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Cardiologie tijdens Covid isolatie maatregelen
Casuïstiek
Wat uit te leren ?

Accreditatie
www.cardiologie-bertem.be

Dr. H. Celen
Cardiologie
RZ HHart Leuven

Inhoud

- Casuïstiek :
    - hartfalen 3 x
    - Een atleet test Covidpositief Casus 4
        - ECG's "Wearables" en sporten tijdens pandemie Casus 5
- Vaccinatie: hoe raken we uit de pandemie ?
- Rondvraag :Teleconsultatie ? Ervaring ? Hoe kunnen we ons werk verbeteren?

Accreditatie
www.cardiologie-bertem.be

Casus 1, vrouw 75j

Voorgeschiedenis

- Ideopatisch gedilateerde CMP (EF:30%)
- Coronaro 2005: 50% stenose RCA
- CCE, appendectomie, THP

Therapie

asaflow 80mg, pantomed 20mg, coversyl 5mg, bisoprolol 5mg
aldactone 12,5mg, burinex 5mg

Labo

- Hct: 37,5%
- Creatinine: 1,6mg/dl; Ureum: 89mg/dl
- Normaal ionogram

Probleem :

, pre syncopes, gevallen thuis, "lock down" eerste golf

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Casus 1, vrouw 75j

Teleconsult 20/3/2020

- komt huis niet uit
- BD 90/60, weinig gegeten, depressief, meermaals gevallen
- “Stop ACE-I”

Raadpleging cardiologie gepland

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Casus, vrouw 75j

Secretaresse belt voor verzetten rdpl 2 weken later,
“dyspneu” kan niet plat liggen

Fast track raadpleging

- BD: 160/60mmHg 110x’
- Sat: 89%
- Systolische souffle en derde harttoon
- Bibasale demping en crepitaties
- CVD↗, malleolaire oedemen

- Urgent transfer 2A rdplg cardiologie naar spoed

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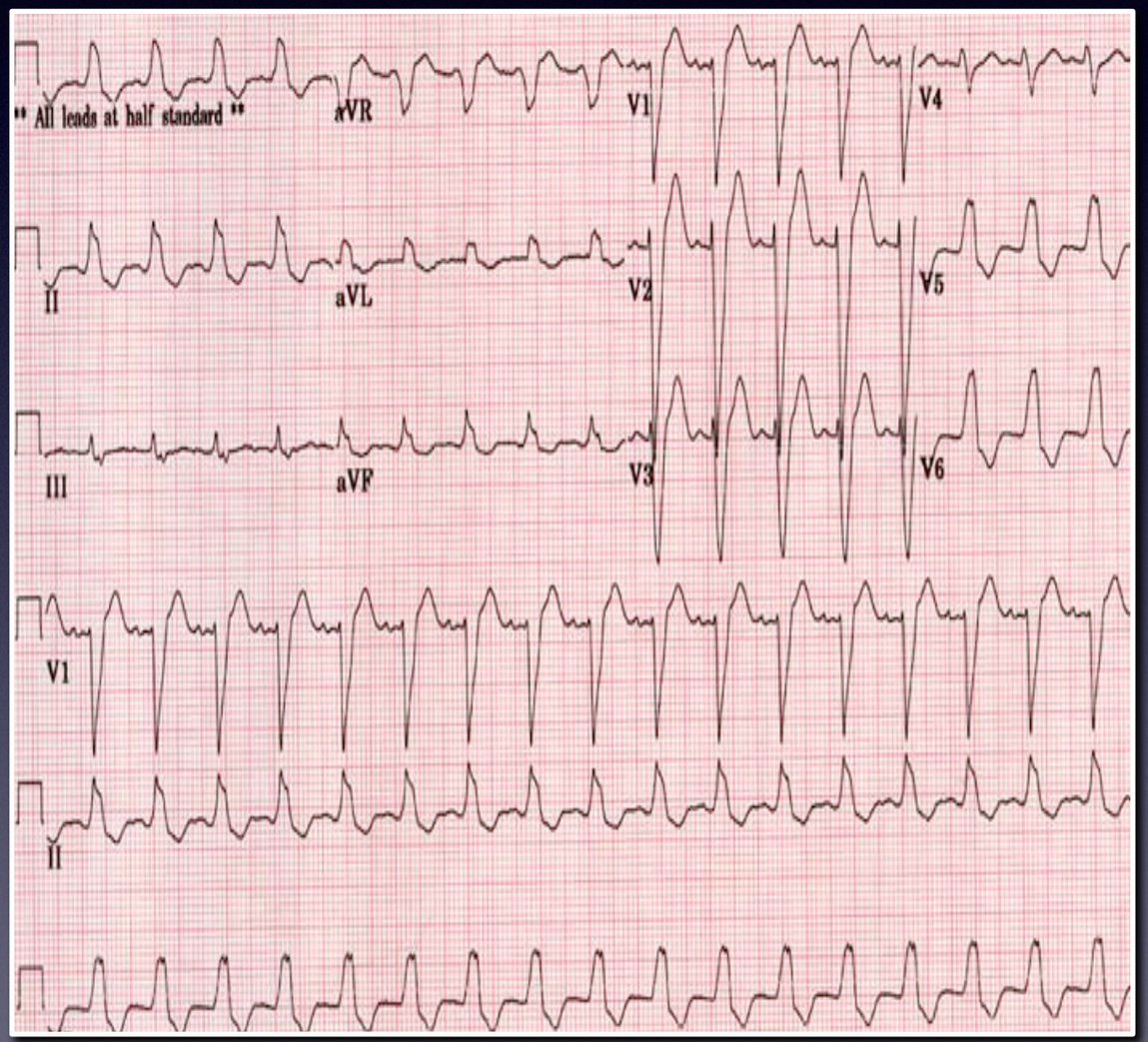
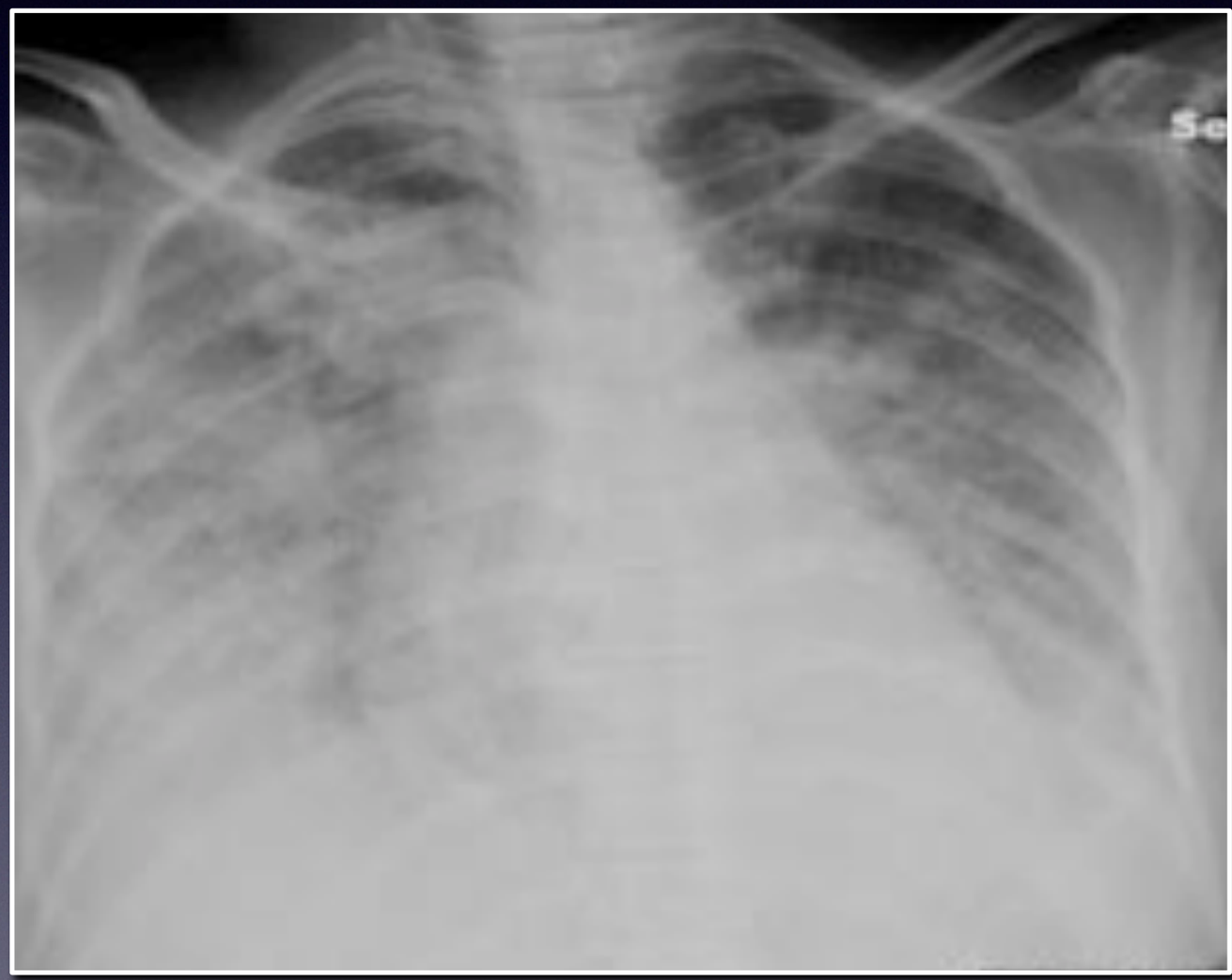
ECG + RX Thorax

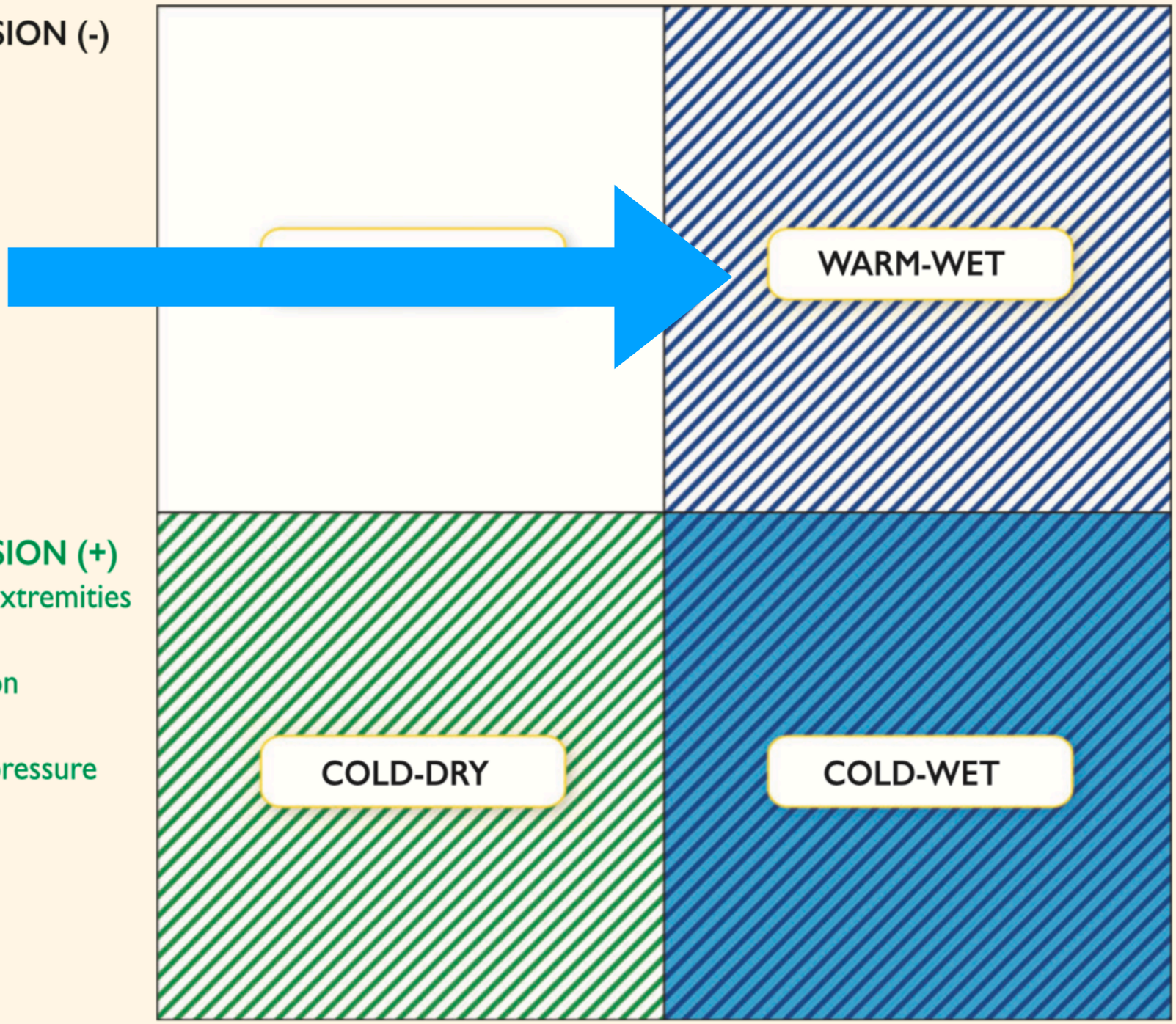




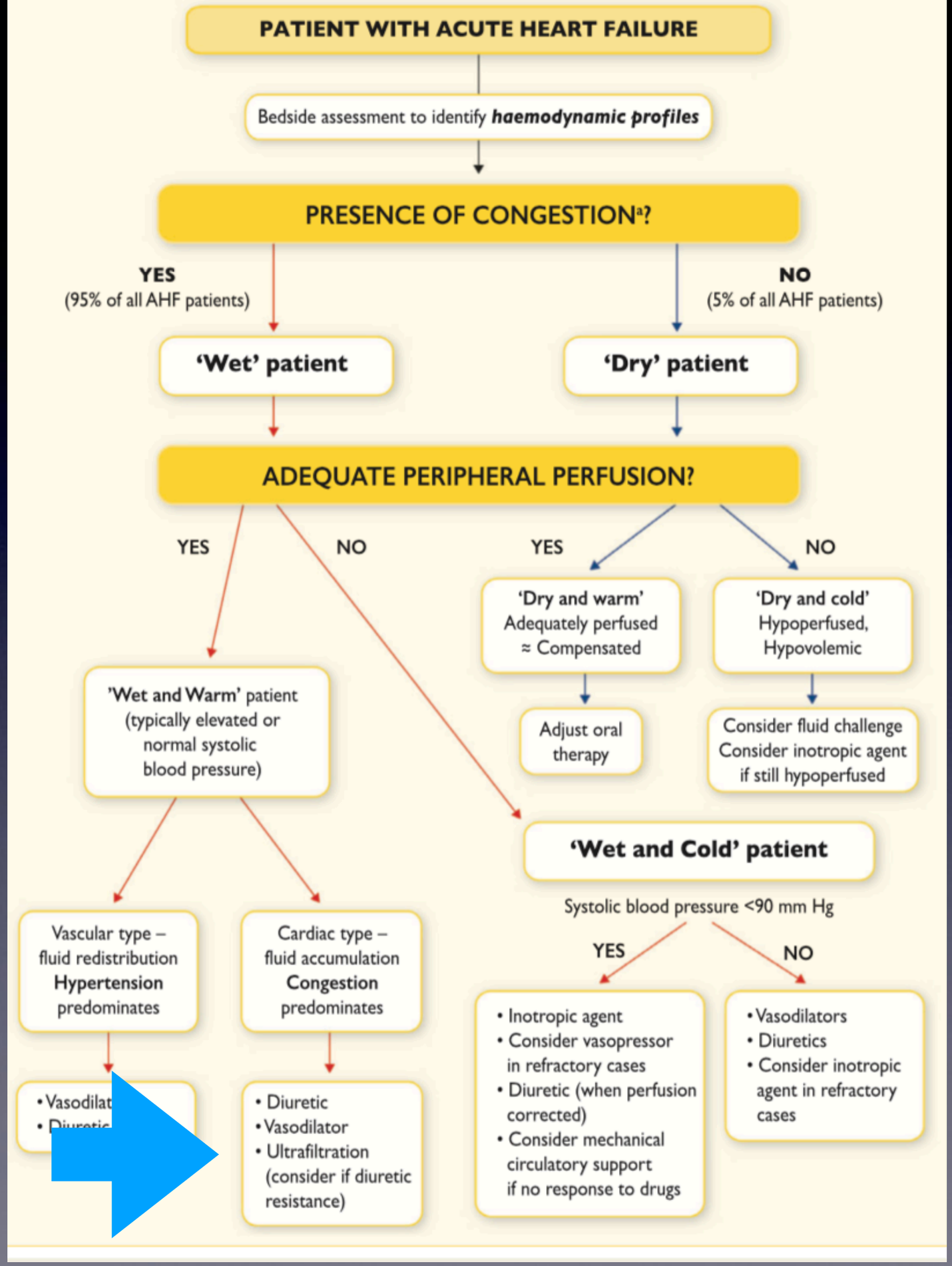
CONGESTION (-)

CONGESTION (+)
Pulmonary congestion
Orthopnoea/paroxysmal nocturnal dyspnoea
Peripheral (bilateral) oedema
Jugular venous dilatation
Congested hepatomegaly
Gut congestion, ascites
Hepatojugular reflux

HYPOPERFUSION (-)



HYPOPERFUSION (+)
Cold sweated extremities
Oliguria
Mental confusion
Dizziness
Narrow pulse pressure


PATIENT WITH ACUTE HEART FAILURE
Bedside assessment to identify haemodynamic profiles
PRESENCE OF CONGESTION[a]?
YES
(95% of all AHF patients)
NO
(5% of all AHF patients)
'Wet' patient
'Dry' patient
ADEQUATE PERIPHERAL PERFUSION?
YES
NO
YES
NO
'Wet and Warm' patient (typically elevated or normal systolic blood pressure)
'Dry and warm' Adequately perfused ≈ Compensated
'Dry and cold' Hypoperfused, Hypovolemic
Adjust oral therapy
Consider fluid challenge Consider inotropic agent if still hypoperfused
'Wet and Cold' patient
Systolic blood pressure <90 mm Hg
YES
NO
Vascular type – fluid redistribution Hypertension predominates
Cardiac type – fluid accumulation Congestion predominates
• Vasodilat
• Diuretic
• Diuretic
• Vasodilator
• Ultrafiltration (consider if diuretic resistance)
• Inotropic agent
• Consider vasopressor in refractory cases
• Diuretic (when perfusion corrected)
• Consider mechanical circulatory support if no response to drugs
• Vasodilators
• Diuretics
• Consider inotropic agent in refractory cases

Hemodynamische optimalisatie

Doel

- Dringend naar spoed, covid test negatief,
- Ondanks diuretica , nitraten en morfine geen verbetering
- Electieve intubatie en KV en transfer CIZ

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Casus, vrouw 75j

ontslag CIZ

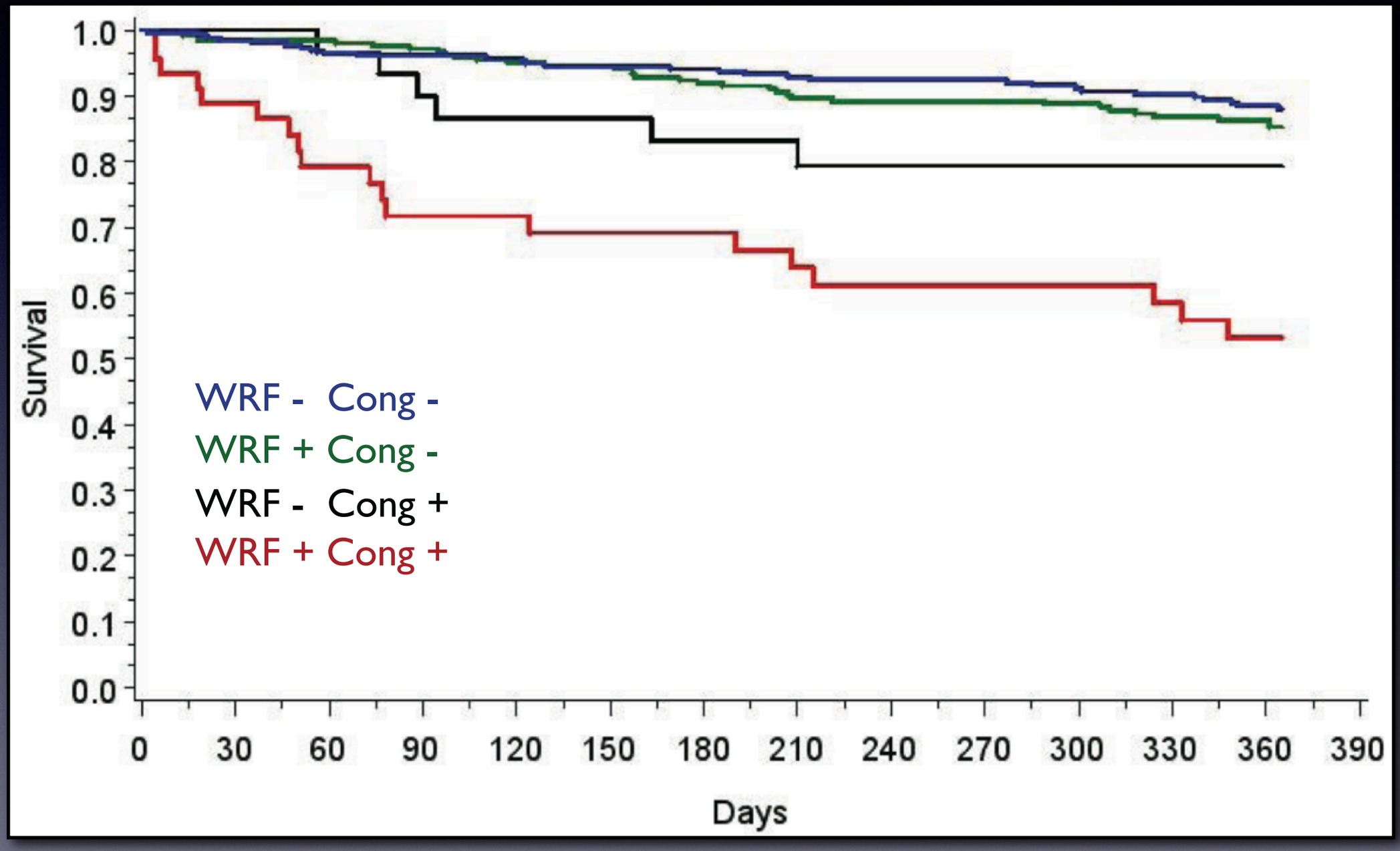
- Dyspnee NYHA II, geen perifeer oedemen, normale cortonen, normale CVD.

