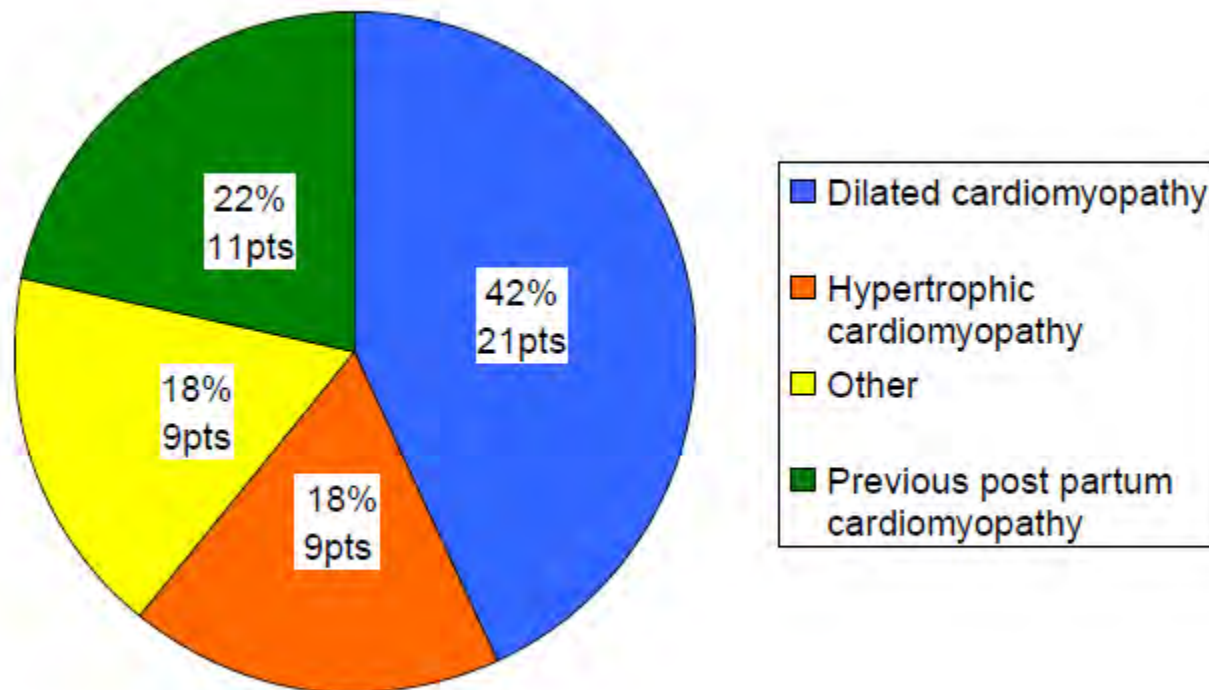


### Etiológia:



## Pregnancy and Heart Disease Registry

### Cardiomyopathiak



## Pregnancy and Heart Disease Registry

### Kórházi felvételek kardiológiai indikációval:

Diagnosis	Patients
Heart failure	101 (11%)
Atrial fibrillation	26
Ventricular arrhythmia	16
Hemorrhagic	13
ACS	5
Thombro-embolic event	3
Endocarditis	2

### A szülés módja:

Vaginal	491 pts ( 54%)	
Caesarian	406 pts (46%)	
	Planned	263
	Emergency	143

**35% Caesarians were emergency**

## Pregnancy and Heart Disease Registry

Magzati halálozás: 911 magzat

	Heart disease patients	Normal European population
Fetal mortality	37 (41:1000)	4,7 :1000
Neonatal mortality	4 (4,6:1000)	4,0: 1000
Mean birth weight	3 kg	3,5 kg

**A magzati mortalitás 8.7 %-kal magasabb!**

## Pregnancy and Heart Disease Registry

### Anyai halálozás 9 eset (1%)

1 during pregnancy

8 after delivery (0-6 months)

• Main reasons:

–6 cardiac

–3 other:

- 1 appendicitis
- 1 septic shock
- 1 brain stem embolisation + mesenteric vascular occlusion

• NYHA before pregnancy

- Class 1: 4
- Class 2: 4
- Class 3: 1

• Diagnosis:

- 1 Eisenmenger
- 4 MVD -rheumatic
- 1 mixed AS /AR
- 1 PS
- 1 TR
- 1 ASD

7 Caesarean sections  
4 Fetal death

# Fiziológiás változások a terhesség alatt

- **Hemodinamika:**

- vér volumen ↑ (40%)
- CO ↑
  - srtoke volumen (korai)
  - Szívfrekvencia (késői)
- Vaszkuláris rezisztencia ↓

- **Hemosztázis:**

- hiperkoaguláció
- procoaguláns faktorok ↑
- fibrinogén ↑
- thrombocyta adhézió ↑
- fibrinolízis ↓
- a véna cava obstrukciója

# Fiziológiás változások a terhesség alatt

- **Homeosztázis:**

- glükóz
- koleszterin ↑
- megnövekedett plazma volumen → nagyobb gyógyszerigény
- megnövekedett máj- és veseperfúzió → megnövekedett clearance



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### Újdonságok/változások

- Genetikai tanácsadás
- Fogamzásgátlás
- Rizikó becslés
- Invazív diagnosztika és terápia
- Trombózis rizikó és anticoaguláció
- Peripartum cardiomyopathia
- Gyógyszerek terhesség és szoptatás alatt