- R/ asaflow 80mg, pantomed 20mg, coversyl 7,5mg, bisoprolol 5mg, burinex 2,5mg, aldactone 12,5mg, hydralazine 10mg 4x/d, coruno 16mg.

- Labo: HCT:39%; Creat: 2.1mg/dl, ureum: 90mg/dl, normaal ionogram.

Hartfalen & nierfunktie

Metra



Circ Heart Fail published online December 13, 2011;
DOI: 10.1161/CIRCHEARTFAILURE.111.963413

Casus, vrouw 75j

4 maanden later verder verloop

- 4 maanden goed
- Dyspnee en inspanningsintolerantie NYHA II, hydralazine en corunon gestopt wegens hypotensie
- Euvolemie , R/ asaflow 80mg, pantomed 20mg, coversyl 7,5mg, bisoprolol 5mg, burinex 2 mg, aldactone 12,5mg,
- Welke medicatie stoppen en herstarten poll
-

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Welke medicatie stoppen en starten ?

- start ARNI en stop ACE-I :entresto 24/26 mg, en uiteindelijke 49/51 mg,

Class I

Class IIa

Patient with symptomatic[a] HFrEF[b]

Therapy with ACE-I[c] and beta-blocker
(Up-titrate to maximum tolerated evidence-based doses)

Still symptomatic and LVEF ≤35%

No

Yes

Add MR antagonist[d,e]
(up-titrate to maximum tolerated evidence-based dose)

Yes

Still symptomatic and LVEF ≤35%

No

Yes

Able to tolerate ACEI (or ARB)[f,g]

Sinus rhythm, QRS duration ≥130 msec

Sinus rhythm,[h] HR ≥70 bpm

ARNI to replace ACE-I

Evaluate need for CRT[i,j]

Ivabradine

These above treatments may be combined if indicated

Resistant symptoms

Yes

No

Consider digoxin or H-ISDN or LVAD, or heart transplantation

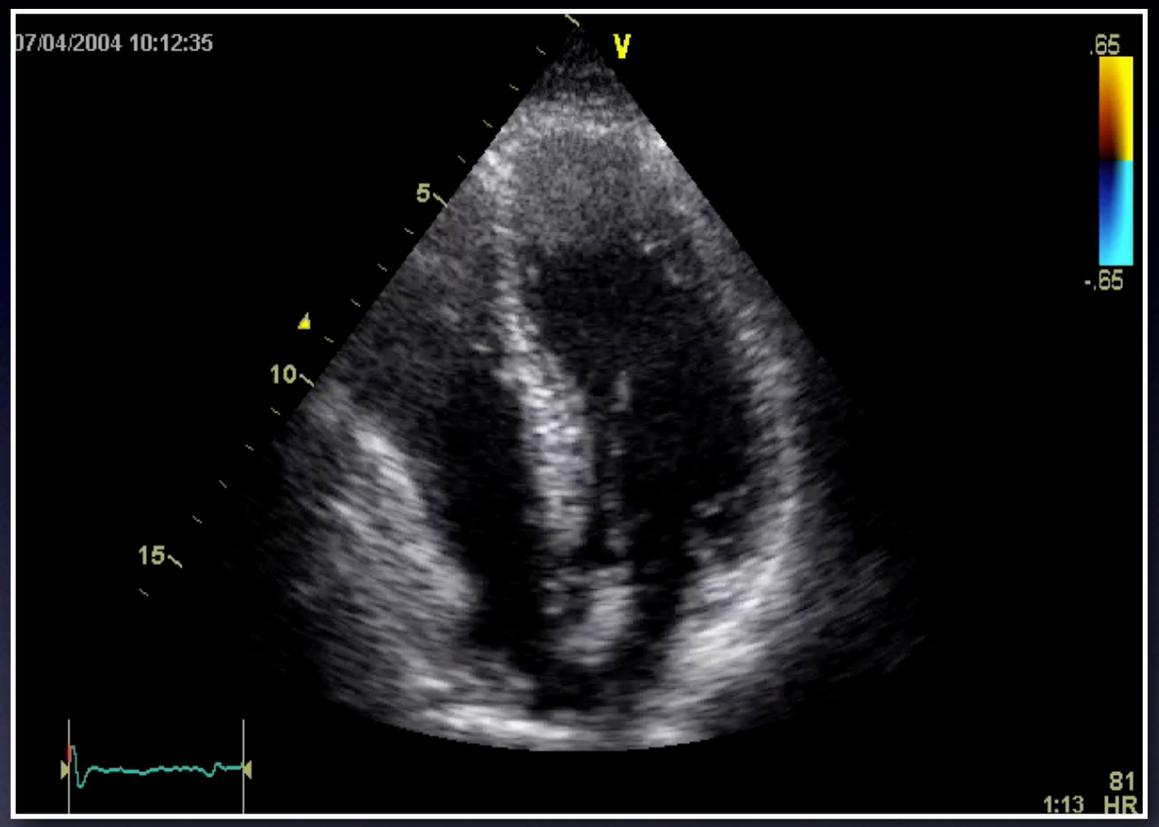
No further action required
Consider reducing diuretic dose

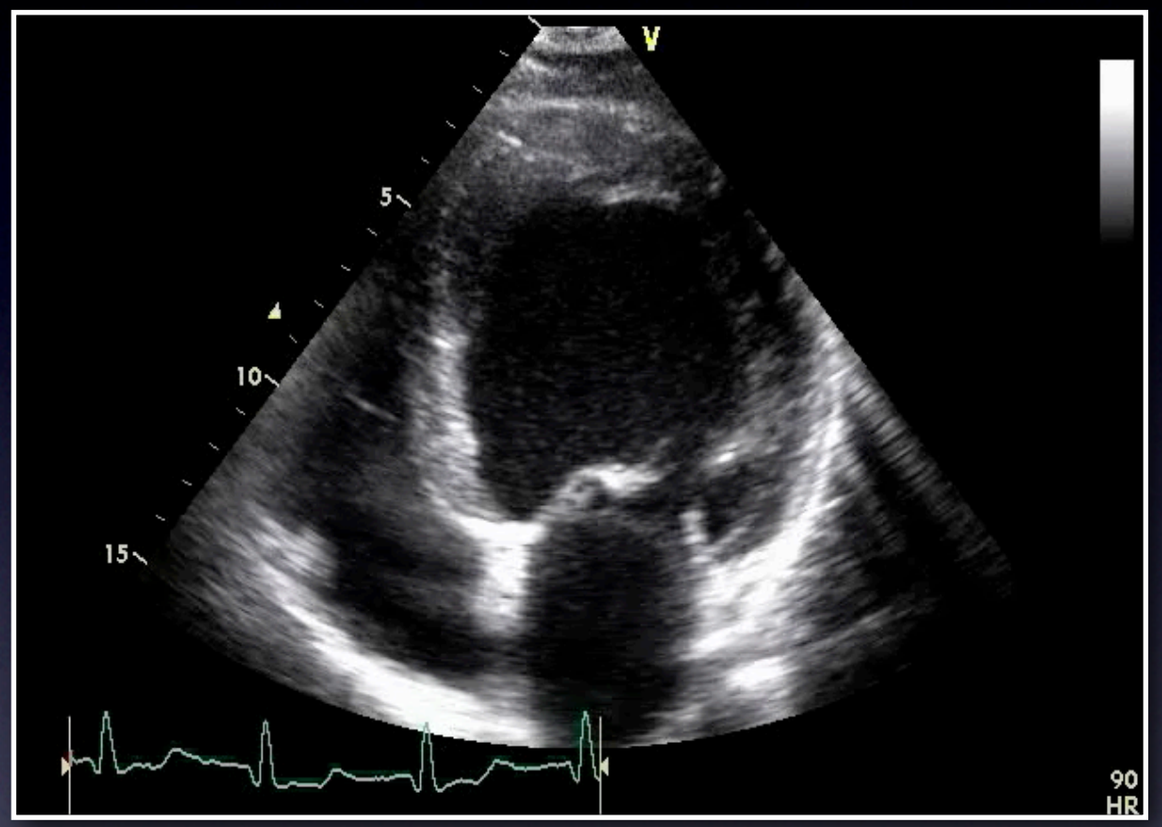
Diuretics to relieve symptoms and signs of congestion

LVEF ≤35% despite OMT or a non-ischaemic symptomatic VT/VF, implant ICD

Sinusritme - 62/min - nl AV geleiding
QRS duur 170 msec - VLBTB

Addendum…LBTB en hartfalen





LBTB en hartfalen

- LBTB: asynchroon contraheren van het hart

  het niet tesamen contraheren van alle delen van het ventrikel

- CRT: cardiac resynchronisation therapy

  dmv pacemaker thv de beide ventrikels het opnieuw laten tesamen contraheren van de ventrikels

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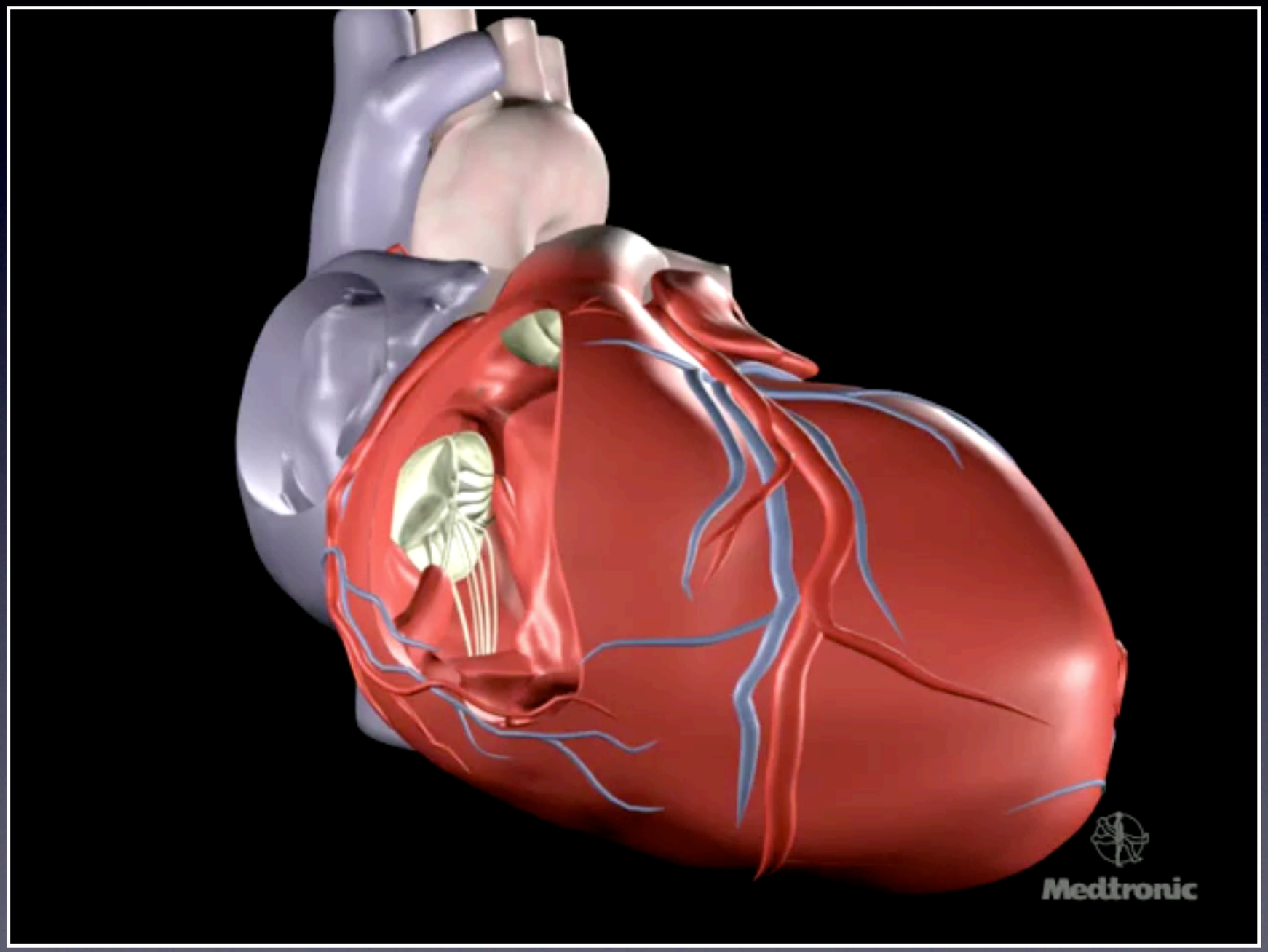
CRT

Cardiale Resynchronisatie Therapie



Indicatie CRT

NYHA	Population	Indicatie
III-IV	SR QRS > 120 ms LVEF ≦ 35%	CRT-P of CRT-D
II	SR QRS > 150 msec LVEF ≦ 35%	CRT-P of CRT-D
III-IV	VKF QRS > 130 ms LVEF ≦ 35%	CRT-P of CRT-D

European Heart Journal (2010) 31,2677-2687

evolutie labo

	4/2020	9/2020
NYHA	3	2
crea	2,1	1,9
K	4	5,2
Na	132	135

European Heart Journal (2010) 31,2677-2687

Take home message

- Euvolemie , durven stoppen met diuretica zeker bij. hypotensie
- Detoriatie nierfunctie ≠ stoppen ACE-I
  ≠ slechte prognose

LBTB → indicatie plaatsen CRT-P / CRT-D ? indien NYHA III blijft overschakelen naar ARNI
GFR verbetert na opstarten ARNI

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Casus 2, 76 j

- gepensioneerd huisarts
- 2007: anterior infarct waarvoor PCI met plaatsen van Medtronic Driver stent. Echocardiografie: apicaal en mid anterior akinesie met hoge einddiastolische drukken waarvoor opstarten ACE-1 inhibitoren en lisdiuretica
- NMR hart: Acuut haemorrhagishe anteroseptale myocardinfarct met matige impact op de globale systolische functie, voorafbestaande linker ventrikelhypertrofie.
- LVEF bij ontslag 40% ; opstarten HARPA revalidatie 3 x wekelijks.
- 2016 : hospitalisatie wegens pleuritis ; CT emfyseem met beginnende longfibrose : diagnose CPFE ;; opstarten met steroïden en antibiotica. Ischemische cardiomyopathie met functioneel status NYHA-klasse II ;
- LVEF 33 % ; echocardiografie : radiale LVEF 36 % en een longitudinale strain -8.5 %. Opstarten Ivabradine
- 2018 : NYHA-klasse II naar NYHA-klasse III. van ACE inhibitie naar ARNI.
- CRT ? : Diskinesie van het interventriculair septum maar het QRS complex is kleiner dan 120 ms ; 'septal flush' geen duidelijke asynchronie, voorlopig geen kandidaat.
-

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- Aldactone, 25 mg, 8u
- Asaflow, 80 mg, 1/d, 8u
- Burinex, 1 mg, 1 keer om de 3 dagen, 8u
- Emconcor, 10 mg, 1/d, 8u
- Entresto (filmtabl 97mg/103mg), 1 tabl, 8u 20u juli 2019
- Glucophage, 850 mg, 1/d, 8u
- Procoralan, 5 mg, 8u 20u
- Rosuvastatin sandoz, 20 mg, 1/d, 20u

Dr. H. Celen
Cardiologie
RZ HHart Leuven

2020 na opstarten entresto

		Juli 2019	Okt 2019	Dec 2019	Maart 20	
					TELECONSULT	
NYHA		3	2	2	2	
maand		1	2	4	6	
Kreatinine	mg/dL	1,3	1,3	1,1	1,2	
eGFR (volgens	mL/min	53	52	65	61	
Ureum	mg/dL	40	42	27	26	
Osmolaliteit (b	mOsmol/kg	267	271			
Urinezuur	mg/dL	6,4	7,7	6,3	5,6	
Laktaat poc	mmol/L					
Hartmerkers						
HS TnT	ng/mL	0,021	0,026	0,015		
NT-ProBNP	pg/ml			863		
CK-MB (immun	ng/mL	1,2	1	2,8		
Ionogram						
Totaal eiwit (ou	g/dL					
Totaal eiwit	g/L	73,6	73,2	82	82,2	
Natrium	mmol/L	131	133	137	143	
Natrium poc	mmol/L					
Kalium	mmol/L	4,4	4,1	4,6	5,6	

The NEW ENGLAND JOURNAL of MEDICINE

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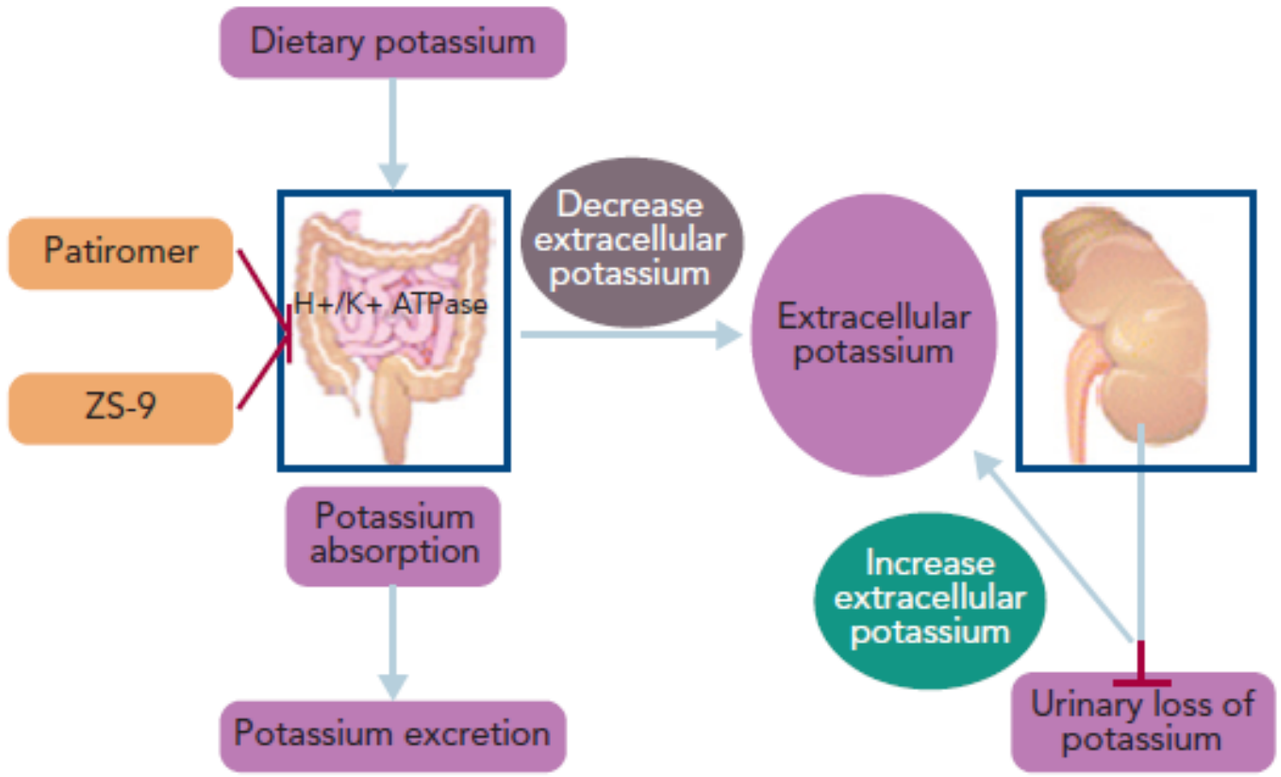
Patiromer in Patients with Kidney Disease and Hyperkalemia Receiving RAAS Inhibitors

Matthew R. Weir, M.D., George L. Bakris, M.D., David A. Bushinsky, M.D., Martha R. Mayo, Pharm.D., Dahlia Garza, M.D., Yuri Stasiv, Ph.D., Janet Wittes, Ph.D., Heidi Christ-Schmidt, M.S.E., Lance Berman, M.D., and Bertram Pitt, M.D., for the OPAL-HK Investigators*

Terugbetaling attest Bf nefrologie

Figure 1: Mechanisms of Action of ZS-9 and Patiromer



Source: Adapted from van der Meer et al. 2011.[59]

CFR | Cardiac Failure Review

UZ LEUVEN I.G. NEFROLOGIE

AANVRAAG ATTESTERING VELTASSA

Naam: ..... Voornaam: .....

EAD: ..... Geboortedatum: .....

Bovenstaande patiënt voldoet aan volgende voorwaarden (duid aan/vul in):

1) Een of meerdere voorwaarden vereist

□ Diabetes mellitus, type ..... □ Congestief hartfalen □ Proteïnurie, ... g/g creat

2) ALLE voorwaarden vereist

□ Chronisch nierlijden stadium 3 of 4 met een eGFR tussen 15-60 ml/min/1.73m²

□ Recidiverende hyperkaliëmie van > 5.1 mEq/l sinds de behandeling met een RAAS-inhibitor, ondanks een kaliumarm dieet en de correctie van een eventuele metabole acidose

□ Onvoldoende effect van het gebruik van lisdiuretica (indien klinisch aangewezen)

□ De klinische noodzakelijke posologie van de RAAS inhibitor niet kan worden gegeven omwille van recidiverende hyperkaliëmie

□ Geen voorgeschiedenis van darmobstructie of ingrijpende gastro-intestinale chirurgie, ernstige gastro-intestinale aandoeningen of slikstoornissen

→ Indien wel, specifieer: .....

Huidige RAAS inhibitor: .....

Begindatum behandeling: ..... / ..... / .....

Huidige posologie: .....

Gewenste klinisch noodzakelijke posologie: .....

Dit document werd ingevuld door

Naam: .....

Functie: .....

Handtekening: ..... Datum: ..... / ..... / .....

Gelieve ook het laatste verslag en bijhorende laboresultaten bij te voegen!

2020 na opstarten Veltassa 13 g

		Juli 2019	Okt 2019	Dec 2019	Maart 20	April20	Juli 20	September 20
					TELECONSULT			
NYHA		3	2	2	2	2	2	2
maand		1	2	4	6	8	9	11
Kreatinine	mg/dL	1,3	1,3	1,1	1,2	1,2	1,1	1,2
eGFR (volgens	mL/min	53	52	65	61	58	64	57
Ureum	mg/dL	40	42	27	26	37	36	24
Osmolaliteit (b	mOsmol/kg	267	271					
Urinezuur	mg/dL	6,4	7,7	6,3	5,6	6,7	6,2	6,9
Laktaat poc	mmol/L							
Hartmerkers								
HS TnT	ng/mL	0,021	0,026	0,015				
NT-ProBNP	pg/ml			863				
CK-MB (immun	ng/mL	1,2	1	2,8				
Ionogram								
Totaal eiwit (ou	g/dL						8	7,3
Totaal eiwit	g/L	73,6	73,2	82	82,2	82,3		
Natrium	mmol/L	131	13	137	143	146	142	140
Natrium poc	mmol/L							
Kalium	m			4,6	5,6	4,9	4,5	4,9

Casus 3 : man 74j

- Anterior infarct in 2015
- Type 2 diabetes sedert 2011, metformine
- Geen controle sedert 2017 : LVEF 45 %
- 2019 associatie GLP1 , gewichtsverlies van 90 naar 80 kg
- Mantelzorger voor vrouw met Alzheimer

Casus 3 : Medicatie

- Asflow 80 mg
- Rosuvastatine 20 mg
- Olmesartan 20 mg
- Burinex 1 mg
- Spironolactone 25 mg
- Metformine 850 mg 2x dag
- Ozempic 0,1 mg 1 x week
- Coruno 16 mg

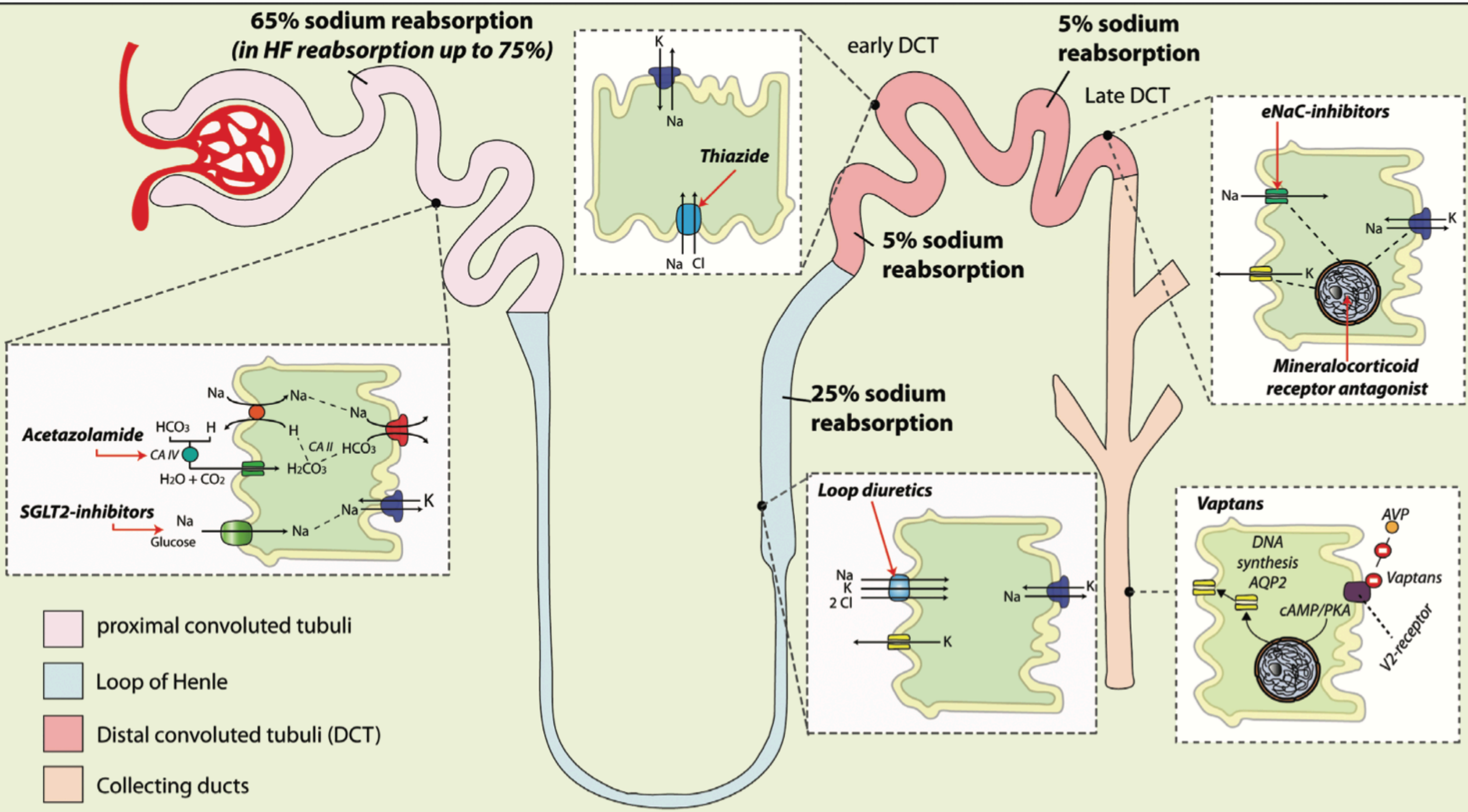
Casus 3 : LABO en KO

- HgA1c 7,1%
- GFR 65 en Crea 1,3, K 4,9
- ntProBNP 1100
- BD 160/80, G toename van 80 naar 85 kg
- Enkeloedemen, NYHAklasse II

Casus 3 man

- Telefonisch overleg huisarts : “Gewichtstoename en dypnae sedert 2 weken”
- Man weigert naar rdplg en ziekenhuis te komen 86 kg, BD 140/80 mmhm , pols 80
- ECG : sinusaal , Anterior infarct, 80
- Huisbezoek : Burinex 2 mg per oraal, geen effect,
- na 3 dagen en diamox 250 mg eenmalig en hygroton 50 mg 3 dagen… diurese neemt toe, kliniek beter

WERKINGSMECHANISME DIURETICA



DIURETICA

Table 2 Pharmacology of diuretics

	Acetazolamide	Loop diuretics	Thiazide-like diuretics	MRA[a]
Site of action	Proximal nephron	Ascending loop of Henle	Early distal convoluted tubule	Late distal tubuie
Starting dose/usual chronic dose	Oral: 250–375 mg Intravenous: 500 mg	Furosemide: 20–40/40–240 mg[b] Bumetanide: 0.5–1.0/1–5 mg[b] Torsemide: 5–10/10–20 mg[b]	HCTZ: 25/12.5–100 mg[c] Metolazone: 2.5/2.5–10 mg[c] Chlorthalidone: 25/25–200 mg[c] Chlorothiazide: 500–1000 mg (IV formulation available)	Spironolactone: 25/25–50 mg Eplerenone: 25/25–50 mg Potassium canrenoate: 25–200 mg/not for chronic use
Maximum recommended total daily dose	Oral: 500 mg 3x/day Intravenous: 500 mg 3x/day	Furosemide: 400–600 mg Bumetanide: 10–15 mg Torsemide: 200–300 mg	HCTZ: 200 mg Metolazone: 20 mg Chlorthalidone: 100 mg Chlorothiazide: 1000 mg	50–100 mg (doses up to 400 mg are used in hepatology)
Half-life	2.4–5.4 h	Furosemide: 1.5–3.0 h Bumetanide: 1–1.5 h Torsemide: 3–6 h	HCTZ: 6–15 h Metolazone: 6–20 h Chlorthalidone: 45–60 h	Canrenone: 16.5 h[d] Eplerenone: 3–6 h
Onset	PO: 1 h IV: 15–60 min	PO: 0.5–1 h[e] IV: 5–10 min[e] SC: 0.5 h[e]	PO: 1–2.5 h IV: Chlorothiazide is IV available, onset action: 30 min	PO: 48–72 h[d] IV: potassium canrenoate; 2.5 h
Oral bioavailability	Absorption is dose-dependent, dose >10 mg/kg exhibit variable uptake	Furosemide: 10–100% Bumetanide: 80–100% Torsemide: 80–100%	HCTZ: 65–75% Metolazone: 60–65%[f] Chlorthalidone: unknown Chlorothiazide: 9–56%	Spironolactone: ~90% Eplerenone: 69%
Enteral absorption affected by food	May be taken with food. Food decreases symptoms of GI upset.	Furosemide: yes (slowed) Bumetanide: yes (slowed) Torsemide: no	HCTZ: unknown Metolazone: unknown Chlorthalidone: unknown	Spironolactone: bioavailability increase with high fat food Eplerenone: unknown
Potency (FENa%)[g]	4%	20–25%[e]	5–8%	2%

Acute treatment phase

Within 1 hour of admission

Congestion with volume overload

Loop diuretic naive?

No

Starting dose =1-2 times 24-hours oral home dose intravenously

+ ask to empty bladder

Yes

Starting dose ≥ 20-40 furosemide equivalents intravenously [&]

+ ask to empty bladder

Early evaluation phase

First 6 hours after loop diuretic administration

Start urine collection

EARLY EVALUATION OF TREATMENT

- After 2 hours: spot urinary sodium analysis
- After 6 hours: assess average urine output

Early response phase

Remaining time of first 24 hours

Urine spot sodium > 50-70 meq/L

6-hours urine output > 100-150ml/hours

Yes

Persistent congestion?

*No**

Yes

Repeat similar dose of IV loop diuretics every 12-hours [#]

No

Double dose IV loop diuretics

Assess within 6 hours

< 50-70meq/L sodium

< 100mL / hourly diureses

Yes

Repeat until maximal dose loop diuretics°

No

Go to part 2: treatment algorithm after 24-hours

Parallel interventions

(1) continue guideline directed medical therapy, (2) consider early use of mineralocorticoid receptor antagonists in case of low potasium, (3) salt and water restriction, (4) IV potassium and magnesium if necessary

Parallel evaluation

Standard non-invasive monitoring of heart rate, rhythm, respiratory rate, oxygen saturation and blood pressure. Check for signs of hypoperfusion. Consider invasive BP measurement in case of hypotension. Clearly register baseline weight before diuretics.

B

Second day of admission

Second day of admission until discharge

Persistent congestion

Evaluate 24-hour urine output

UO < 3-4L

UO > 3-4 L

double loop diuretic dose until maximal loop diuretic dose

Assess within 6 hours

< 100mL / hourly diureses

maximal loop diuretic dose?

No

Repeat until maximal loop diuretic dose

Yes

Combinational diuretic therapy:
First line: thiazides
Second line: Acetazolamide or amiloride
Third line: consider SGLT2-I
dose according to table 2

Persistent congestion

UF- bail out

predischarge decongestion evaluation according to figure 1

Consider discharge

Continue current dose until decongestion

consider reducing loop diuretic dose if daily UO > 5L

Parallel interventions

(1) Uptitrate Guideline directed medical therapy. (2) Initiate Mineralocorticoid receptor antagonist and pottasium supplement if hypokalemia (with or without magnesium) (3) Salt and water restriction, (4) If presence of ascites and/or pleural effusion consider draining, mobilize leg edema using stockings. (5) Physical rehabilitation

Parallel evaluation

Standard non-invasive monitoring of heart rate, rhythm, respiratory rate, oxygen saturation and blood pressure. Check for signs of hypoperfusion. Daily weight and urine output monitoring. Laboratory assessment. Assessment of comorbidities, nutritional status and home maintenance therapy/polypharmacy

Casus 3

- G : van 85 naar 79 kg op een week.
- Lichte orthostatische hypotensie, Crea stijgt naar 1,8., Natrium serum 133 ;
- Wat doen we nu ?
- Labo urine : natrium 25 meq/liter
- Stopzetten alle diuretica

	Variabele	EUVOLEMIE → CONGESTIE				
Klinisch onderzoek	Orthopneu	Geen		Mild	Matig	Ernstig
	CVD (cm)	< 8 + geen HJR	< 8	8-10 of HJR+	11-15	> 16
	Hepatomegalie		Afwezig	Leverrand voelbaar	Matige pulsatiel vergroting	Massieve vergroting + gevoelig
	Oedeem		Geen	+1	+2	+3/+4
	6MWT	> 400m	300-4003	200-300m	100-200m	< 100m
Technische evaluatie	Natriuretische peptide - BNP - NT-proBNP		< 100 < 400°	100-299 400-1.500	300-500 1.500-3.000	> 500 > 3.000
	RX-Thorax	Zuiver	Zuiver	Cardio-megalie	- Pulmonale congestie - Kleine pleura-effusie	Interstitieel of alveolair oedeem
	Evaluatie van de vena cava inferior (VCI)	Geen van beide - max. diameter > 2,2cm - collaps VCI < 50%		Één van beide - max. diameter > 2,2cm - collaps VCI < 50%		Beide - max. diameter > 2,2cm - collaps VCI < 50%
	Longechografie	< 15 B-lines bij evaluatie van 28 posities		15-30 B-lines bij evaluatie van 28 posities		> 30 B-lines bij evaluatie van 28 posities

Adapted from: Mullens W, et al. Eur J Heart Fail 2019;21(2):137-55.

Casus 3

- Na 4 dagen : NYHA klasse I tot II, BD 120/70 mmhg, voelt zich goed

- R/ Asflow 80 mg, Rosuvastatine 20 m, OImesartan 20 mg, Metformine 850 mg 2x dagOzempic 0,1 mg 1 x week,Coruno 16 mg

- Teleconsulatie en Huisbezoek huisarts

Casus 3 : Teleconsultatie

- Na 4 dagen :
  - Crea 1,2, GFR 70, HA&c 7,4 %
  - Natrium urine (sodiumspot) 112 meq/l
  - ntProBNP 889
  - G 81 kg, euvolemie
- Wat nu ? Welke medicatie stoppen en herstarten ?
  - Forxiga 10 mg

Welke medicatie stoppen en wat starten ?

- Start SGLT-2 inhibitie en stopGLP 1 A (ozempic)

- Forxiga 10 mg

Overview of antidiabetic drugs with proven CV benefit on the Belgian market

GLP-1RAs

VICTOZA® liraglutide injection 1.2 mg | 1.8 mg

trulicity® dulaglutide (rDNAorigin) injection

OZEMPIC® semaglutide injection

RYBELSUS® semaglutide tablets

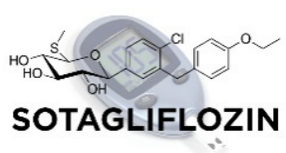
SGLT2i

Jardiance® (empagliflozin) tablets 10 mg/25 mg

Invokana® canagliflozin tablets

forxiga® (dapagliflozin)