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# Genetikai tanácsadás

- Genetikai teszt javasolt (anyai):
  - Cardiomyopathiák, channelopathiák, pl. longQT,
  - Ha valamelyik családtag érintett,
  - Mentális retardáció, fejlődési rendellenesség, Marfan, 22q11 deléció, Williams - Beuren, Alagille, Noonan, Holt-Oram syndrome esetén.
  - Magzati szűrés a 12. héten - chorionbiopsia,
  - Minden congenitalis vitiumos nőnél magzati echo a 19-22. héten
  - Nuchal fold (nyaki redő vastagság) mérés szívbetegsége a 12.-13. héten: szenzitivitás: 40%, specificitás: 99%

# Holt-Oram sy.

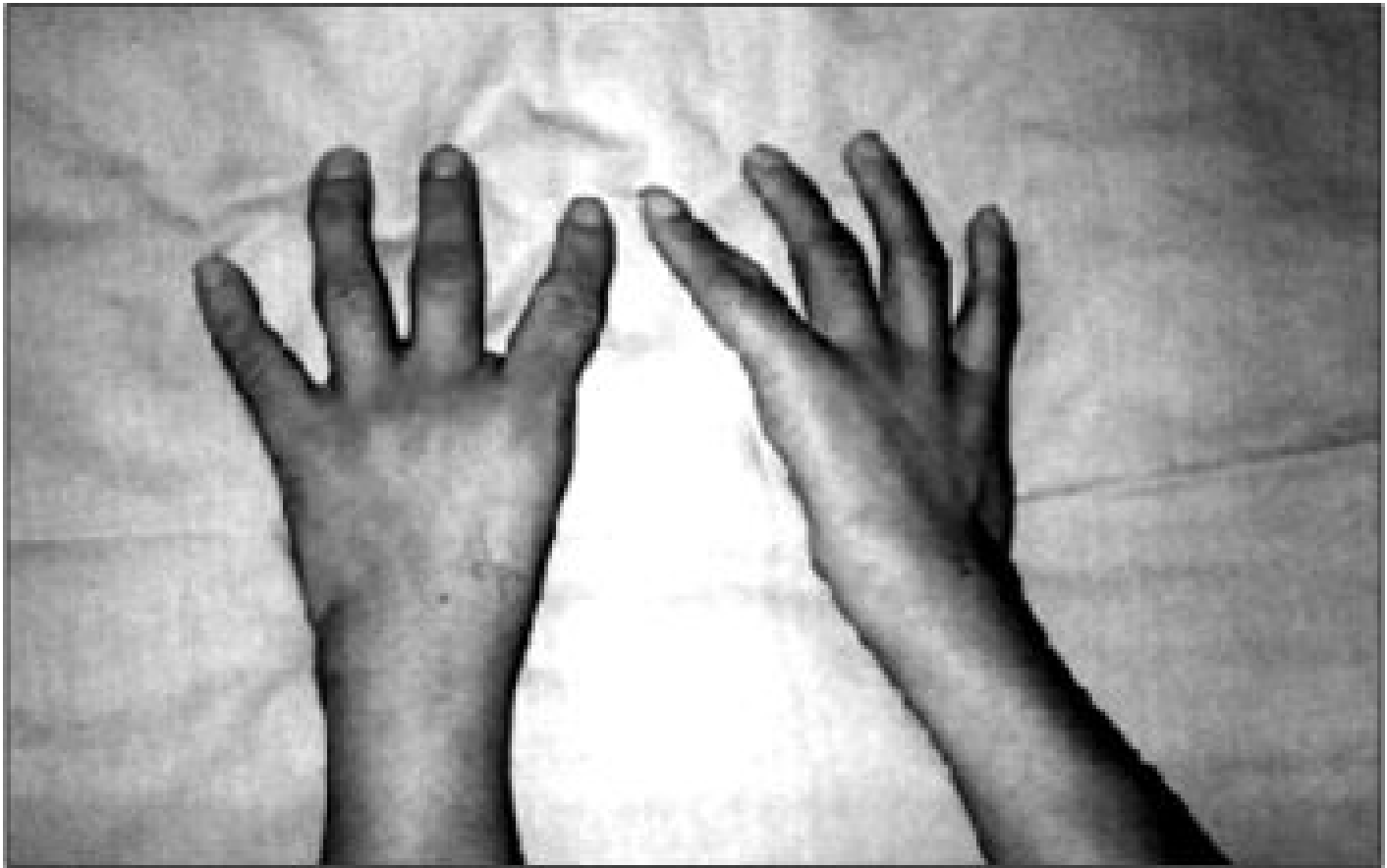
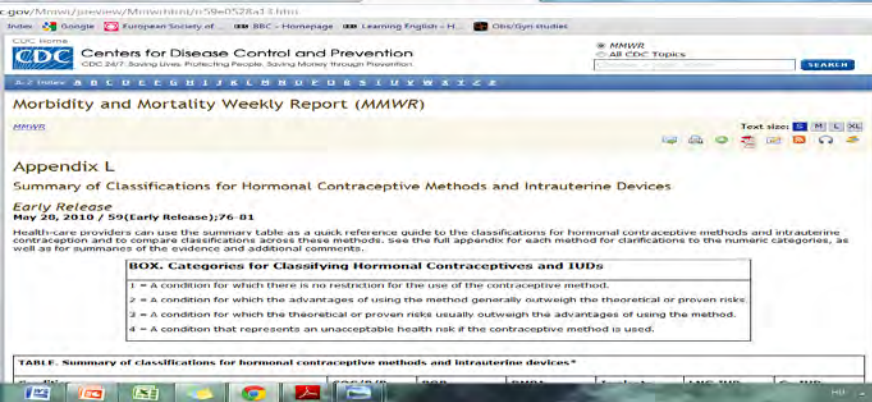


Fig. 1 - Note the absence of thumbs.