Steglatro™ (ertugliflozin) 5 mg, 15 mg tablets

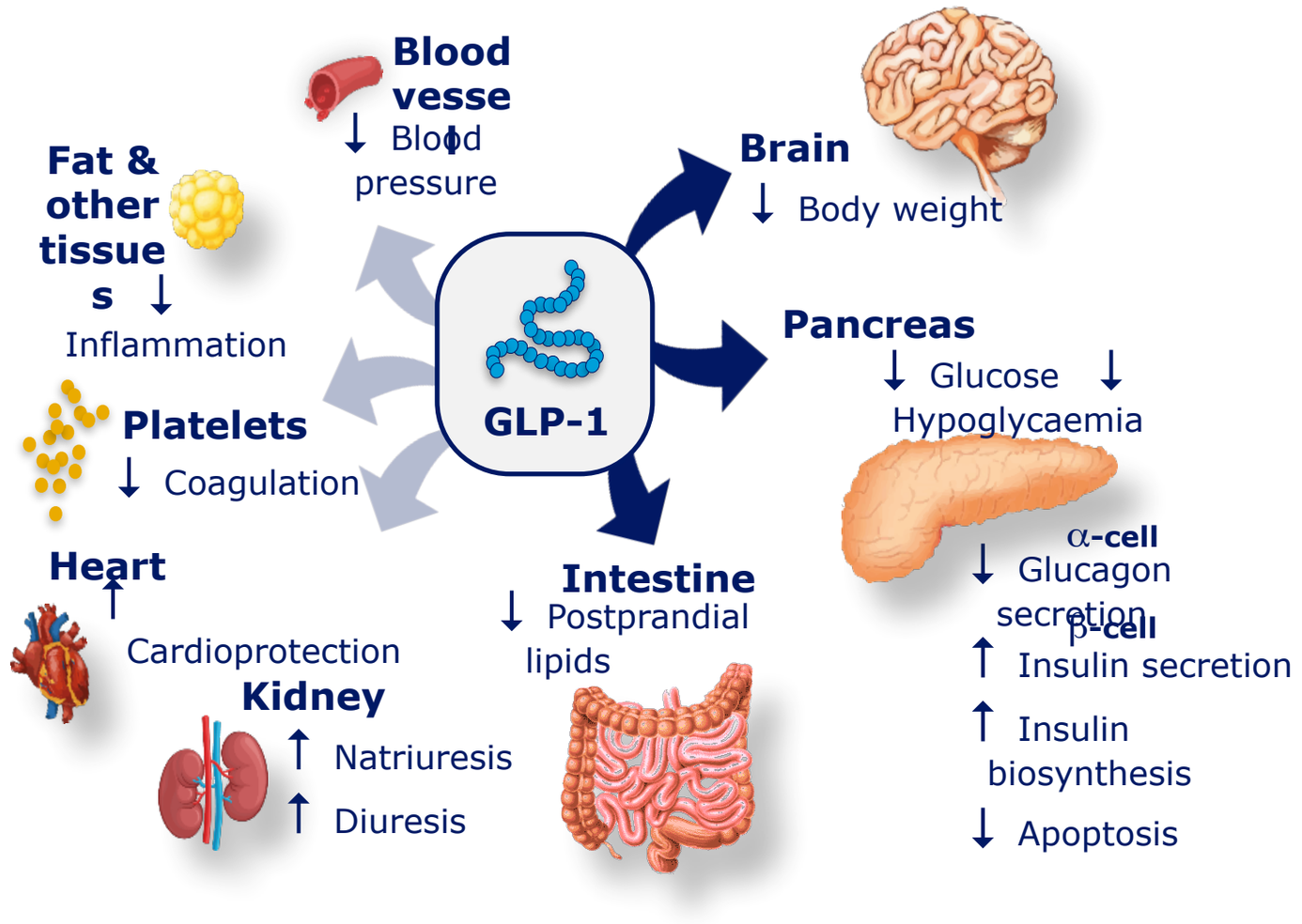


SOTAGLIFLOZIN

novo nordisk®

Status March 2021

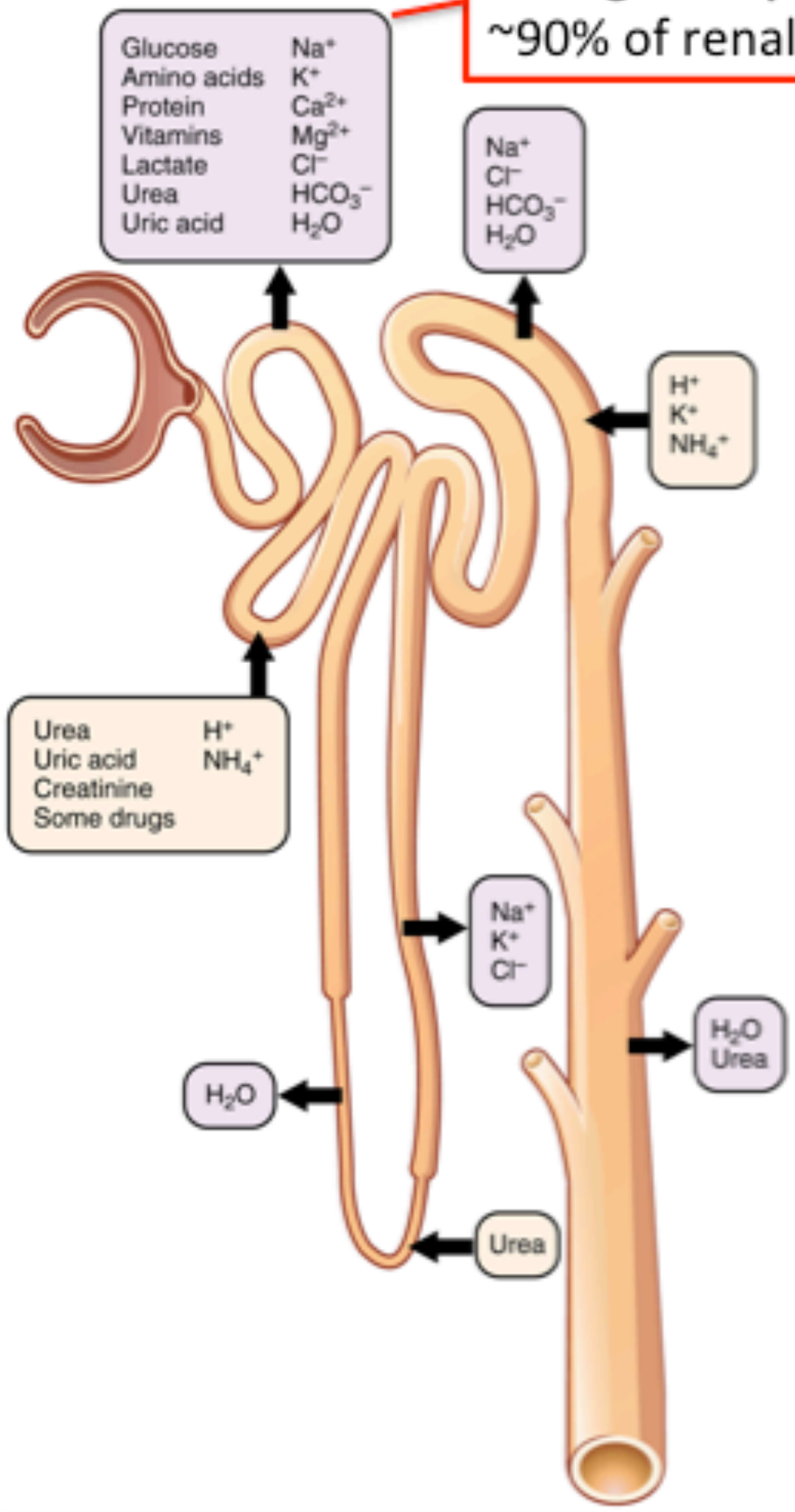
Pleiotropic effects of GLP-1 RA

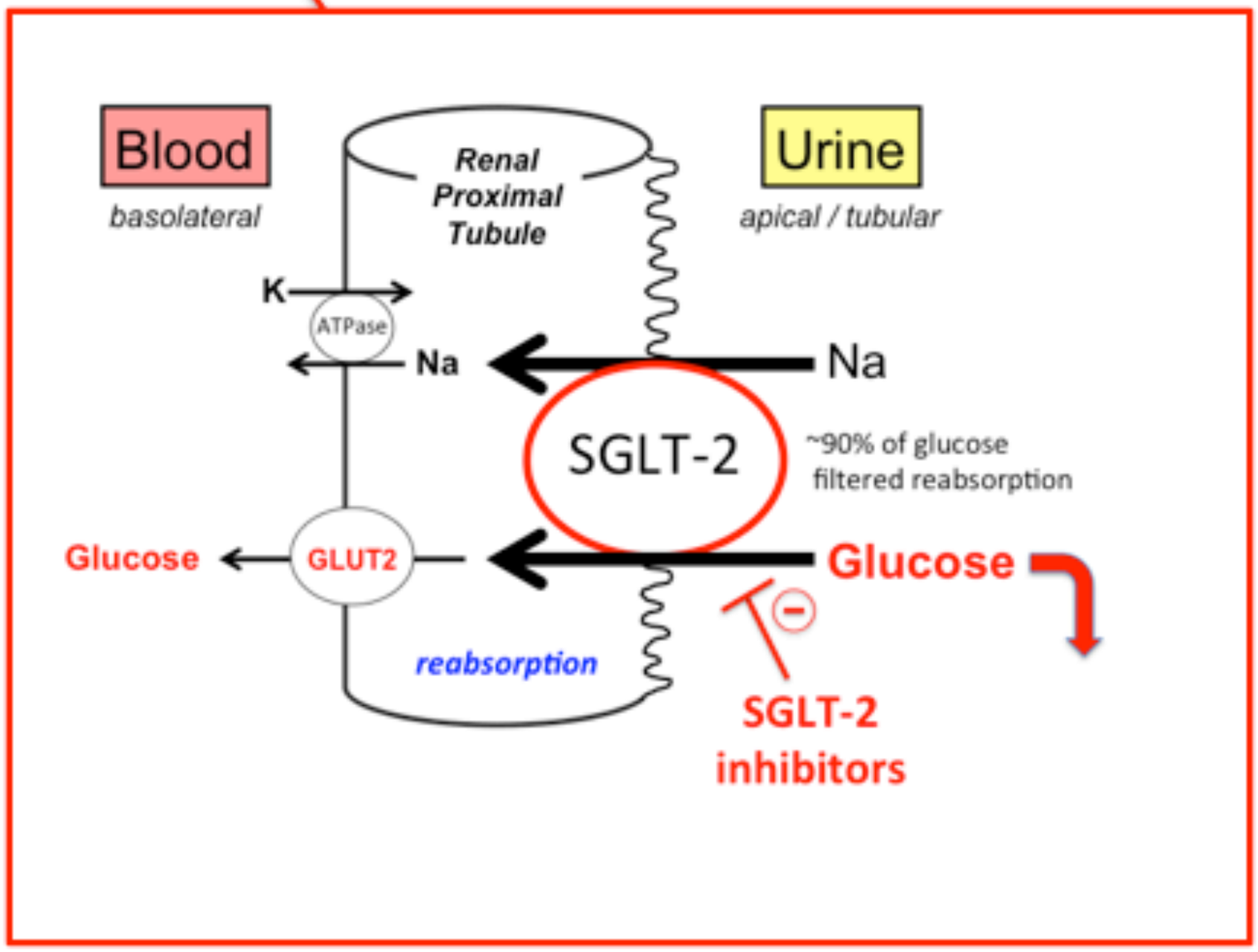


- ↓ **Glucose**
- ↓ **Body weight**
- ↓ **Hypertension**
- ↓ **Dyslipidaemia**

- Anti-atherosclerotic effects
- Anti-inflammatory effects
- Reduced platelet aggregation

S1 segment proximal tubule:
~90% of renal glucose reabsorption





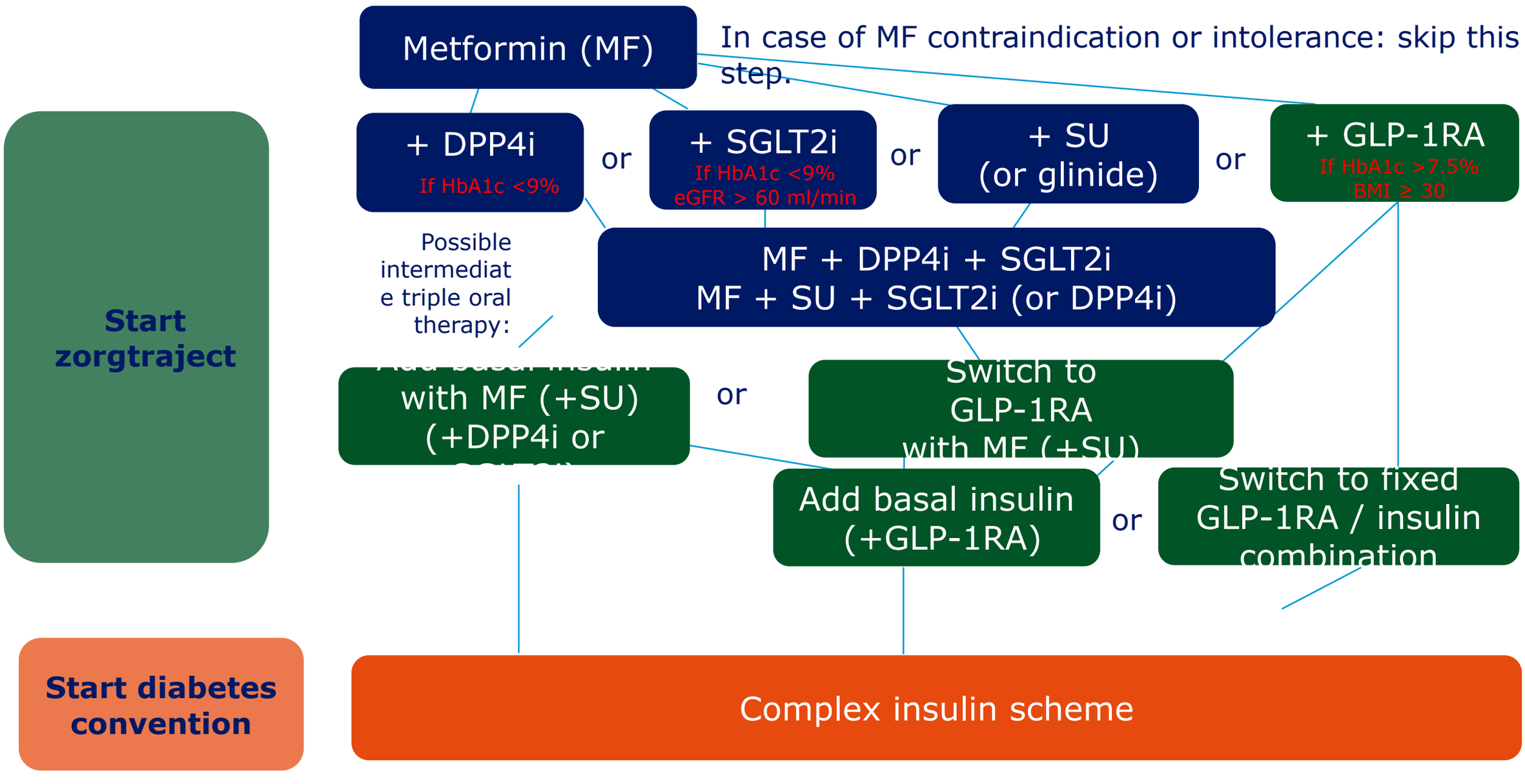
How to chose between a GLP-1RA and a SGLT2i?

- Both GLP-1RAs and SGLT2is have favourable CV outcomes; GLP-1RAs are associated **with decreased atherosclerosis-mediated events**, whereas SGLT2is are associated **with favourable HF and CKD outcomes**

CARDIOMETABOLIC ↔ **CARDIORENAL**
Fat & Inflammation — **Salt & Water**

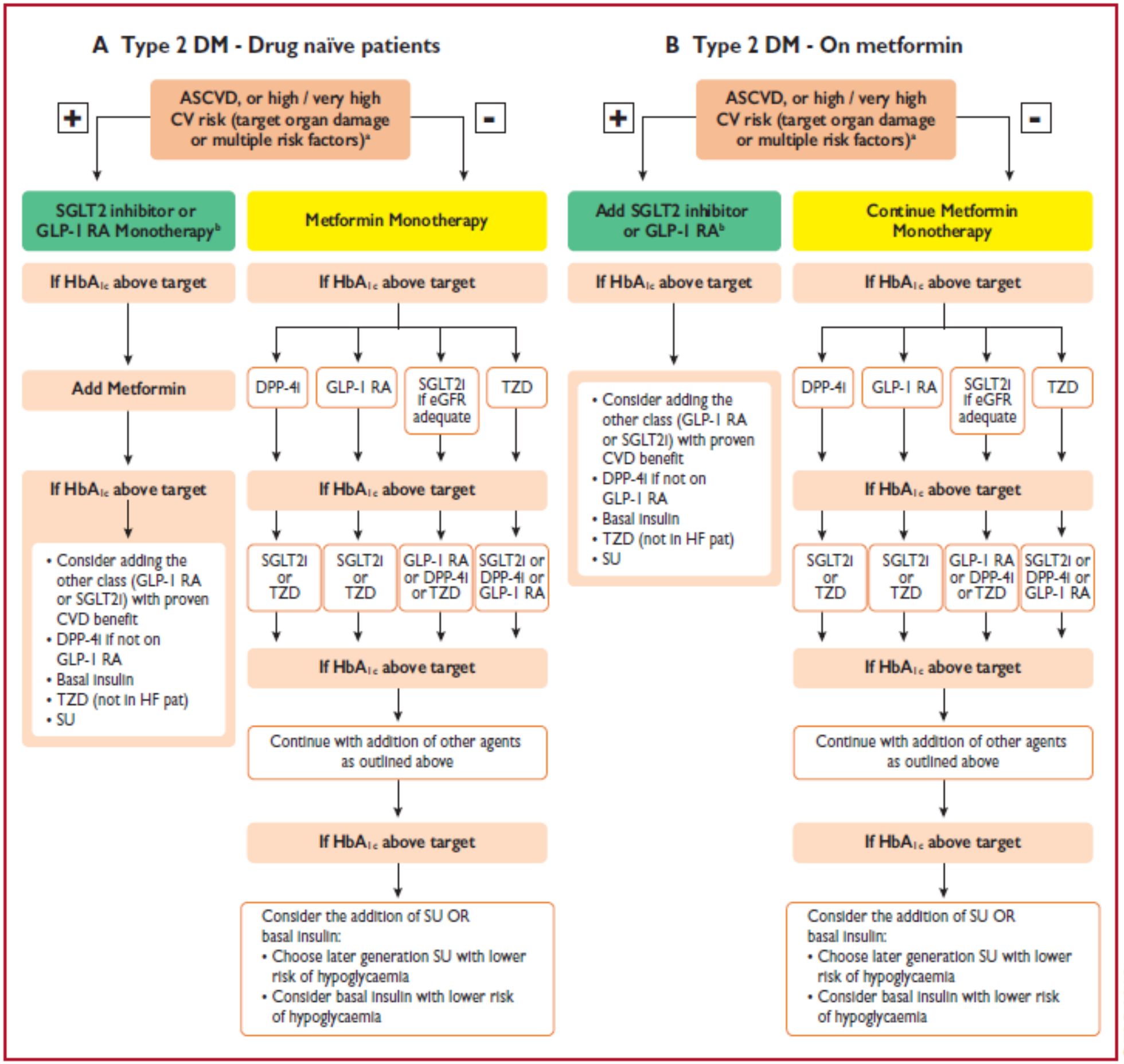
Considerations	GLP-1RAs may be a better choice*	SGLT2is may be a better choice*
Cardiorenal	• **Established ASCVD and/or cerebrovascular disease** • eGFR <30 mL/min/1.73 m^2	• HF or CKD predominates
Glycaemic control and DKA	• **More HbA_{1c} reduction needed** • History of DKA	–
Comorbidities	• **Overweight of obesity** • Frequent genital mycotic infections • Osteoporosis or history of fractures • Lower-limb ulcers or amputations	• Active gallbladder disease • Pancreatitis • Gastroparesis or delayed gastric emptying • Personal or family history of MTC or MEN-2 • History of proliferative retinopathy
Other	Patient preference	Patient preference

Antihyperglycemic therapy in adult T2D:
the Belgian situation



Due to many side effects, the use of glitazones is not used very often in Belgium

ESC/EASD guidelines (2019)



Studies hartfalen

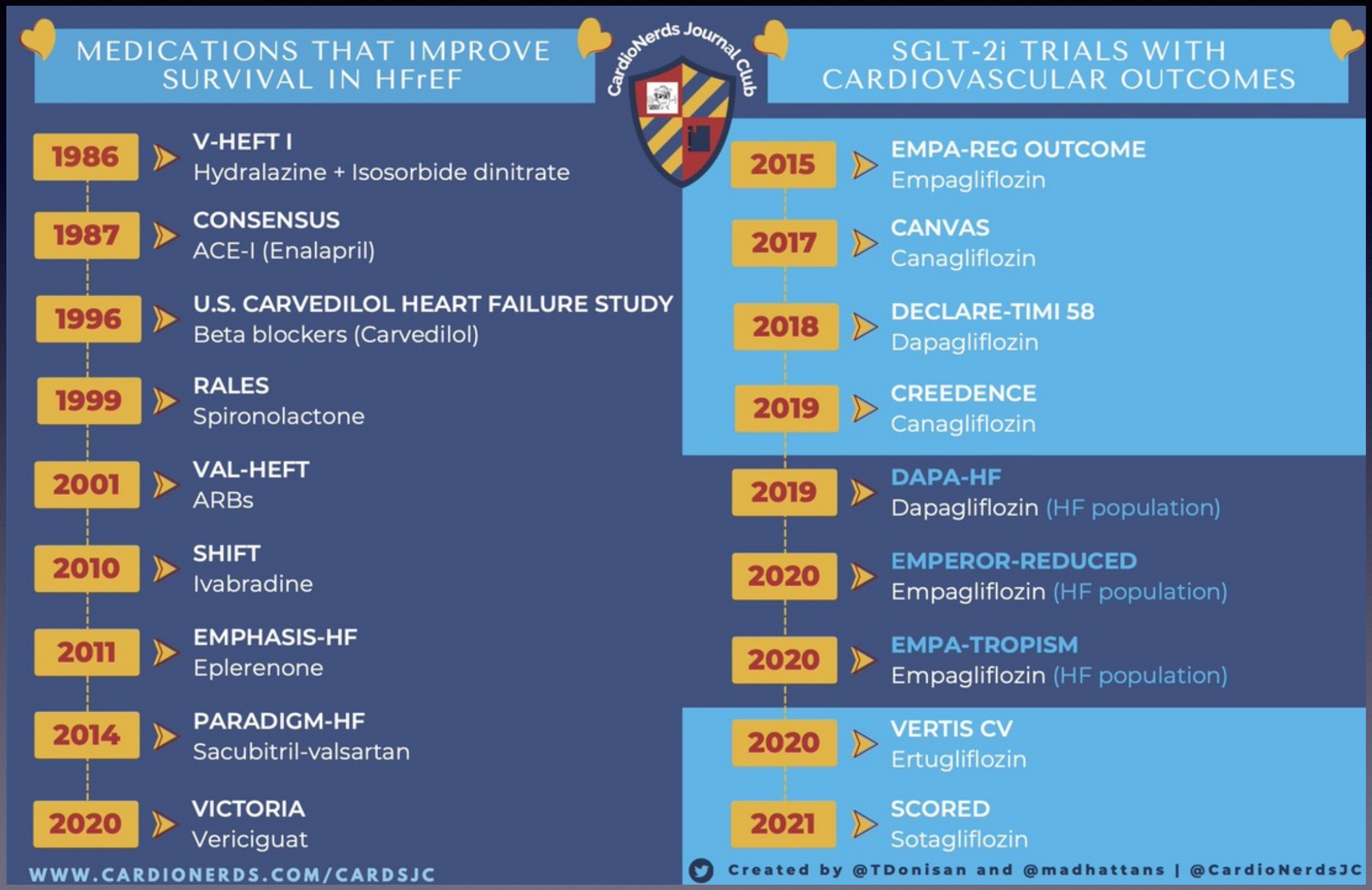
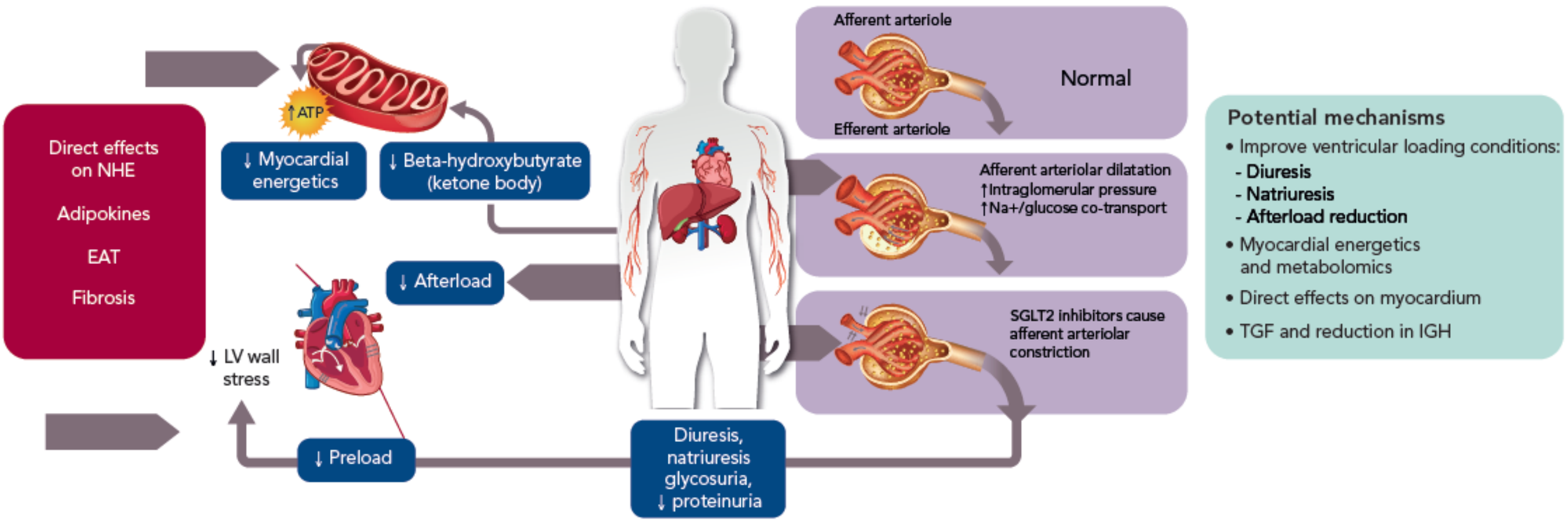


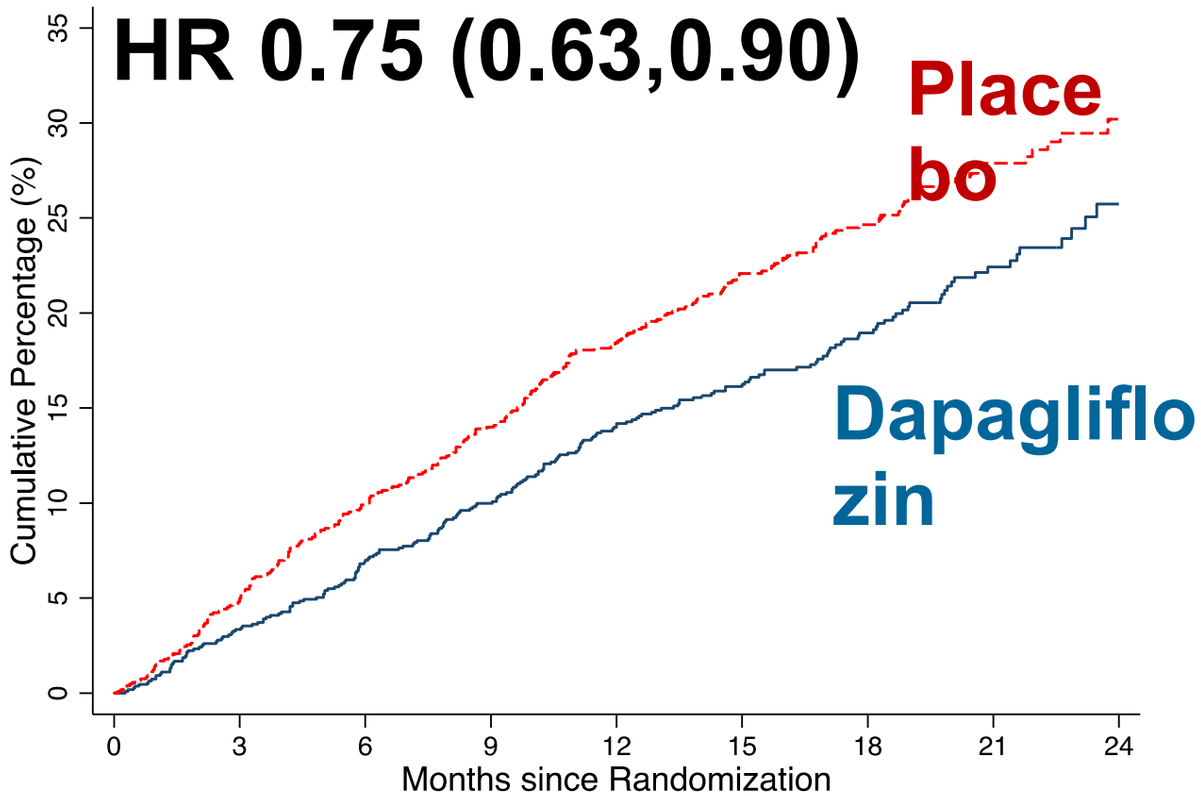
Figure 3: Proposed Mechanism of Cardiovascular Benefits of SGLT2 Inhibitors



ATP = adenosine triphosphate; BP = blood pressure; EAT = epicardial adipose tissue; eGFR = estimated glomerular filtration rate; IGH = intraglomerular hypertension; LV = left ventricular; NHE = sodium-hydrogen exchanger; SGLT2 = sodium–glucose co-transporter 2; TGF = tubuloglomerular feedback. Source: Verma et al. 2017.[37] Adapted with permission from the American Medical Association.

CV death or HF hospitalization

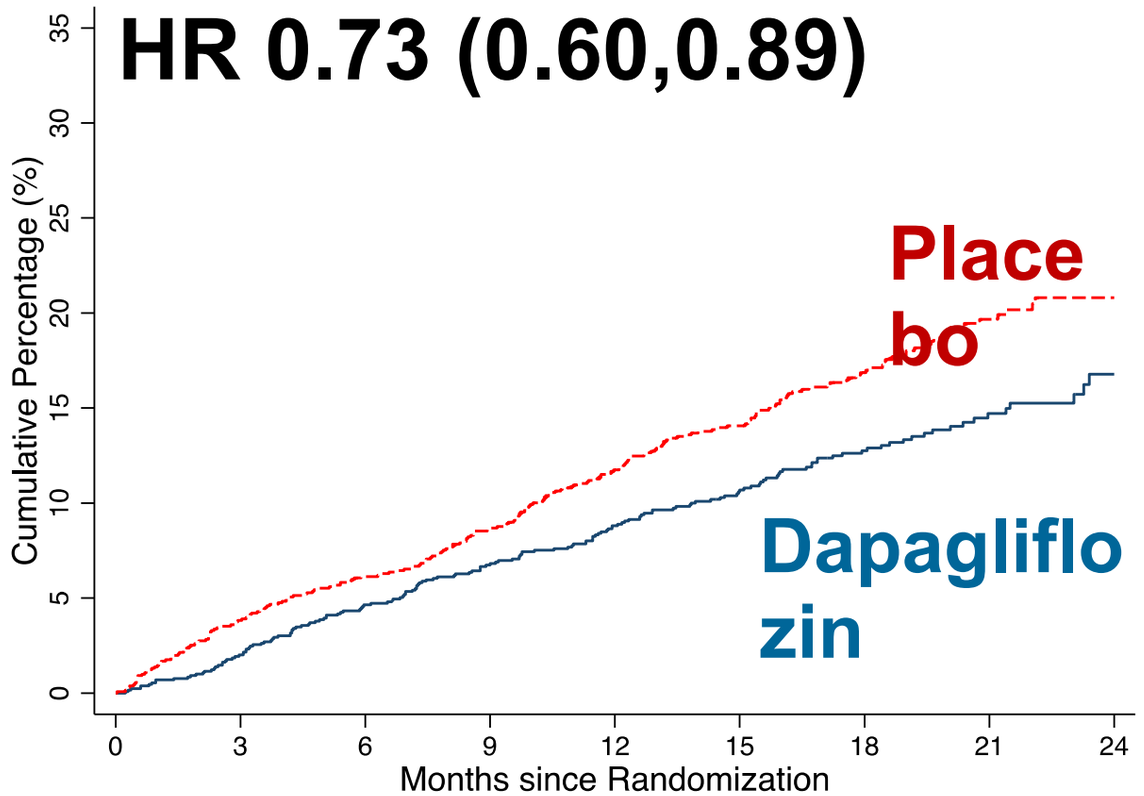
Diabetes



Number at Risk

Dapagliflozin	1075	1038	996	959	879	681	501	260	88
Placebo	1064	1009	951	901	819	632	470	254	90

No Diabetes



Number at Risk

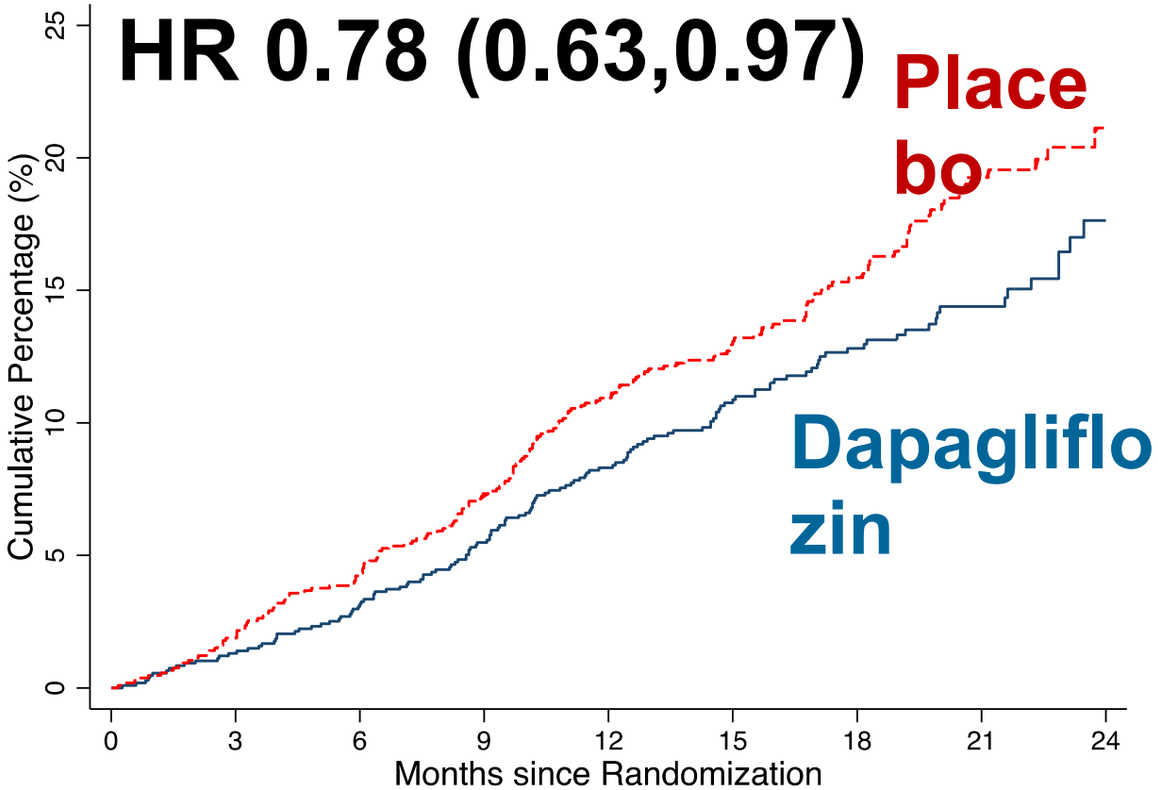
Dapagliflozin	1298	1268	1227	1194	1128	882	646	353	122
Placebo	1307	1255	1217	1181	1105	851	631	342	122

P interaction
0.83

All-cause death

Diabetes

HR 0.78 (0.63,0.97)

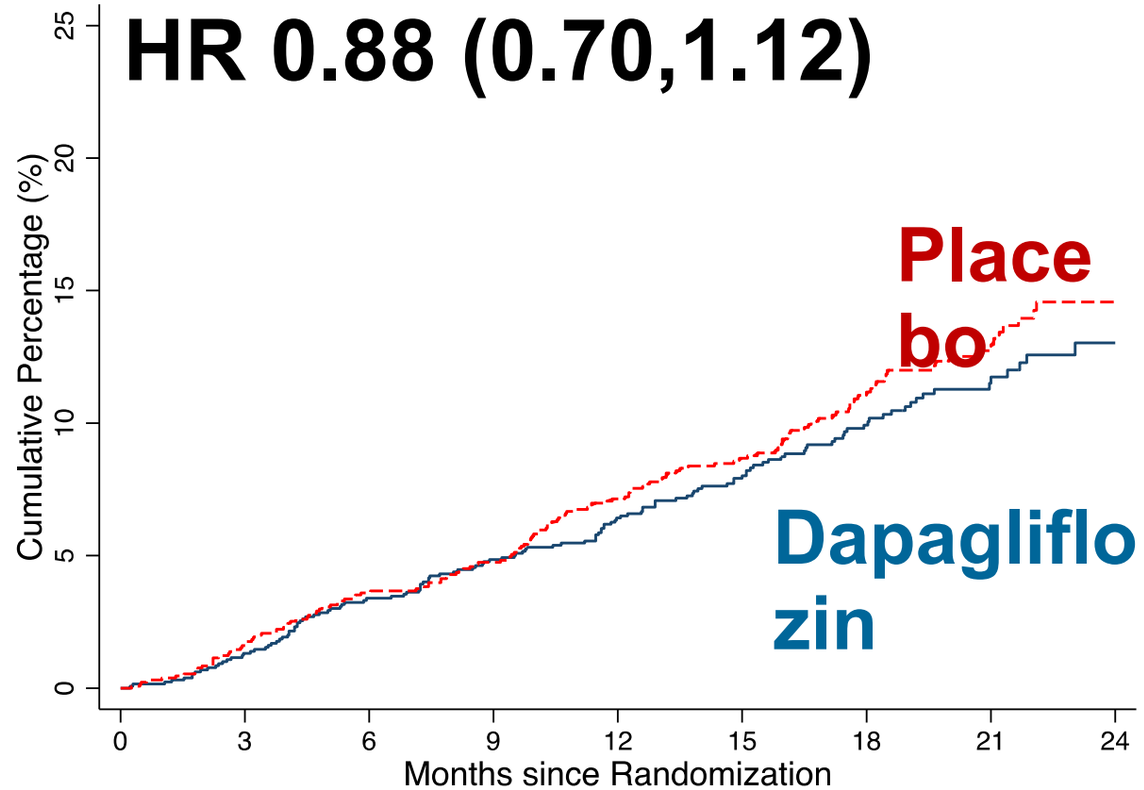


Number at Risk

Dapagliflozin	1075	1061	1042	1016	952	740	552	295	104
Placebo	1064	1044	1019	986	911	718	535	286	102

No Diabetes

HR 0.88 (0.70,1.12)



Number at Risk

Dapagliflozin	1298	1281	1254	1235	1178	926	691	377	129
Placebo	1307	1286	1260	1245	1181	920	686	379	133

P interaction
0.45

Table 1: Summary of Heart Failure Outcomes in SGLT2 Inhibitor Clinical Studies

Outcome	Meta-analysis of SGLT2 Inhibitors in T2D CVOTs (Empagliflozin, Canagliflozin and Dapagliflozin)[17]		DAPA-HF (Dapagliflozin)[8]	EMPEROR-Reduced (Empagliflozin)[9]
	Overall Population (n=38,723)	History of HF (n=4,543)	HFrEF (n=4,744)	HFrEF (n=3,700)
Relative risk reduction (%)				
HHF	32	31	30	30
HHF and CV death	24	27	26	25
HR				
HHF	0.68 (95% CI [0.60–0.76]; p<0.001)	0.69 (95% CI [0.57–0.83]; p<0.001)	0.70 (95% CI [0.59–0.83]; p<0.001)	0.70 (95% CI [0.58–0.85]; p<0.001)
HHF and CV death	0.76 (95% CI [0.63–0.84]; p<0.001)	0.73 (95% CI [0.63–0.84]; p<0.001)	0.74 (95% CI [0.65–0.85]; p<0.001)	0.75 (95% CI [0.65–0.86]; p<0.001)

CV = cardiovascular; CVOT = cardiovascular outcomes trial; HF = heart failure; HFrEF = heart failure with reduced ejection fraction; HHF = hospitalisation for heart failure; SGLT2 = sodium–glucose co-transporter 2; T2D = type 2 diabetes. Source: Arnott et al. 2020,[17] McMurray et al. 2019[8] and Packer et al. 2020.[9]