# Fogamzásgátlás, sterilizáció

## A fogamzásgátlás módjai:

Condom

Orális:

- NEM medroxyprogesteron acetat – folyadék visszatartás!
- IGEN csak progesteron tartalmú tbl.  
20 ug ethynil estradiol – feltétele: alacsony trombozisz rizikó,  
nincs komplex billentyűbetegség

IUD:

- levonorgestel tartalmú (Cooper) – csökkenti a menstruációs vérvesztességet, teljes amenorrhoea érhető el.

Hátrány: - 5%-ban vazovagális reakció a behelyezésnél  
- Ha a hematokrit > 55% nem javasolt – vérzéses rizikó!

## Sterilizáció:

Tuba ligáció: - hysteroscopia – PAH és Fontain esetén

Hátránya : várni kell 3 hónapot

Vazektómia: ffi partner

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# CARPREG vizsgálat: szerzett és veleszületett szívbetegség esetén:

Rizikó faktor	Pont érték
Megelőző kardiális esemény (szívelégtelenség, stroke, aritmia)	0 vagy 1
NYHA> II (a terhesség előtt)	0 vagy 1
EF<40%	0 vagy 1
Balszívfél obstrukció (mitralis bill. area <2 cm <sup>2</sup> , aorta bill. area <1.5 cm <sup>2</sup> )	0 vagy 1

Megjegyzés:

A terhesség alatti kardiális esemény rizikója:

0 pont – 5%

1 pont – 27%

> 1 pont – 75%

# Rizikó becslés

- Hátránya:
  - populáció függő,
  - kevés beteg,
  - ritka, de jelentős rizikó faktorok kimaradtak,  
(pl. PAH, aorta dilatáció)

Siu SC, Sermer M, Colman JM, et al: Prospective multicenter study of pregnancy outcomes in women with heart disease. Circulation 104:515, 2001

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# Rizikó becslés WHO Osztályozás

## WHO I.:

**Nincs detektálható anyai mortalitás növekedés. Nincs/enyhe morbiditási rizikó.**

**Nem komplikált, kicsi vagy enyhe**

- pulmonális sztenózis
- ductus arteriosus Botalli persistens
- mitrális billentyű prolapsus

**Sikeresen megoldott egyszerű léziók  
(ASD, VSD, ductus Botalli persistens, pulm. vénás drainage)**

**Izolált VES, SVES**

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# Rizikó becslés WHO Osztályozás

## WHO II.:

**Enyhe anyai mortalitás növekedési rizikó. Közepesen megemelkedett morbiditási rizikó.**

**Nem operált ASD, VSD**

**Operált Fallot tetralogia**

**A legtöbb ritmuszavar**

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# Rizikó becslés WHO Osztályozás

## WHO II. - III.: Besorolása egyén/eset függő.

**Közepes balkamra funkció csökkenés**

**Hypertrophias cardiomyopathia**

**Natív vagy biológiai billentyűhiba amely nem WHO I vagy IV.**

**Marfan syndroma aorta dilatáció nélkül  
Bicuspidális aorta billentyű, aorta < 45 mm**

**Operált coarctatio**

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# Rizikó becslés WHO Osztályozás

## WHO III.:

**Megemelkedett anyai mortalitási és morbiditási rizikó. Szoros monitorozás szükséges. Kezelése centrumban javasolt.**

**Mechanikus műbillentyű**

**Szisztémás jobb kamra**

**Fontan keringés**

**Nem operált cianotikus szívbetegség**

**Egyéb komplex congenitális szívbetegség**

**Marfan szindróma és 40-45 mm-es aorta dilatáció  
Bicuspidális billentyű és 45-50 mm-es aorta**

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# Rizikó becslés WHO Osztályozás

## WHO IV.:

**Extrém magas anyai rizikó. A terhesség nem javasolt. Ha mégis megszakítása szóba jön. Kezelése centrumban szükséges.**

**Bármilyen okú PAH**

**LV diszfunkció EF < 30%, NYHA III-IV**

**Megelőző Peripartum cardiomyopathia, maradványként balkamra funkció csökkenéssel.**

**Súlyos MS, AS**

**Marfan szindróma, aorta > 45 mm**

**Bicuspidális aorta billentyű, aorta > 50 mm**

**Súlyos coarctatio**

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# Rizikó becslés

## Az újszülött rizikó anyai prediktorai

### Kezdeti NYHA> II vagy cianózis

Anyai balszívfél obstrukció

Dohányzás terhesség alatt

Sokadik terhesség

Per os anticoagulálás terhesség alatt

Mechanikus műbillentyű

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# Rizikó becslés Általános rendelkezések

<b>Ebben a populációban terhesség előtti rizikó becslés szükséges</b>	<b>I C</b>
<b>A magas rizikójú WHO III-IV betegek centrumban kezelendők</b>	<b>I C</b>
<b>Echo készítendő terhes nő+kardiológiai tünetek esetén</b>	<b>I C</b>
<b>Szívsebészeti beavatkozás előtt corticosteroid adandó az anyának</b>	<b>I C</b>
<b>IE profilaxisra ugyanazok a szabályok érvényesek, mint nem terhesek esetén</b>	<b>I C</b>
<b>A 28. hét után, ha sebészet szükséges a szülés megfontolandó</b>	<b>I C</b>
<b>Sectio cesarea javasolt: nőgyógyászati indikációval, vagy aorta &gt; 45 mm, súlyos AS, oralis antocoagulans, Eisenmenger szindróma, súlyos szívelégtelenség esetén</b>	<b>IIa C</b>
<b>Sectio cesarea megfontolandó, ha az aorta 40-45 mm</b>	<b>IIb C</b>
<b>Profilaktikus AB szülés alatt nem javasolt</b>	<b>III C</b>

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- Rizikó becslés
- **Invazív diagnosztika és terápia**
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# Invazív diagnosztika és terápia

- Terheléses diagnosztika:
  - Dobutamin stressz echo nem javasolt
    - helyette kerékpár ergométer

(Nincs adat arra vonatkozóan, hogy növelné a spontán abortuszok számát.)