4 hoekstenen HFrEF

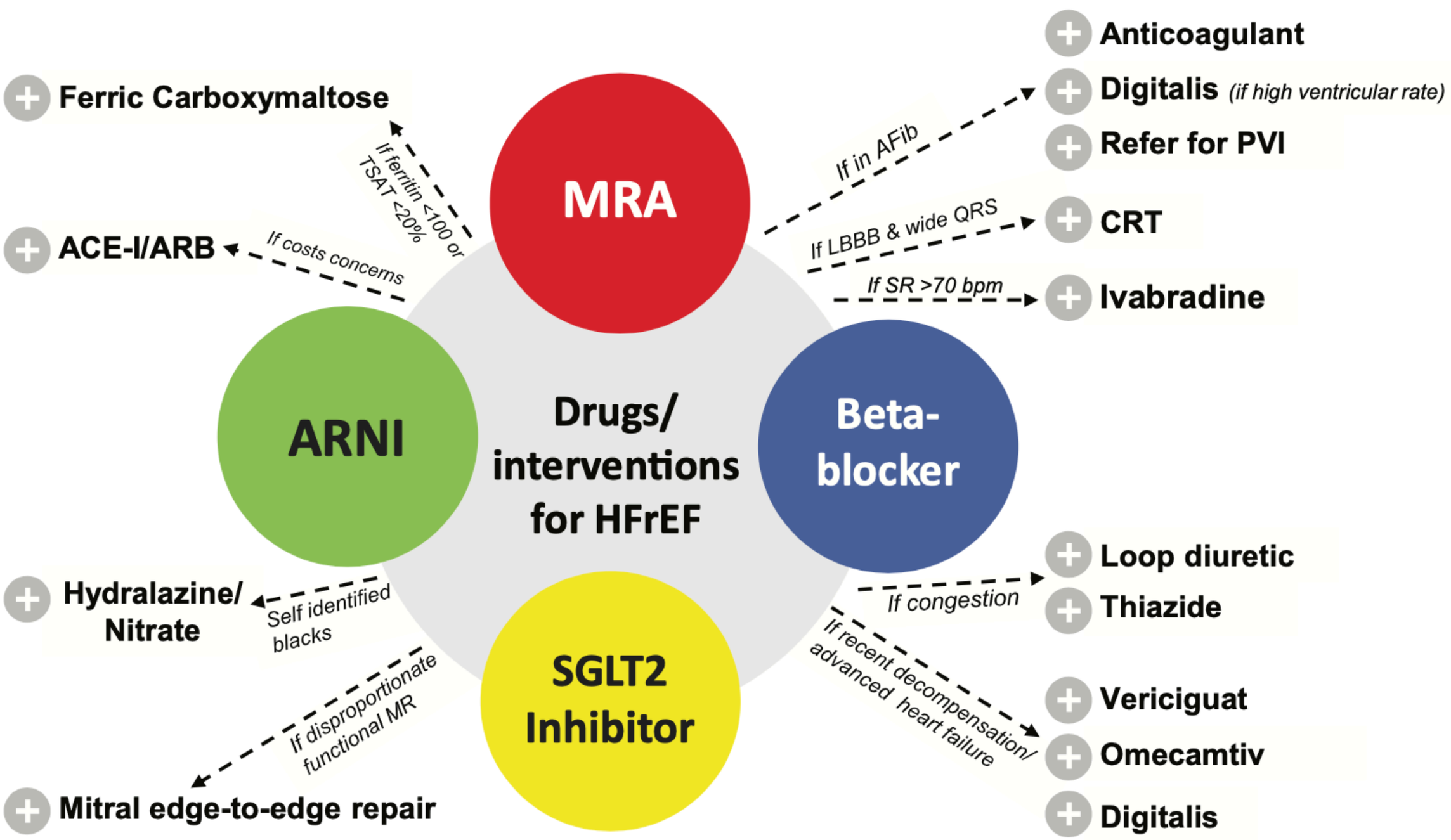
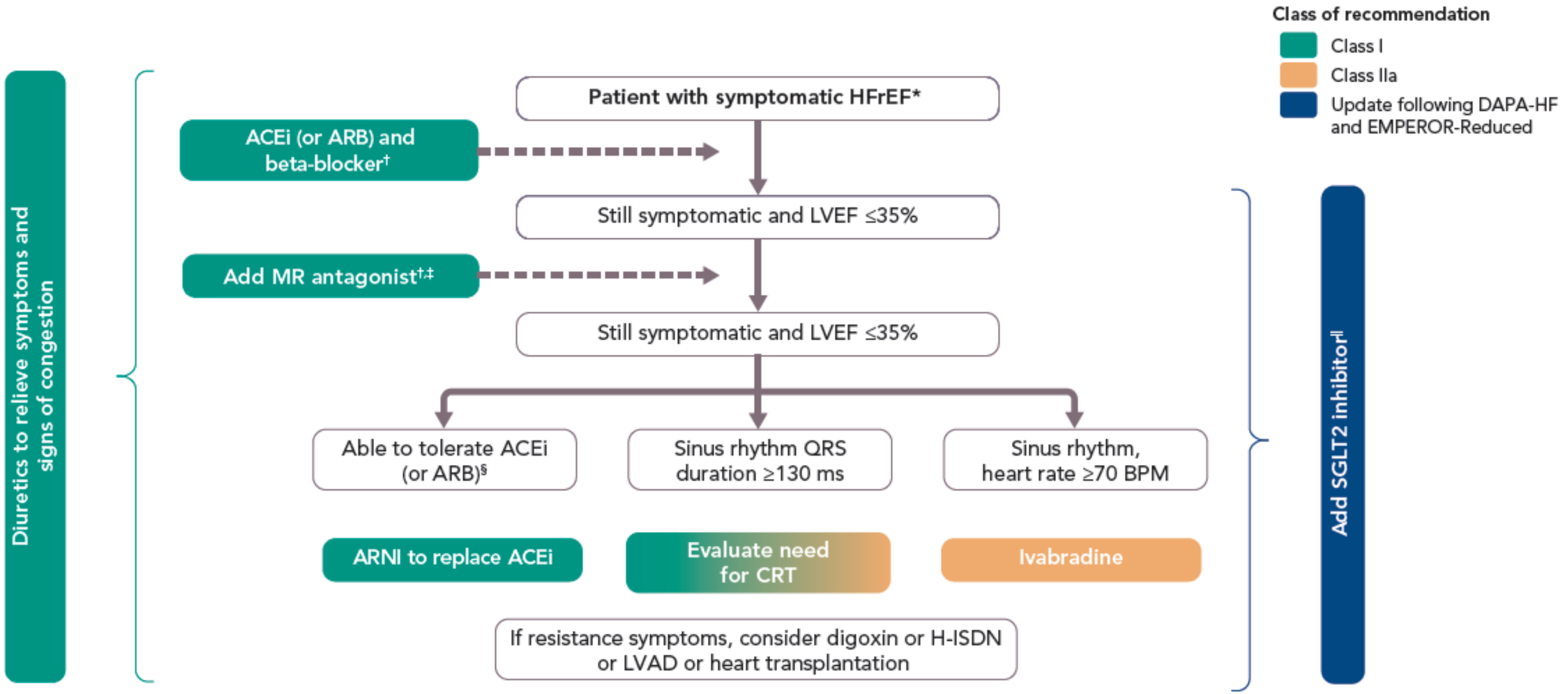


Figure 4: Proposed Modification to the Therapeutic Algorithm for a Patient with Symptomatic Heart Failure with Reduced Ejection Fraction Following Results From DAPA-HF and EMPEROR-Reduced



*Green indicates a class I recommendation; orange indicates a class IIa recommendation; blue indicates the suggested revision to the algorithm based on recent DAPA-HF trial results. *NYHA class II–IV, LVEF <40%; †Up-titrate to maximum tolerated evidence-based dose; ‡With a hospital admission for HF within the last 6 months or with elevated natriuretic peptides (BNP >250 pg/ml or NT-proBNP >500 pg/ml in men and 750 pg/ml in women); §With an elevated plasma natriuretic peptide level (BNP ≥150 pg/ml or plasma NT-proBNP ≥600 pg/ml, or if HF hospitalisation within 12 months plasma BNP ≥100 pg/ml or plasma NT-proBNP ≥400 pg/ml); ‖Dapagliflozin is the only SGLT2 inhibitor that has demonstrated significant and clinically meaningful reductions in both the CV deaths and worsening HF components of the primary composite endpoint in patients with HFrEF, both with and without T2D. ACEi = angiotensin-converting enzyme inhibitor; ARB = angiotensin receptor blocker; ARNI = angiotensin receptor neprilysin inhibitor; BNP = B-type natriuretic peptide; CRT = cardiac resynchronisation therapy; H-ISDN = hydralazine and isosorbide dinitrate; HF = heart failure; HFrEF = heart failure with reduced ejection fraction; LVAD = left ventricular assist device; LVEF = left ventricular ejection fraction; MR = mineralocorticoid receptor; NT-proBNP = N-terminal pro-B-type natriuretic peptide; NYHA = New York Heart Association; SGLT2 = sodium–glucose co-transporter 2.*
Source: Ponikowski et al. 2016.[46] Reproduced with permission from Oxford University Press.

Casus 4:

- 35 j, spoed 22 april :”Covid pneumonie”, wielertoerisme hoog niveau (15000 km/jaar) Elite zonder contract
- O2 sat >90 % rust , 98 % PO2 106 met neusbril
- D dimeren 531, trop 0,04
- CT Thorax : matglasverdichtingen

Casus 4

- Mag hij naar huis ?
- Wat als D dieren 1500 zouden zijn ?

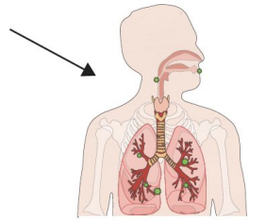
Casus 4

- Klachtenvrij, wil fietsen1 april “tel huisarts Trop 0,050”

- Wanneer mag deze man terug fietsen ?

A Stage 1

Patients who are ambulant or admitted to hospital because of other reasons

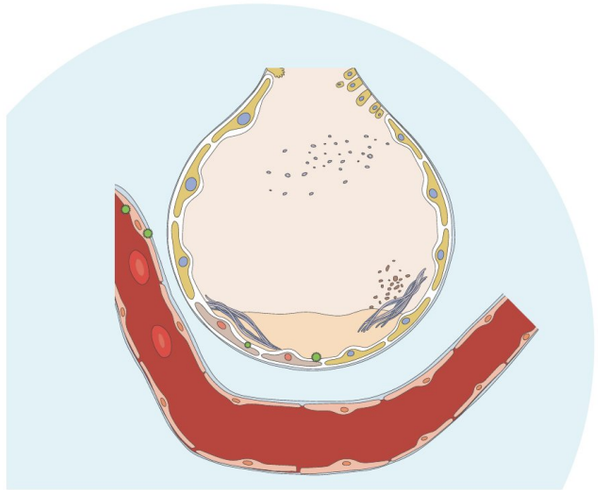


Symptoms
Mild, do not need respiratory support

Inflammatory reaction
Mild

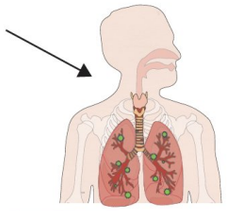
Coagulation markers
D-dimer 2–3 times the ULN
Fibrinogen normal
Prothrombin time normal
Platelet count normal

Thrombotic events
Limited local pulmonary (inflammatory) microthrombi



B Stage 2

Patients who are admitted to hospital and need increased oxygen supply

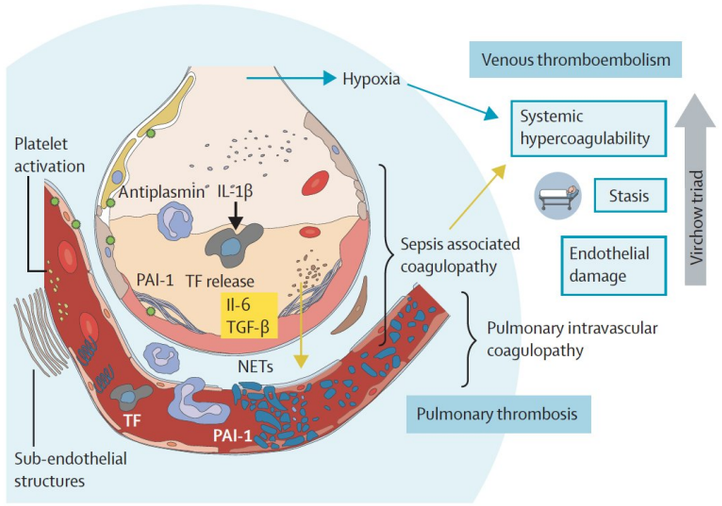


Symptoms
More severe, need respiratory support

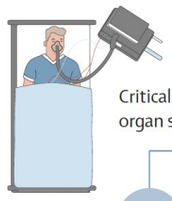
Inflammatory reaction
Pronounced

Coagulation markers
D-dimer 3–6 times the ULN
Fibrinogen mildly increased
Prothrombin time mildly increased
Platelet count 100–500 × 10^9 platelets per L

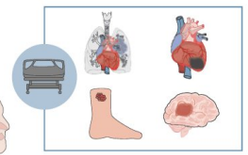
Thrombotic events
Increased incidence of (inflammatory) microthrombi and macrothrombi

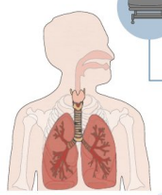


C Stage 3



Critically ill patiens in need of organ support



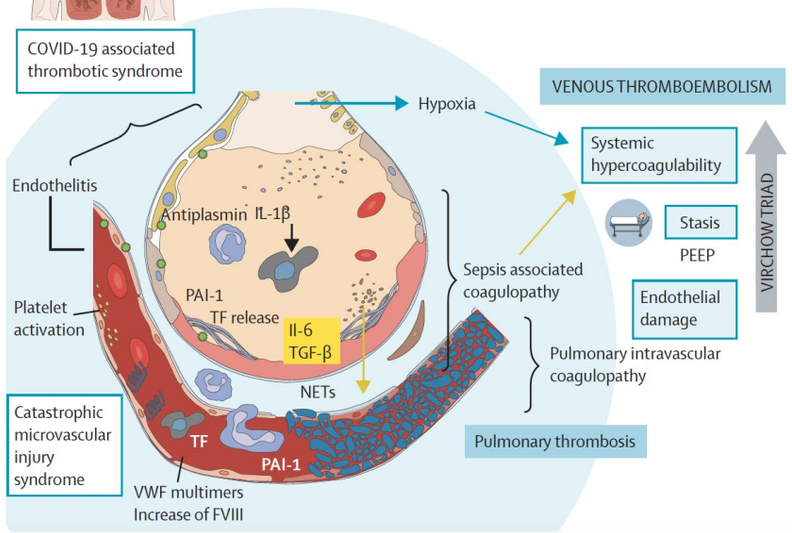


Symptoms
Critically ill patients who need organ support—eg, high-flow oxygen therapy or mechanical ventilatory support, or both

Inflammatory reaction
Cytokine storm

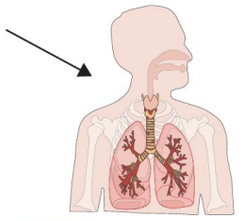
Coagulation markers
D-dimer more than 6 times the ULN
Fibrinogen markedly increased
Prothrombin time markedly increased
Platelet count less than 100 × 10^9 platelets per L

Thrombotic events
High incidence of microthrombi and macrothrombi



D Post-discharge

Discharged from hospital

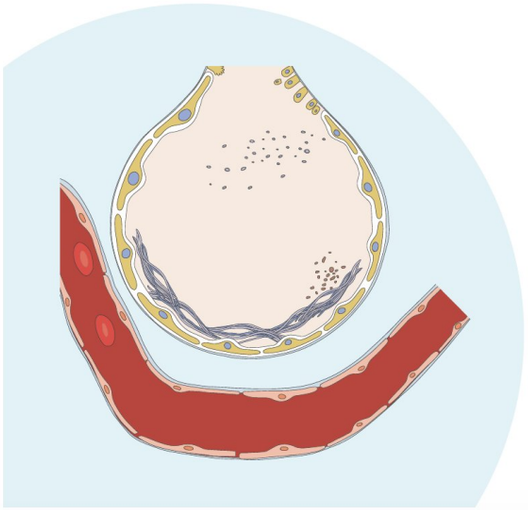


Symptoms
Recovering. Functional limitations are often still present 3 months after discharge

Inflammatory reaction
Restored

Coagulation markers
Restored

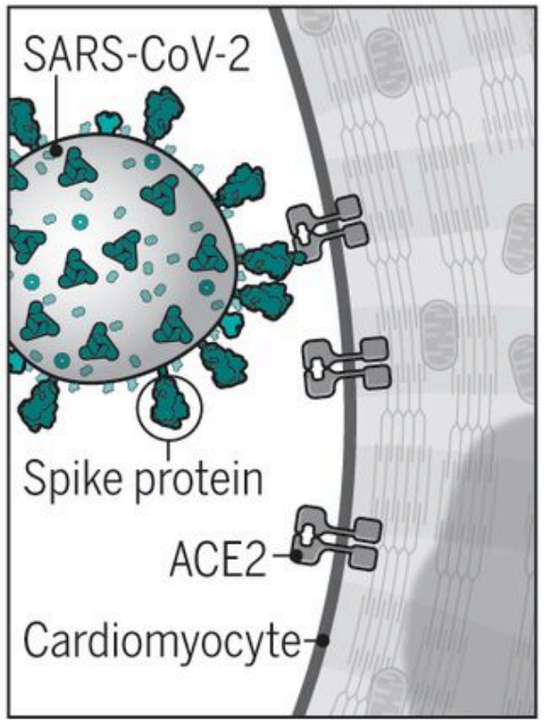
Thrombotic events
Unknown



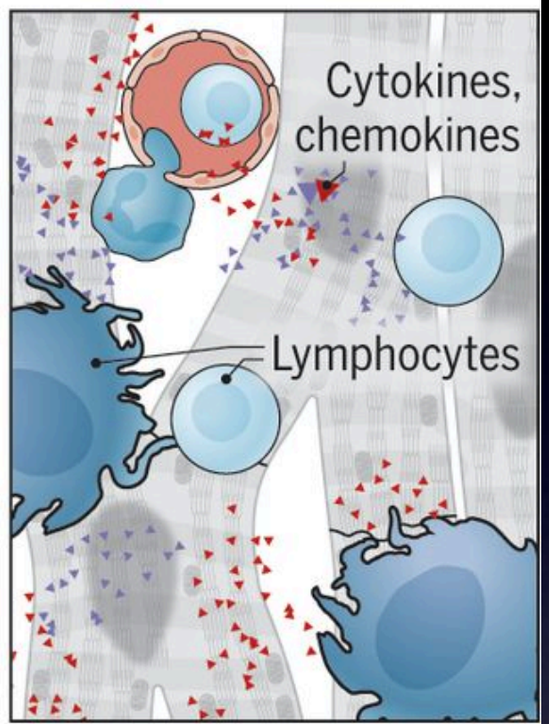
Casus 4

Damaging the heart

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection has the potential to directly and indirectly induce cardiac damage.



SARS-CoV-2 can **directly infect** cardiomyocytes, attaching to angiotensin-converting enzyme 2 (ACE2) through its spike protein and entering the cells by fusing viral and cellular membranes.

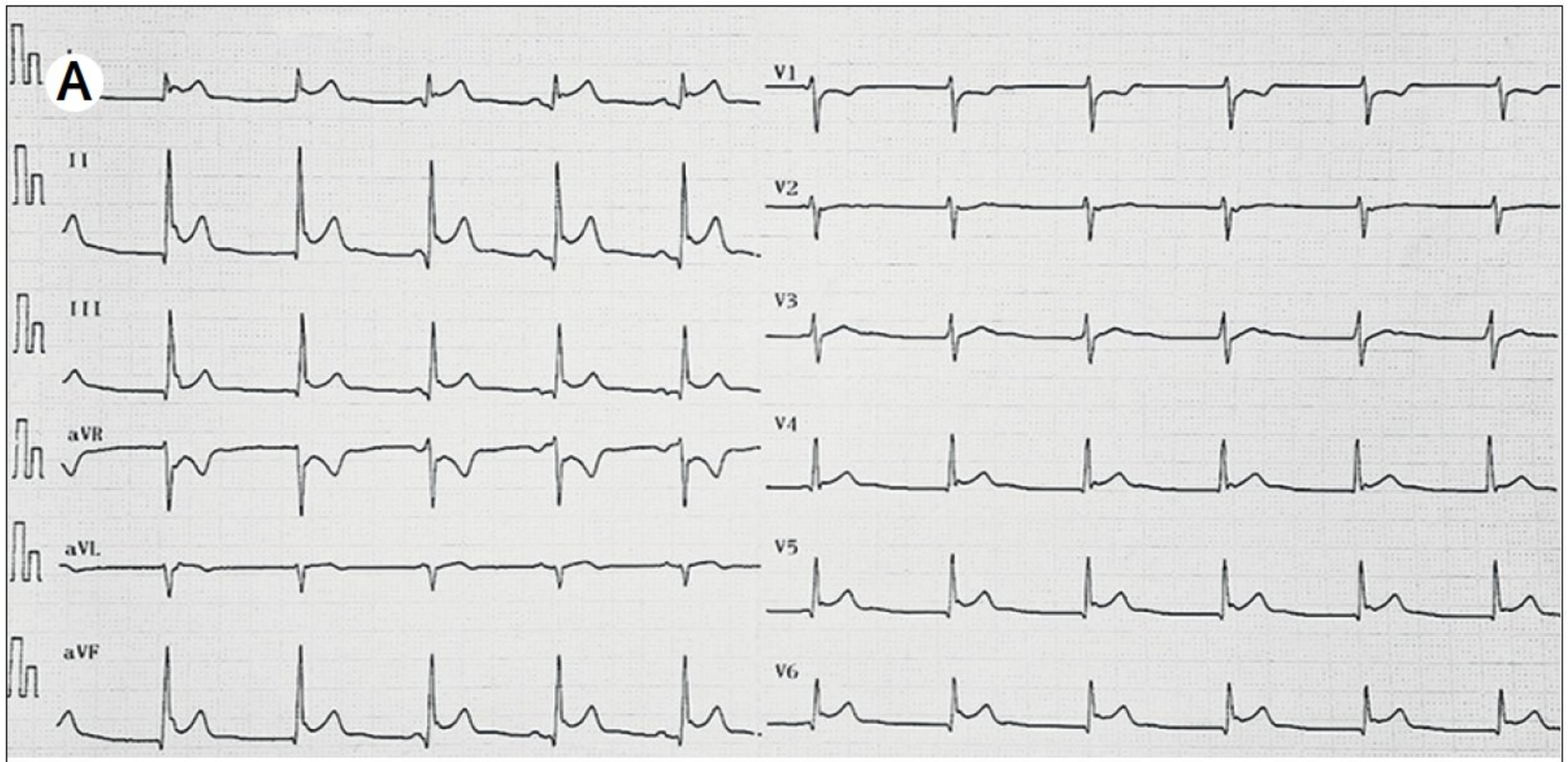


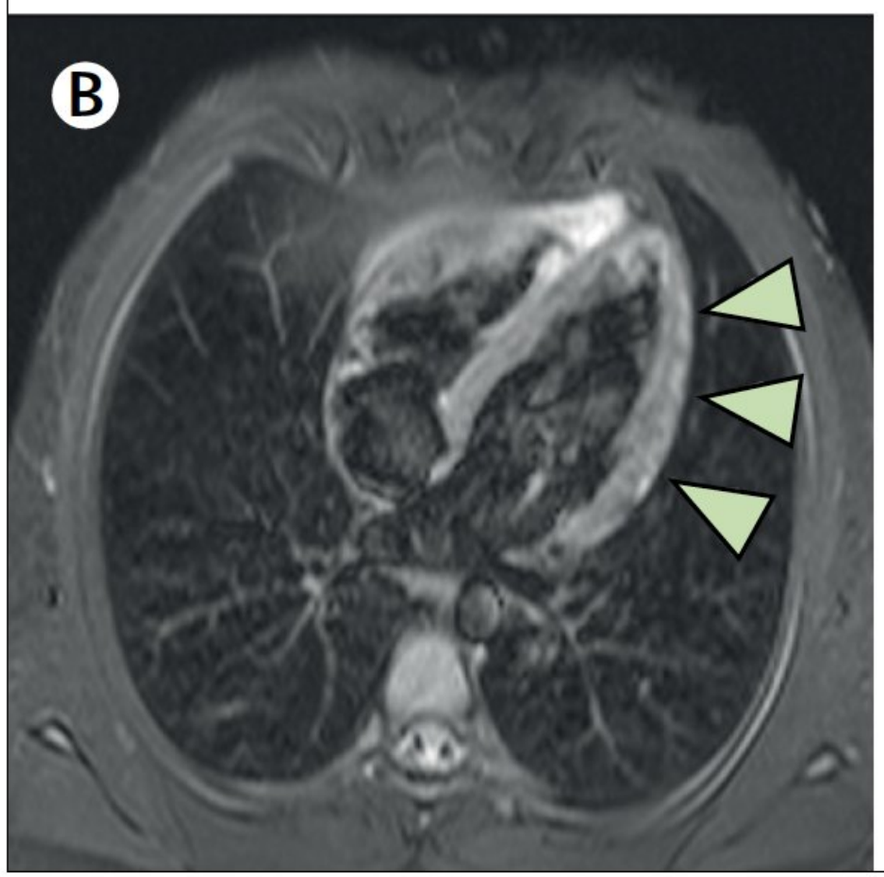
SARS-CoV-2 infection can **indirectly damage** cardiomyocytes through systemic inflammatory responses and diminished blood supply (e.g., from blood clots and endothelitis, not shown).