- Sugárterhelés

**A magzati károsodás függ a sugárterheléstől és a terhesség idejétől.**

- A procedura halasztandó > 12 hét
- nincs evidencia magzati károsodásra < 50 mGy (gyermekkori daganatok?)

Procedure	Fetal exposure		Maternal exposure	
Chest radiograph (PA and lateral)	<0.01 mGy	<0.01 mSv	0.1 mGy	0.1 mSv
CT chest	0.3 mGy	0.3 mSv	7 mGy	7 mSv
Coronary angiography <sup>a</sup>	1.5 mGy	1.5 mSv	7 mGy	7 mSv
PCI or radiofrequency catheter ablation <sup>a</sup>	3 mGy	3 mSv	15 mGy	15 mSv

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# Invazív diagnosztika és terápia

<b>MRI (gadolinium nélkül) ha az echo insufficiens</b>	<b>IIa C</b>
<b>Mellkas RTG, ha szükséges dyspnoe miatt magzati védelemben</b>	<b>IIb C</b>
<b>Szívkatéterezés szigorú indikációval</b>	<b>IIb C</b>
<b>CT és EP vizsgálat szelektált betegekben, vitális indikációval</b>	<b>IIb C</b>
<b>CABG és billentyű sebészet, a konzervatíván és perkután nem kezelhető</b>	<b>IIb C</b>
<b>MS: mitralis commissurotomia tünetes beteg+ PAP &gt; 50 Hgmm</b>	<b>IIa C</b>
<b>AS: ?</b>	
<b>STE-ACS →</b>	<b>I C</b>
<b>Magas rizikójú NSTEMI-ACS</b>	<b>IIa C</b>
<b>ICD, ha indikált</b>	<b>I C</b>
<b>ICD, pacemaker implantáció esetén (különösen a 8. héten túl) echo vezérlés javasolt</b>	<b>IIa C</b>
<b>Gyógyszer refrakter, rosszul tolerált tachycardia esetén az abláció indikációja</b>	<b>IIb C</b>

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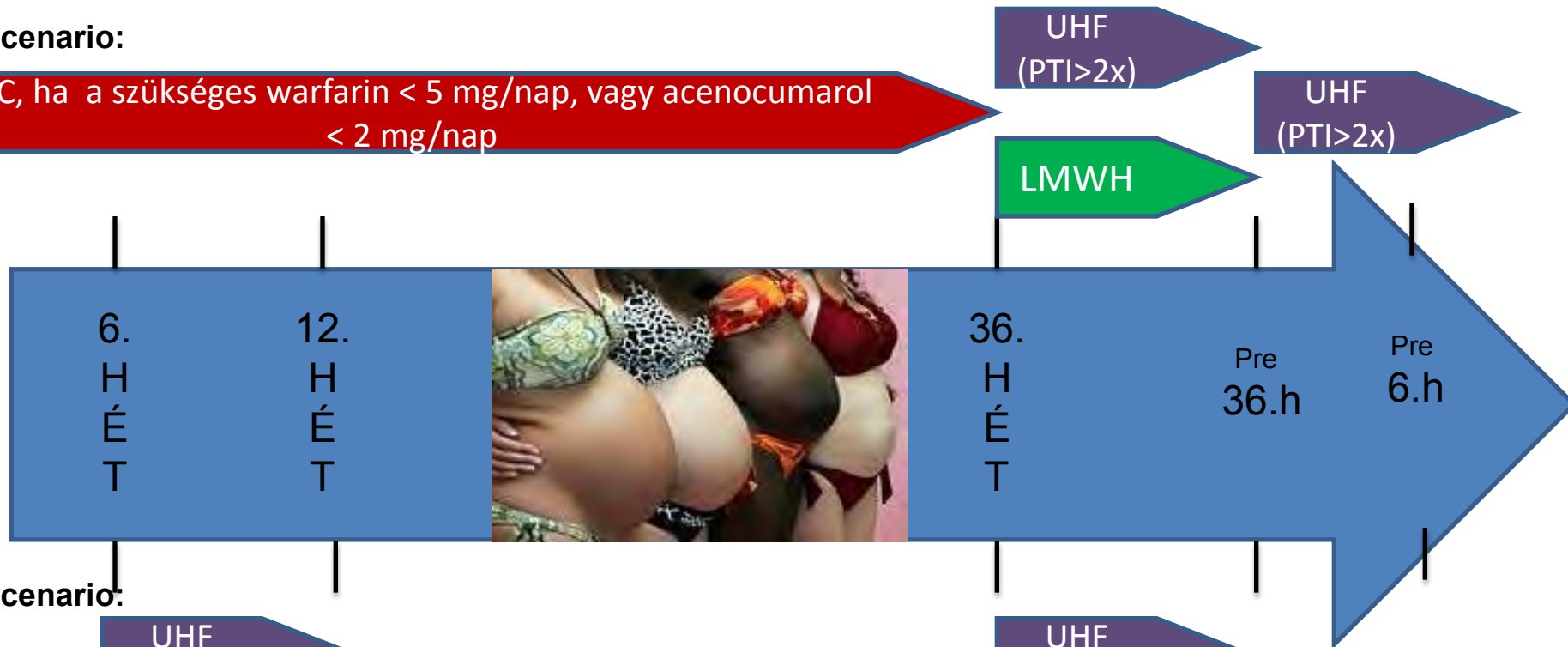
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# Mechanikus műbillentyűvel élő terhes nő antikoagulálása

**Ha LWWH, az anti Xa szint hetente monitorozandó! – I C**  
**Az LMWH kontraindikált anti Xa monitorozás nélkül! – III C**  
*Cél antiXa szint: 0.8-1.2 U/ml 4-6 órával a beadás után/hét*

## 1. Scenario:

OAC, ha a szükséges warfarin < 5 mg/nap, vagy acenocumarol < 2 mg/nap



## 2. Scenario:



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# Trombembóliás rizikó

## nem (csak) szívbeteg nőknél

### (Royal College of Obstetricians and Gynaecologist: Check List)

Megelőző rizikó faktorok	Nőgyógyászati rizikó	Átmeneti rizikó
Megelőző rekuráló VTE	Pre-eclampsia	Szisztémás infekció
Megelőző VTE nem provokált/ösztrogénhez kapcsolt	Hyperemesis, dehydratio	Immobilitás
Megelőző VTE provokált	Többszörös terhesség, vagy asszisztált reprodukció	Sebészi beavatkozás a terhesség alatt vagy < 6 hét postpartum
VTE a családban	Sürgősségi sectio cesarea	
Ismert thrombophilia	Elektív sectio cesarea	
Társbetegségek: pl. SLE, Nephrosis sy.	Forgási rendellenességek	
Kor > 35 év	Elhúzódó szülés > 24 h	
BMI > 30 kg/m <sup>2</sup>	Peripartum vérzés >1 liter vagy transzfúzió	
Terhességek száma $\geq 3$		
Dohohányzás		
Nagy varicosus vénák		

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# Trombembolia prevenció (Royal College of Obstetricians and Gynaecologist)

Rizikó	Rizikó	Prevenció
Magas	-Megelőző rekurrens VTE Vagy -Nem provokált/ösztrogénhez kapcsolt Vagy -1 korábbi VTE + thrombophilia vagy családi anamnézis	LMWH A terhesség kezdetétől a postpartum 6. hétig + Compressziós harisnya a terhesség alatt
Közepes	≥3 rizikó faktor > 2 rizikó faktor+hospitalizáció	LMWH Postpartum legalább a 7. napig, a terhesség alatt megfontolandó + Compressziós harisnya megfontolandó
Alacsony	< 3 rizikó faktor	Korai mobilizáció, dehidráció kerülése

**Current state of knowledge on aetiology, diagnosis, management, and therapy of peripartum cardiomyopathy: a position statement from the Heart Failure Association of the European Society of Cardiology Working Group on peripartum cardiomyopathy**

Karen Silwa<sup>1\*</sup>, Denise Hilfiker-Kleiner<sup>2</sup>, Mark C. Petrie<sup>3</sup>, Alexandre Mebazaa<sup>4</sup>, Burkert Pieske<sup>5</sup>, Eckhart Buchmann<sup>6</sup>, Vera Regitz-Zagrosek<sup>7</sup>, Maria Schaufelberger<sup>8</sup>, Luigi Tavazzi<sup>9</sup>, Dirk J. van Veldhuisen<sup>10</sup>, Hugh Watkins<sup>11</sup>, Ajay J. Shah<sup>12</sup>, Petar M. Seferovic<sup>13</sup>, Uri Elkayam<sup>14</sup>, Sabine Pankuweit<sup>15</sup>, Zoltan Papp<sup>16</sup>, Frederic Mouquet<sup>17</sup>, and John J.V. McMurray<sup>18</sup>

# Peripartum cardiomyopathia

## Definition of PPCM

European Society of Cardiology on the classification of cardiomyopathies <sup>4,9</sup>	A non-familial, non-genetic form of dilated cardiomyopathy associated with pregnancy
AHA Scientific Statement on contemporary definitions and classifications of the cardiomyopathies <sup>7</sup>	A rare and dilated acquired primary cardiomyopathy associated LV dysfunction and heart failure
Workshop held by the National Heart Lung and Blood Institute and the Office of Rare Diseases <sup>2</sup>	The development of heart failure in the last month of pregnancy or within 5 months post-partum The absence of an identifiable cause of heart failure The absence of recognizable heart disease prior to the last month of pregnancy LV systolic dysfunction demonstrated by classical echocardiographic criteria. The latter may be characterized as an LV ejection fraction <45%, fractional shortening <30%, or both, with or without an LV end diastolic dimension >2.7 cm/m <sup>2</sup> body surface area
Heart Failure Association of the European Society of Cardiology Working Group on PPCM 2010	PPCM is an idiopathic cardiomyopathy presenting with heart failure secondary to left ventricular systolic dysfunction towards the end of pregnancy or in the months following delivery, where no other cause of heart failure is found. It is a diagnosis of exclusion. The left ventricle may not be dilated but the ejection fraction is nearly always reduced below 45%.