◀ Complications

Damaged cardiomyocytes, necrosis, and cardiogenic shock can result from direct and/or indirect effects of SARS-CoV-2 infection. This can lead to scarring and thinning of the myocardium, myocarditis, cardiomyopathy, arrhythmias, and potentially cardiac arrest.

GRAPHIC: V. ALTOUNIAN/*SCIENCE*





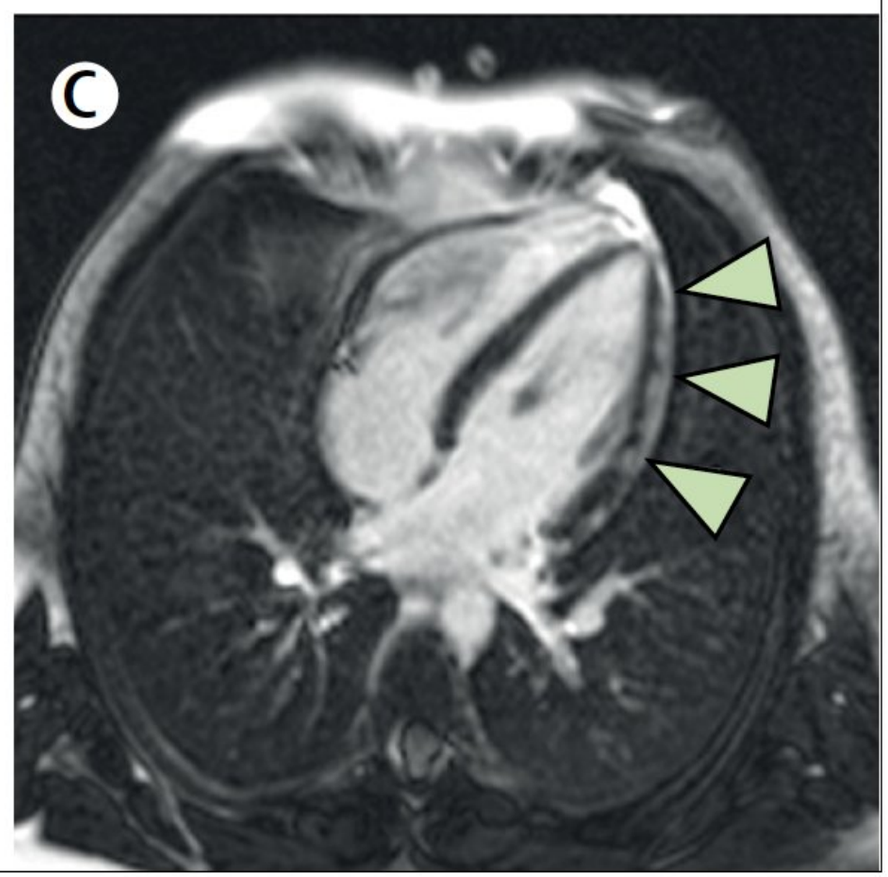


Figure: Myocarditis in a paediatric patient with COVID-19

Casus 19 jaar
Covid pneumonie

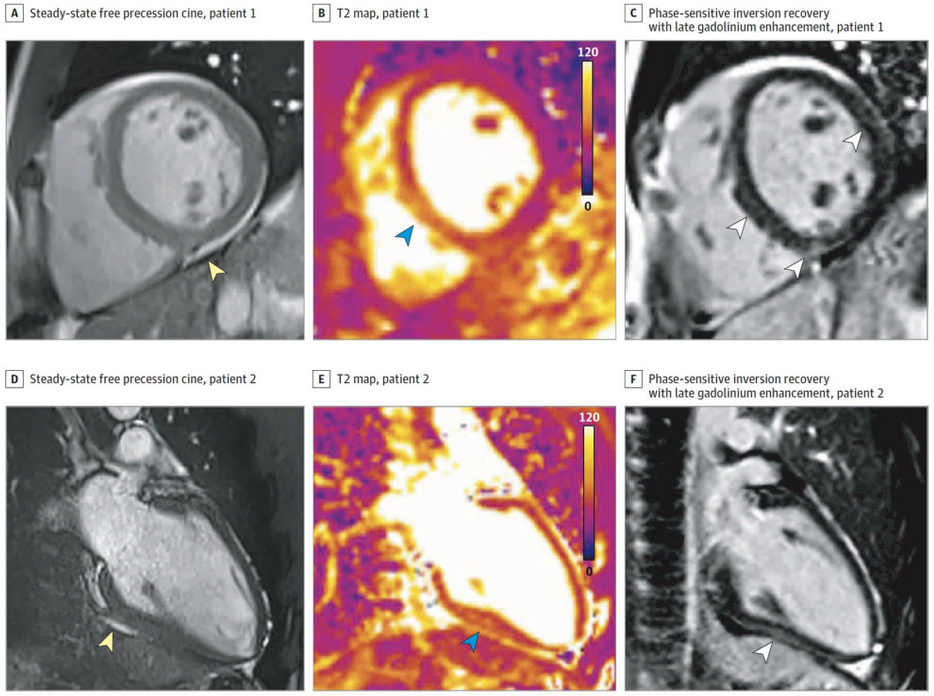
RESEARCH LETTER

Cardiovascular Magnetic Resonance Findings in Competitive Athletes Recovering From COVID-19 Infection

Myocarditis is a significant cause of sudden cardiac death in competitive athletes and can occur with normal ventricular function.[1] Recent studies have raised concerns of myocardial inflammation after recovery from coronavirus disease 2019 (COVID-19), even in asymptomatic or mildly symptomatic patients.[2] Our objective was to investigate the use of cardiac magnetic resonance (CMR) imaging in competitive athletes recovered from COVID-19 to detect myocardial inflammation that would identify high-risk athletes for return to competitive play.

Methods | We performed a comprehensive CMR examination including cine, T1 and T2 mapping, extracellular volume fraction, and late gadolinium enhancement (LGE), on a 1.5-T scanner (Magnetom Sola; Siemens Healthineers) using standardized protocols,[3] in all competitive athletes referred to the sports medicine clinic after testing positive for COVID-19 (reverse transcriptase–polymerase chain reaction) between June and August 2020. The Ohio State University institutional review board approved the study, and informed consent in writing was obtained from participating athletes. Cardiac magnetic resonance imaging was performed after recommended quarantine (11-53 days). Electrocardiogram, serum troponin I, and transthoracic echocardiogram were performed on day of CMR imaging.

Figure. Cardiovascular Magnetic Resonance Findings in Competitive Athletes Recovering From Coronavirus Disease 2019 Infection



A, Cine mid short-axis images showing pericardial effusion indicated by yellow arrowhead. B, T2 map with color overlay mid short-axis showing myocardial edema (elevated T2, 61 milliseconds) indicated by blue arrowhead. C, Short-axis view showing late gadolinium enhancement in the mid inferoseptum, right ventricular insertion point, and mid anterolateral wall indicated by white arrowheads. D, Cine 2-chamber long-axis view showing pericardial effusion indicated by yellow arrowhead. E, T2 map with color overlay myocardial edema (elevated T2, 58 milliseconds) indicated by blue arrowhead. F, Right 2-chamber long-axis view showing epicardial late gadolinium enhancement in the inferior wall indicated by white arrowhead.

Casus

Atleten Ohio covid 19 infectie
Mild tot asymptomatisch
April 2020

4 of 26 (15%)

competitive athletes w/ positive SARSvov PCR tests had MRI signs of myocarditis and 8 (31%) findings suggestive of heart injury

HLN+ EXCLUSIEF VOOR ABONNEES

Nieuw onderzoek bewijst: herstelde coronapatiënten hebben vaak littekens op hun hart (ook wie thuis uitziekt)

Ellen de Visser | 28 juli 2020 | 12u05 | Bron: de Volkskrant

NET BINNEN Alle berichten

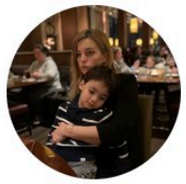
11u35 KIJK LIVE (16u00). Zorgt gure weer voor spektakel in Rapencross van...

11u30 INTERVIEW. Ex-judoka's Heidi Rakels en Ann Simons die hun mannetje...

11u30 Wanneer vliegen je passie is en corona toeslaat: "Ik mis die...

11u30 Er zijn 296 zwarte verkeerspunten in Vlaanderen, en dat getal daalt...

11u24 Bezoek van prins Andrew aan Ierse golfclub kostte 16.000 euro:...



Anish Koka
@anish_koka

To put recent and future abnormal CMRIs papers in context
1. 2009 cardiac MRI study of elite athletes who had a cold demonstrated MRI abnormalities in 38% during infection, and 48% in follow up.

deter athletes from participating in sport during common colds. Cardio-vascular Magnetic Resonance (CMR) allows for non-invasive visualization of myocardial inflammation, where it has emerged as the imaging modality of choice to assess the course of myocarditis. Thus, using CMR-based tissue characterization, we hypothesized that colds in elite high-endurance athletes would lead to depressed cardiac function and myocardial inflammation.

Methods: 62 (32 male, 31 ± 13 years) elite high-endurance athletes were prospectively recruited. CMR scans were performed at baseline, with an acute common cold, and 4 weeks after. Pre-defined symptoms were used to rule in an acute cold. LV function, edema, and myocardial inflammation were assessed using standard SSFP, T2-, and T1-weighted imaging, respectively, on a 1.5 T MRI system.

Standard, previously described approaches for the quantification of LV function, edema and myocardial inflammation were utilized. Statistical comparisons were performed with repeated measures ANOVA, at 2 levels of measurement.

Results: During the 11-month period of recruitment, 21 athletes completed all 3 scans. During an acute cold, we observed a significant increase in LVESVI, with reduced LVSVI and LVEF ($p < 0.05$), while LVEDVI and LVMI did not differ (Table 1). Moreover, there were no statistical differences between LV volumes at the 4-week follow-up to those at baseline or with an acute cold.

In terms of tissue characterization, 19% of athletes had evidence for myocardial edema with an acute cold, and 24% at follow-up (Figure 1). 38% had myocardial inflammation during an acute cold; and this proportion increased to 48% at follow-up.

Figure 1 (abstract O3)

Table 1 (abstract O3) LV volume and CMR markers for edema and inflammation at baseline, with a common cold and at a 4-week follow-up. Volumetric data are presented as mean standard deviation

	Baseline visit	Visit with common cold	4-week follow-up
LVEDVI (ml/m)	111.4 ± 20	110.0 ± 22	109.9 ± 21
LVESVI (ml/m)	39.4 ± 11	41.7 ± 11*	40.6 ± 9
LVSVI (ml/m)	72.0 ± 12	68.3 ± 13*	69.3 ± 15
LVEF (%)	65.0 ± 4.8	62.5 ± 4.9*	63.0 ± 5.8
LVMI (g/m)	58.8 ± 15	59.1 ± 15	60.1 ± 16
Edema (n)	4 of 21	4 of 21	5 of 21
Inflammation (n)	7 of 21	8 of 21	10 of 21

*$p < 0.05$ baseline compared to visit with common cold.

Conclusion: We provide first evidence of sub-clinical myocardial involvement with common colds in high-endurance athletes. Colds were associated with a small yet significant decrease of systolic function, and persisting myocardial inflammation visualized with CMR-derived markers for edema and inflammation. Further research is required to investigate the implications of these findings on athletic performance.

O4
A T2-mapping method to quantitatively differentiate edema from normal myocardium

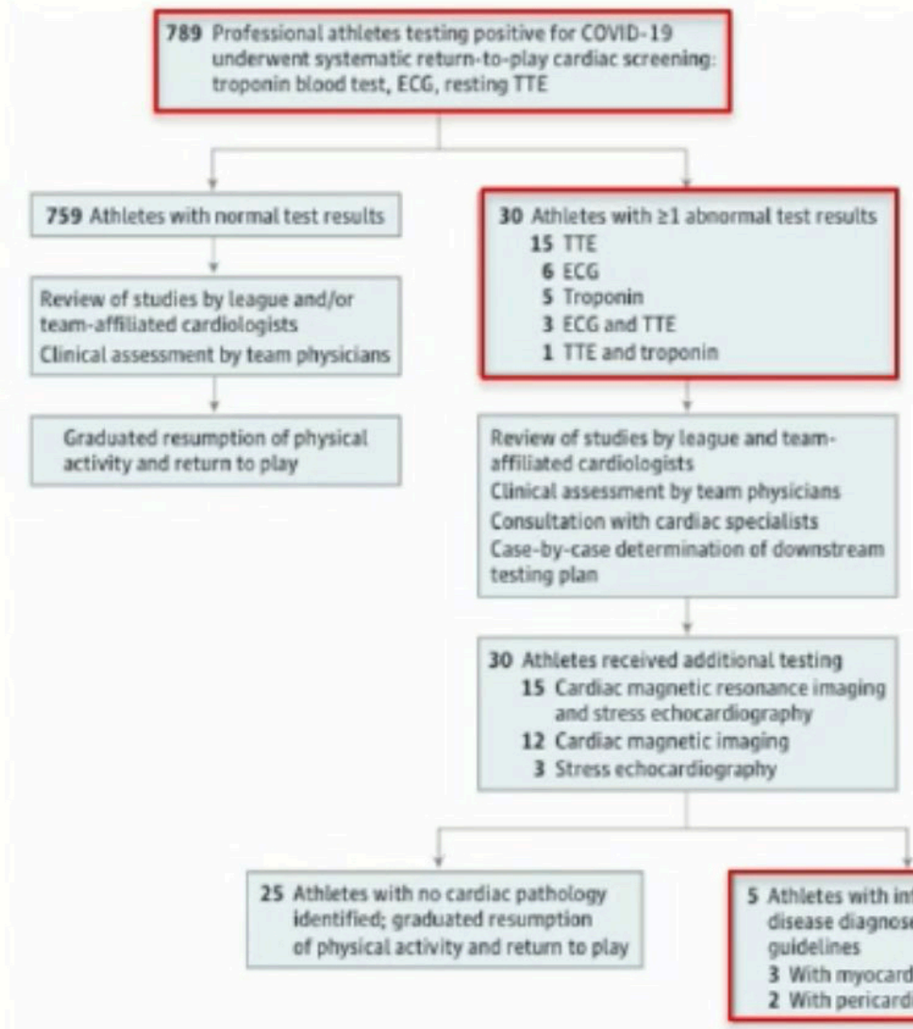
Shivraman S Giri[1], Yiu-Cho Chung[2], Ali Merchant[1], Tam Tran[1], Subha Raman[1] and Orlando Simonetti[1]
[1]*The Ohio State University, Columbus, OH, USA*
[2]*Siemens Medical Solutions, Columbus, OH, USA*

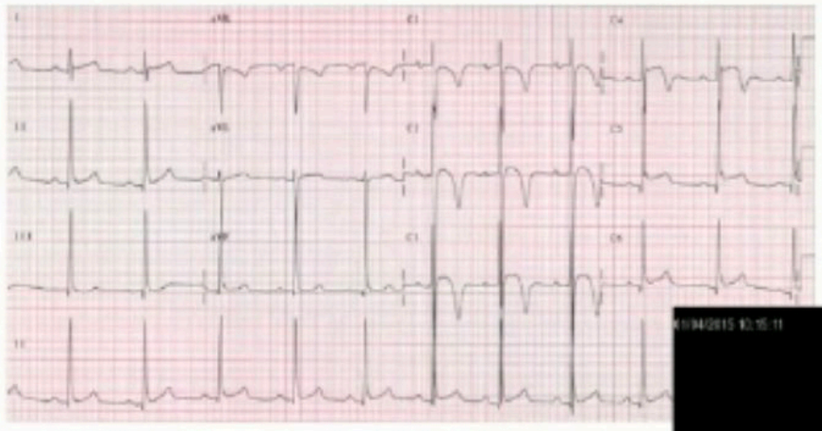
Journal of Cardiovascular Magnetic Resonance 2009, **11(Suppl 1):**O4

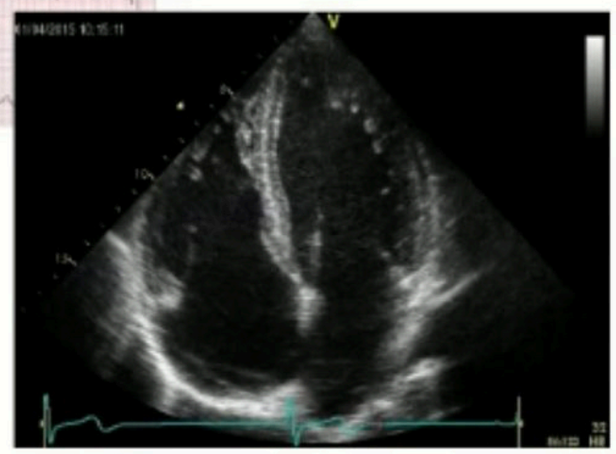
Introduction: T2-Weighted (T2W) imaging sequences can detect myocardial edema associated with acute inflammation,

Casus en studie

Prevalence of cardiac inflammation in athletes with COVID-19 infection







0.6%

All 5 were symptomatic

Challenges of interpreting tests in isolation

ESC Preventive Cardiology 2021

Martinez MW, et al. JAMA Cardiology 2021; doi:10.1001/jamacardio.2021.0565

Casus 4

- Fast track raadpleging :
  - Controle trop negatief
  - TTE : normale vullingsdrukken
  - Angio CT : geen longembolen
  - Cyclo tot 300 W
  - Conservatief beleid, “myocarditis”
- Na 7 dagen symptoomvrij hernemen gradueel van training

Clinical history & examination

No history of symptoms OR Currently asymptomatic + normal evaluation

→ **Gradual retraining & return to play***

Currently asymptomatic but prolonged illness (>7 days) OR myocarditis symptoms during acute infection

→ **ECG, echocardiogram§**

- Normal → **Maximal exercise tolerance test**
  - Normal → **Gradual retraining & return to play***
  - Abnormal → **Further cardiac evaluation & treatment according to protocols**
- Abnormal → **Further cardiac evaluation & treatment according to protocols**