**Current state of knowledge on aetiology, diagnosis, management, and therapy of peripartum cardiomyopathy: a position statement from the Heart Failure Association of the European Society of Cardiology Working Group on peripartum cardiomyopathy**

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# Peripartum cardiomyopathia

**Table 3 Differential cardiovascular diagnoses of peripartum cardiomyopathy**

	Distinguishing features	Diagnosis/investigation
Pre-existing idiopathic dilated cardiomyopathy (IDC) unmasked by pregnancy	PPCM most commonly presents post-partum, whereas IDC (unmasked by pregnancy) usually presents by the 2nd trimester IDC usually presents during pregnancy with larger cardiac dimensions than PPCM	History, ECG, BNP, echocardiography
Pre-existing familial dilated cardiomyopathy (FDC) unmasked by pregnancy	PPCM most commonly presents post-partum, whereas FDC usually presents by 2nd trimester Positive family history in FDC FDC usually presents during pregnancy with larger cardiac dimensions than PPCM	History, ECG, BNP, echocardiography, genetic testing, family screening
HIV/AIDS cardiomyopathy	HIV cardiomyopathy presents often with non-dilated ventricles	HIV test
Pre-existing valvular heart disease unmasked by pregnancy	Rheumatic mitral valve disease is often unmasked by pregnancy PPCM most commonly presents post-partum whereas valvular heart disease usually presents by 2nd trimester	History, examination, ECG, echocardiography
Hypertensive heart disease	Exclude pre-existing severe hypertension in those presenting before delivery	
Pre-existing unrecognized congenital heart disease	Previously unrecognized congenital heart disease often has associated pulmonary hypertension PPCM most commonly presents post-partum, whereas congenital heart disease usually presents by 2nd trimester	History, ECG, echocardiography
Pregnancy-associated myocardial infarction	History (but can present atypically)	History, ECG, cardiac enzymes, coronary angiography, echocardiography
Pulmonary embolus	History	Medical history, ECG, D-dimers; consider echocardiography, ventilation/perfusion scan, CT pulmonary angiogram

Evaluation of Bromocriptine in the Treatment of Acute  
Severe Peripartum Cardiomyopathy  
A Proof-of-Concept Pilot Study

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# Peripartum cardiomyopathia

**Table 3. Comparison of Hemodynamic and Echocardiographic Parameters in PPCM-Br and PPCM-Std Patients at Baseline and 6 Months**

	PPCM-Br Baseline (n=10)*	PPCM-Br 6 Months (n=9)*	PPCM-Std Baseline (n=10)*	PPCM-Std 6 Months (n=6)*	P†
<b>Clinical parameters</b>					
Systolic blood pressure, mm Hg	116±23	118±13	110±19	115±9	0.78
Diastolic blood pressure, mm Hg	70±16	74±9	76±18	73±6	0.77
Heart rate, bpm	102±13	64±7	108±15	79±15	0.22
<b>Echocardiographic parameters</b>					
LVEDD, mm	55±10	51±9	59±5	56±12	0.50
LVESD, mm	46±9	34±10	52±6	45±11	0.18
LVEF, %	27±8	58±11	27±8	36±11	0.0007
Mitral regurgitation (grade)	2.1±0.6	0.22±0.44	1.9±0.6	1.5±1.0	0.0042
Mitral ERO, cm <sup>2</sup>	0.45±0.13	0.11±0.03	0.44±0.18	0.34±0.18	0.02
Left atrial diameter, cm	3.54±0.25	3.36±0.53	3.83±0.62	3.93±0.83	0.25
Mitral E velocity, cm/s	86±19	66±24	89±23	85±24	0.53
Mitral A velocity, cm/s	32±7	48±19	33±6	45±12	0.80
Mitral E velocity/A velocity ratio	2.82±0.76	1.63±1.13	2.73±0.68	1.94±0.67	0.82
Deceleration time, ms	118±26	197±59	136±30	168±36	0.08
Mitral medial annular (E') TDI velocity, cm/s	7.0±1.3	12.4±2.4	6.5±1.1	7.3±2.5	0.014
E/E' (medial annular velocity)	12.5±3.0	5.4±2.5	14.0±4.6	12.4±4.6	0.08
Mitral lateral annular (E') TDI velocity, cm/s	7.2±1.1	12.4±2.5	6.6±0.97	7.3±2.5	0.007
E/E' (lateral annular velocity)	12.0±2.0	5.4±2.5	13.8±4.2	12.1±3.9	0.051

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# Gyógyszerek terhesség és szoptatás alatt

[www.safefetus.com](http://www.safefetus.com)

## FDA osztályozás: A, B, C, D, X kategória

**Table 21** Recommendations for drug use

Drugs	Classification (Vaughan Williams for AA drugs)	FDA category	Placenta permeable	Transfer to breast milk (fetal dose)	Adverse effects
Abciximab	Monoclonal antibody with antithrombotic effects	C	Unknown	Unknown	Inadequate human studies; should be given only if the potential benefit outweighs the potential risk to the fetus.
Acenocoumarol <sup>a</sup>	Vitamin K antagonist	D	Yes	Yes (no adverse effects reported)	Embryopathy (mainly first trimester), bleeding (see further discussion in Section 5 for use during pregnancy).
Acetylsalicylic acid (low dose)	Antiplatelet drug	B	Yes	Well-tolerated	No teratogenic effects known (large datasets).
Adenosine <sup>b</sup>	Antiarrhythmic	C	No	No	No fetal adverse effects reported (limited human data).
Aliskiren	Renin inhibitor	D	Unknown	Unknown	Unknown (limited experience).
Amiodarone	Antiarrhythmic (Class III)	D	Yes	Yes	Thyroid insufficiency (9%), hyperthyroidism, goitre, bradycardia, growth retardation, premature birth.
Ampicillin, amoxicillin	Antibiotic	B	Yes	Yes	No fetal adverse effects reported.



# Összefoglalás

– Csatlakozzunk az európai regiszterhez!

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- Rizikóbecslés, még a terhesség előtt!
- Rizikóbecslés – irányítás!



+ 1 dia

Amiről nem volt most szó, de máshol előkerül...

- Terhesség és:
  - Congenitális vitiumok,
  - Aorta betegségek
  - billentyű betegségek,
  - aritmiák,
  - hipertónia,
  - egyéb kardiomiopátiák

# Congenitalis vitiumok

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Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
Pre-pregnancy relief of stenosis (usually by balloon valvulotomy) should be performed in severe pulmonary valve stenosis (peak Doppler gradient >64 mmHg).	I	B <sup>68,105</sup>
Individual follow-up schedules should be arranged; ranging from twice during pregnancy to monthly.	I	C
Symptomatic patients with Ebstein's anomaly with cyanosis and/or heart failure should be treated before pregnancy or advised against pregnancy.	I	C
In symptomatic women with marked dilatation of the right ventricle due to severe pulmonary regurgitation, pre-pregnancy pulmonary valve replacement (bioprosthesis) should be performed.	I	C
In asymptomatic women with a severely dilated right ventricle due to severe pulmonary regurgitation, pre-pregnancy pulmonary valve replacement (bioprosthesis) should be considered.	IIa	C
All women with a bicuspid aortic valve should undergo imaging of the ascending aorta before pregnancy, and surgery should be considered when the aortic diameter is >50 mm.	IIa	C

Anticoagulation treatment should be considered during pregnancy in Fontan patients.	IIa	C
In PAH, associated anticoagulant treatment should be considered in patients with suspicion of pulmonary embolism as the cause (or partly the cause) of the pulmonary hypertension.	IIa	C
In patients who are already taking drug therapy for PAH before becoming pregnant, continuation should be considered after information about the teratogenic effects.	IIa	C
Women with pulmonary hypertension should be advised against pregnancy. <sup>c</sup>	III	C
Women with an oxygen saturation below 85% at rest should be advised against pregnancy.	III	C
Patients with TGA and a systemic right ventricle with more than moderate impairment of RV function and/or severe TR should be advised against pregnancy.	III	C
Fontan patients with depressed ventricular function and/or moderate to severe atrioventricular valvular regurgitation or with cyanosis or with protein-losing enteropathy should be advised against pregnancy.	III	C

# Aorta betegségek



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ESC GUIDELINES

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Women with Marfan syndrome or other known aortic disease should be counselled about the risk of aortic dissection during pregnancy and the recurrence risk for the offspring.	I	C
Imaging of the entire aorta (CT/MRI) should be performed before pregnancy in patients with Marfan syndrome or other known aortic disease.	I	C
Women with Marfan syndrome and an ascending aorta >45 mm should be treated surgically pre-pregnancy.	I	C
In pregnant women with known aortic dilatation, (history of) type B dissection or genetic predisposition for dissection strict blood pressure control is recommended.	I	C
Repeated echocardiographic imaging every 4-8 weeks should be performed during pregnancy in patients with ascending aorta dilatation.	I	C
For imaging of pregnant women with dilatation of the distal ascending aorta, aortic arch or descending aorta, MRI (without gadolinium) is recommended.	I	C
In women with a bicuspid aortic valve imaging of the ascending aorta is recommended.	I	C
In patients with an ascending aorta <40 mm, vaginal delivery is favoured.	I	C
Women with aortic dilatation or (history of) aortic dissection should deliver in a centre where cardiothoracic surgery is available.	I	C
In patients with an ascending aorta >45 mm, caesarean delivery should be considered.	I	C

Surgical treatment pre-pregnancy should be considered in women with aortic disease associated with a bicuspid aortic valve when the aortic diameter is >50mm (or >27 mm/m <sup>2</sup> BSA).	IIa	C
Prophylactic surgery should be considered during pregnancy if the aortic diameter is ≥50 mm and increasing rapidly.	IIa	C
In Marfan, and other patients with an aorta 40-45 mm, vaginal delivery with epidural anaesthesia and expedited second stage should be considered.	IIa	C
In Marfan, and other patients with an aorta 40-45 mm, caesarean section may be considered.	IIb	C
Patients with (or history of) type B dissection should be advised against pregnancy.	III	C

ESC Guidelines on the management of cardiovascular diseases during pregnancy

# Szerzett billentyűbetegségek

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
<b>Mitral stenosis</b>		
In patients with symptoms or pulmonary hypertension, restricted activities and $\beta$ 1-selective blockers are recommended.	I	B <sup>7,44</sup>
Diuretics are recommended when congestive symptoms persist despite $\beta$ -blockers.	I	B <sup>64</sup>
Patients with severe MS should undergo intervention before pregnancy.	I	C
Therapeutic anticoagulation is recommended in the case of atrial brillation, left atrial thrombosis, or prior embolism.	I	C
Percutaneous mitral commissurotomy should be considered in pregnant patients with severe symptoms or systolic pulmonary artery pressure >50 mmHg despite medical therapy.	IIa	C
<b>Aortic stenosis</b>		
Patients with severe AS should undergo intervention pre-pregnancy if:		
they are symptomatic	I	B <sup>7</sup>
or LV dysfunction ( LVEF <50%) is present	I	C
Asymptomatic patients with severe AS should undergo intervention pre-pregnancy when they develop symptoms during exercise testing.	I	C
Asymptomatic patients with severe AS should be considered for intervention pre-pregnancy when a fall in blood pressure below baseline during exercise testing occurs.	IIa	C
<b>Regurgitant lesions</b>		
Patients with severe aortic or mitral regurgitation and symptoms or impaired ventricular function or ventricular dilatation should be treated surgically pre-pregnancy.	I	C
Medical therapy is recommended in pregnant women with regurgitant lesions when symptoms occur.	I	C

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# Aritmiák

Management of supraventricular tachycardia (SVT)		
For acute conversion of paroxysmal SVT, vagal manoeuvre followed by i.v. adenosine is recommended.	I	C
Immediate electrical cardioversion is recommended for acute treatment of any tachycardia with haemodynamic instability.	I	C
For long-term management of SVT oral digoxin <sup>c</sup> or metoprolol/propranolol <sup>c,d</sup> , is recommended.	I	C
For acute conversion of paroxysmal SVT, i.v. metoprolol or propranolol should be considered.	IIa	C
For long-term management of SVT, oral sotalol <sup>e</sup> or flecainide <sup>f</sup> should be considered if digoxin or a $\beta$ -blocking agent fails.	IIa	C
For acute conversion of paroxysmal SVT, i.v. verapamil may be considered.	IIb	C
For long-term management of SVT, oral propafenone <sup>f</sup> , or procainamide may be considered as a last option if other suggested agents fail and before amiodarone <sup>e</sup> is used.	IIb	C
For long-term management of SVT, oral verapamil <sup>c</sup> may be considered for rate regulation if the other AV nodal-blocking agents fail.	IIb	C
Atenolol <sup>d</sup> should not be used for any arrhythmia.	III	C
Management of ventricular tachycardia (VT)		
The implantation of an ICD, if clinically indicated, is recommended prior to pregnancy but is also recommended whenever indicated, during pregnancy.	I	C
For long-term management of the congenital long QT syndrome, $\beta$ -blocking agents are recommended during pregnancy and also postpartum when they have a major benefit.	I	C
For long-term management of idiopathic sustained VT oral metoprolol <sup>c,d</sup> , propranolol <sup>c,d</sup> or verapamil <sup>c,f</sup> is recommended.	I	C
Immediate electrical cardioversion of VT is recommended for sustained, unstable, and stable VT.	I	C
For acute conversion of VT that is sustained, haemodynamically stable, and monomorphic, i.v. sotalol <sup>e</sup> or procainamide should be considered.	IIa	C
Implantation of permanent pacemakers or ICDs (preferably one chamber) should be considered with echocardiographical guidance, especially if the fetus is beyond 8 weeks gestation.	IIa	C
For acute conversion of VT that is sustained, monomorphic, haemodynamically unstable, refractory to electrical cardioversion or not responding to other drugs, i.v. amiodarone <sup>e</sup> should be considered.	IIa	C
For long-term management of idiopathic sustained VT oral sotalol <sup>e</sup> , flecainide <sup>f</sup> , propafenone <sup>f</sup> should be considered if other drugs fail.	IIa	C
Catheter ablation may be considered in the case of drug-refractory and poorly tolerated tachycardias.	IIb	C

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### Osztályozás:

- Pre-existing hypertension
- Gestational hypertension (with or without proteinuria  $\geq 0.3$  g/d,  $\geq 30$  mg/mmol creatinin urine) – preeclampsia
- Pre-existing hypertension plus superimposed gestational hypertension with proteinuria ( $> 3$  g/d)
- Untenatally unclassifiable hypertension

### Gyógyszeres th.:

**Első:** metyldopa, labetalol,

**Második:** nifedipin, isradipin

Kerülendők: vízajtók,

hydralazin (több perinatalis esemény)

**Table 16** Recommendations for the management of hypertension

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
Non-pharmacological management for pregnant women with SBP of 140-150 mmHg or DBP of 90-99 mmHg is recommended.	I	C
In women with gestational hypertension or pre-existing hypertension superimposed by gestational hypertension or with hypertension and subclinical organ damage or symptoms at any time during pregnancy, initiation of drug treatment is recommended at a BP of 140/90 mmHg. In any other circumstances, initiation of drug treatment is recommended if SBP $\geq 150$ mmHg or DBP $\geq 95$ mmHg.	I	C
SBP $\geq 170$ mmHg or DBP $\geq 110$ mmHg in a pregnant woman is an emergency, and hospitalization is recommended.	I	C
Induction of delivery is recommended in gestational hypertension with proteinuria with adverse conditions such as visual disturbances, coagulation abnormalities, or fetal distress.	I	C
In pre-eclampsia associated with pulmonary oedema, nitroglycerine given as an intravenous infusion, is recommended.	I	C
In severe hypertension, drug treatment with intravenous labetalol or oral methyldopa or nifedipine is recommended.	I	C
Women with pre-existing hypertension should be considered to continue their current medication except for ACE inhibitors, ARBs, and direct renin inhibitors under close BP-monitoring	IIa	C

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# Egyéb cardiomyopathiak

Anticoagulation is recommended in patients with intracardiac thrombus detected by imaging or with evidence of systemic embolism.	I	A <sup>174</sup>
Women with HF during pregnancy should be treated according to current guidelines for non-pregnant patients, respecting contraindications for some drugs in pregnancy – see Section II Table 21.	I	B <sup>140</sup>
Women with DCM should be informed about the risk of deterioration of the condition during gestation and peripartum.	I	C
In patients with a past history or family history of sudden death close surveillance with prompt investigation is recommended if symptoms of palpitations or presyncope are reported.	I	C
Therapeutic anticoagulation with LMWH or vitamin K antagonists according to stage of pregnancy is recommended for patients with atrial brillation.	I	C
Delivery should be performed with $\beta$ -blocker protection in women with HCM.	IIa	C
$\beta$ -blockers should be considered in all patients with HCM and more than mild LVOTO or maximal wall thickness >15mm to prevent sudden pulmonary congestion.	IIa	C
In HCM, cardioversion should be considered for persistent atrial brillation.	IIa	C
Due to high metabolic demands of lactation and breastfeeding, preventing lactation may be considered in PPCM.	IIb	C
Subsequent pregnancy is not recommended if LVEF does not normalize in women with PPCM.	III	C



Köszönöm a figyelmet!