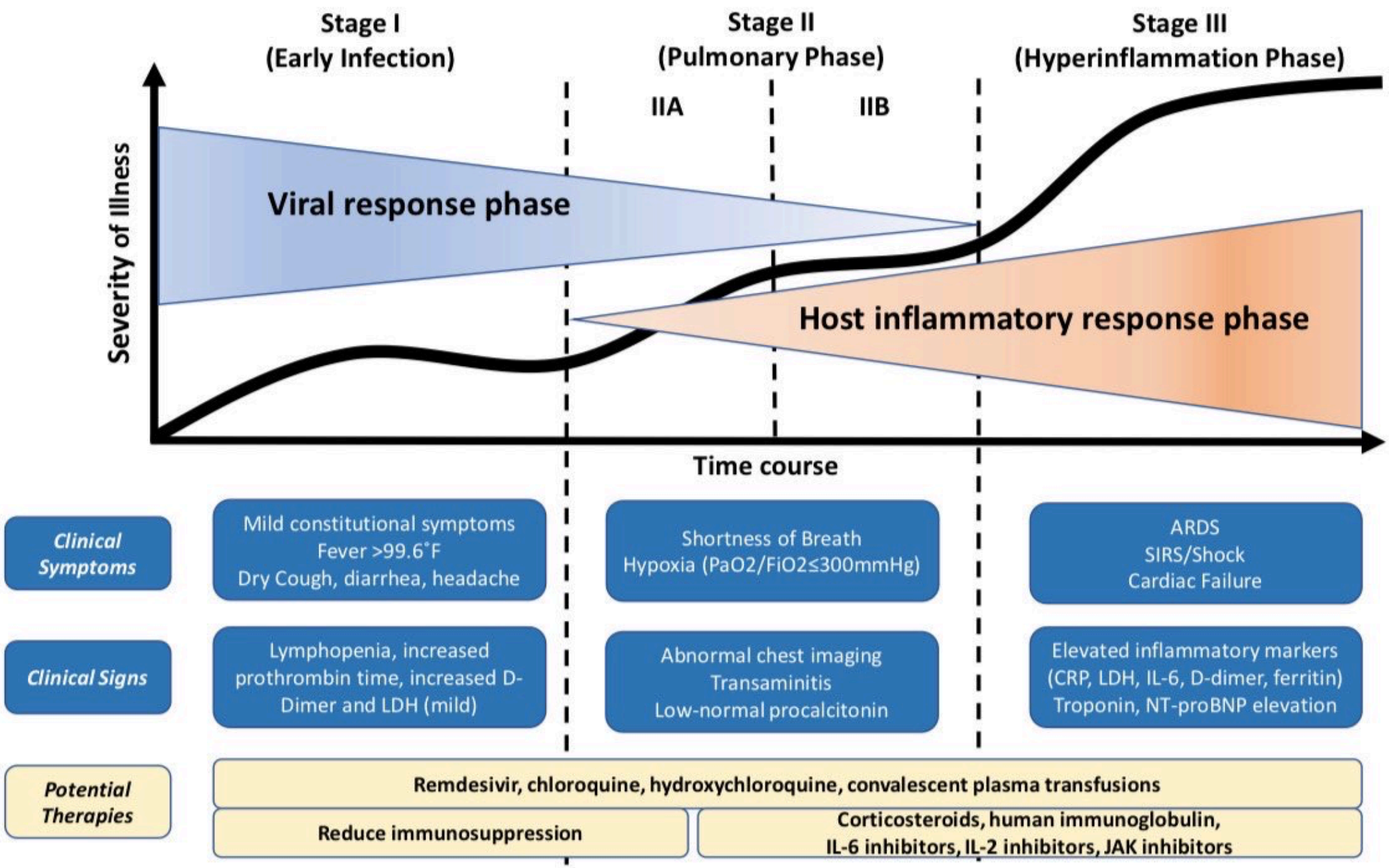
Debilitating symptoms OR hospitalised with COVID-19 OR persistent cardiac symptoms OR reduced performance

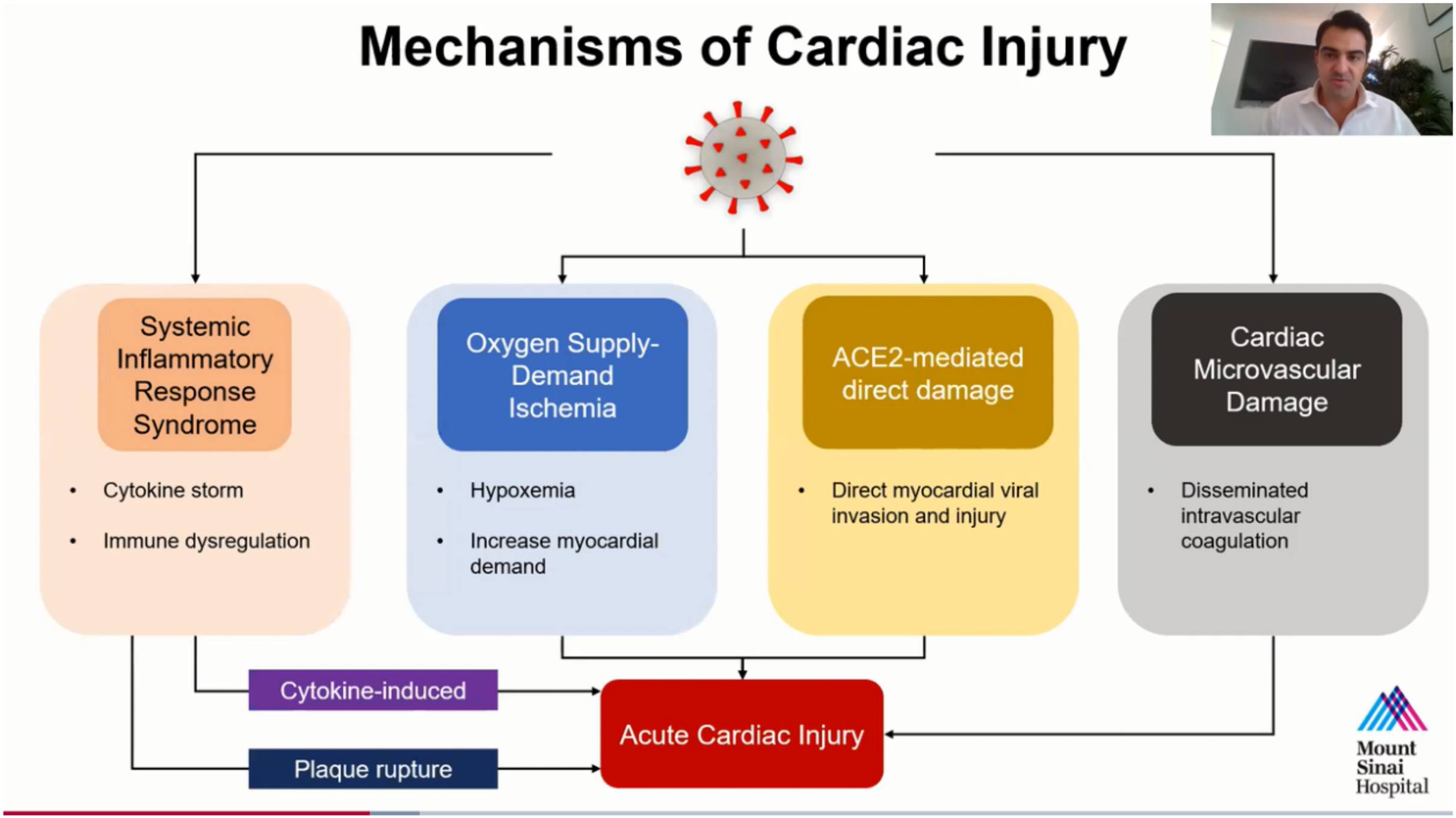
→ **ECG, echocardiogram, troponin, CMR +/- exercise tolerance test, ECG monitor**

- Abnormal → **Further cardiac evaluation & treatment according to protocols**
- Normal → **Gradual retraining & return to play***

Exercise during acute CVOID-19 infection

- If suspected acute infection = NO exercise
  - Nucleic acid tests to confirm infection (throat/nose swab)
  - Self-isolate 7-14 days
  - Until symptom free
- Gradual resumption of exercise once asymptomatic for 7 days
- Asymptomatic carriers - Abstain from exercise for 7 days

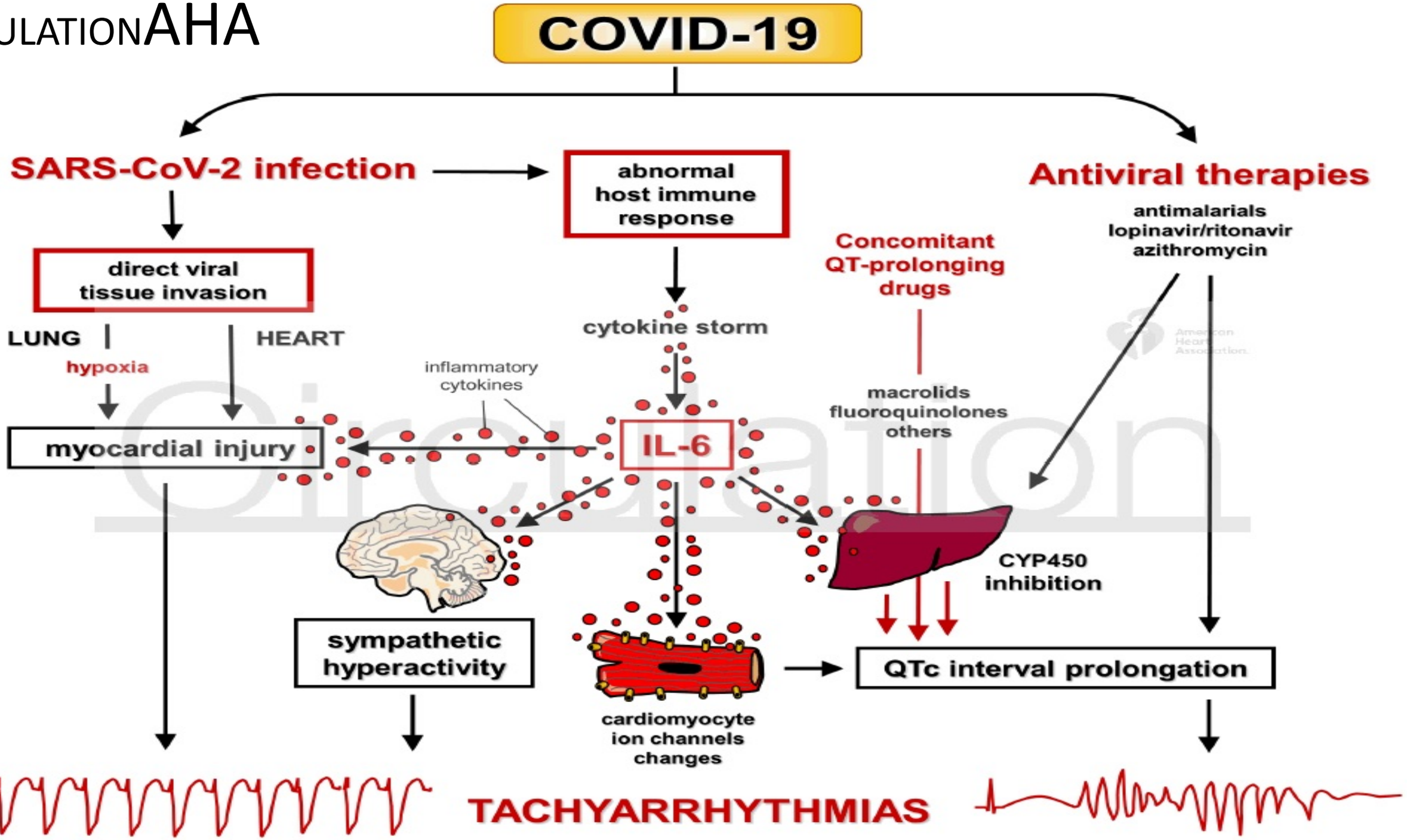

Stage I
(Early Infection)
Stage II
(Pulmonary Phase)
IIA
IIB
Stage III
(Hyperinflammation Phase)
Severity of Illness
Viral response phase
Host inflammatory response phase
Time course
Clinical Symptoms
Mild constitutional symptoms
Fever >99.6˚F
Dry Cough, diarrhea, headache
Shortness of Breath
Hypoxia (PaO2/FiO2≤300mmHg)
ARDS
SIRS/Shock
Cardiac Failure
Clinical Signs
Lymphopenia, increased prothrombin time, increased D-Dimer and LDH (mild)
Abnormal chest imaging
Transaminitis
Low-normal procalcitonin
Elevated inflammatory markers
(CRP, LDH, IL-6, D-dimer, ferritin)
Troponin, NT-proBNP elevation
Potential Therapies
Remdesivir, chloroquine, hydroxychloroquine, convalescent plasma transfusions
Reduce immunosuppression
Corticosteroids, human immunoglobulin,
IL-6 inhibitors, IL-2 inhibitors, JAK inhibitors



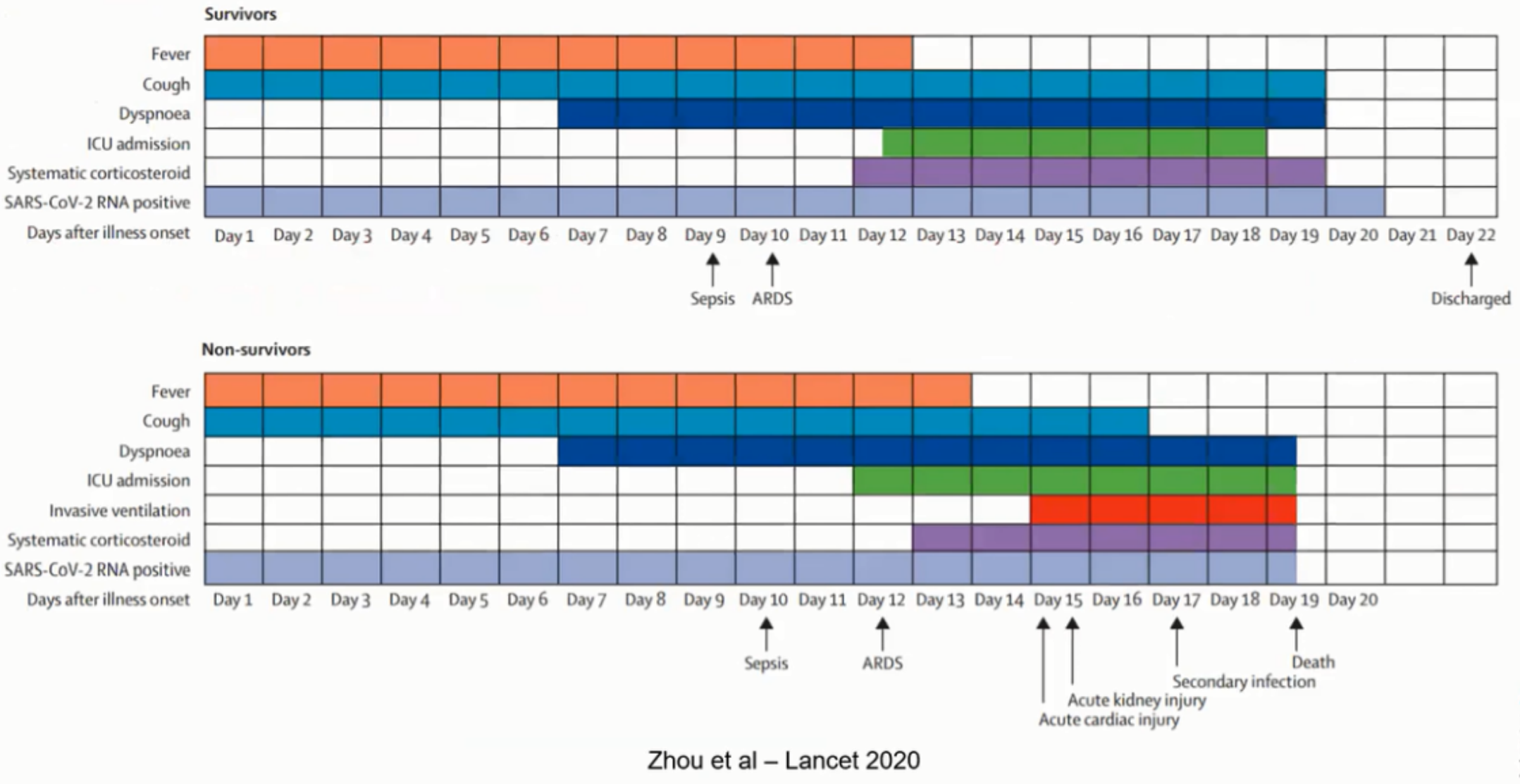
Cardiac Injury in COVID-19 Patients

30:31

CIRCULATIONAHA



Clinical courses of major symptoms and outcomes and duration of viral shedding from illness onset in patients hospitalised with COVID-19

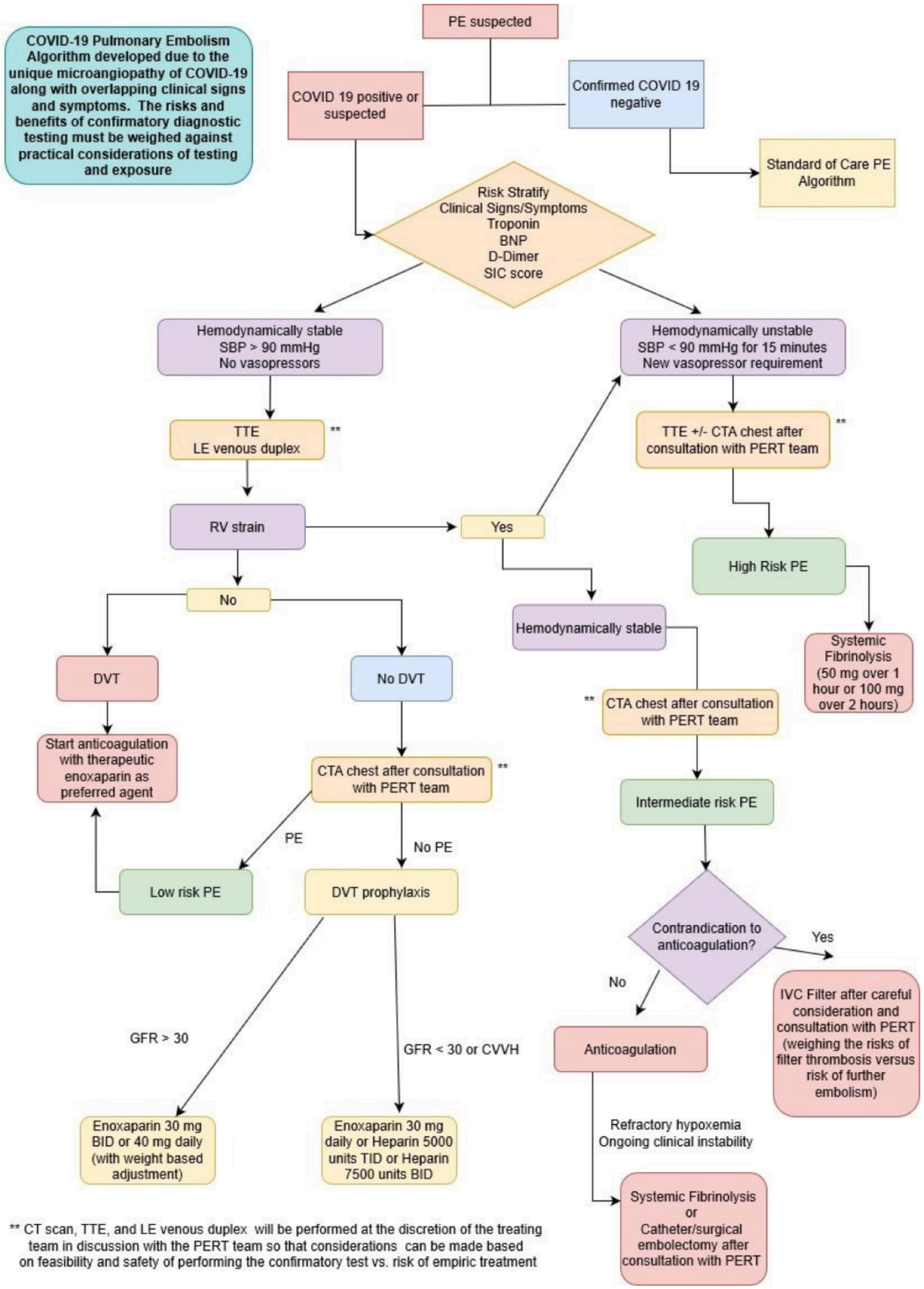


Zhou et al – Lancet 2020

Mount Sinai Hospital

Cardiac Injury in COVID-19 Patients

30:31


COVID-19 Pulmonary Embolism Algorithm developed due to the unique microangiopathy of COVID-19 along with overlapping clinical signs and symptoms. The risks and benefits of confirmatory diagnostic testing must be weighed against practical considerations of testing and exposure
PE suspected
COVID 19 positive or suspected
Confirmed COVID 19 negative
Standard of Care PE Algorithm
Risk Stratify
Clinical Signs/Symptoms
Troponin
BNP
D-Dimer
SIC score
Hemodynamically stable
SBP > 90 mmHg
No vasopressors
Hemodynamically unstable
SBP < 90 mmHg for 15 minutes
New vasopressor requirement
TTE
LE venous duplex
**
TTE +/- CTA chest after consultation with PERT team
**
RV strain
Yes
High Risk PE
No
Hemodynamically stable
Systemic Fibrinolysis (50 mg over 1 hour or 100 mg over 2 hours)
DVT
No DVT
** CTA chest after consultation with PERT team
Start anticoagulation with therapeutic enoxaparin as preferred agent
CTA chest after consultation with PERT team
**
Intermediate risk PE
PE
No PE
Low risk PE
DVT prophylaxis
Contrandication to anticoagulation?
Yes
No
IVC Filter after careful consideration and consultation with PERT (weighing the risks of filter thrombosis versus risk of further embolism)
GFR > 30
GFR < 30 or CVVH
Anticoagulation
Refractory hypoxemia
Ongoing clinical instability
Enoxaparin 30 mg BID or 40 mg daily (with weight based adjustment)
Enoxaparin 30 mg daily or Heparin 5000 units TID or Heparin 7500 units BID
Systemic Fibrinolysis or Catheter/surgical embolectomy after consultation with PERT
** CT scan, TTE, and LE venous duplex will be performed at the discretion of the treating team in discussion with the PERT team so that considerations can be made based on feasibility and safety of performing the confirmatory test vs. risk of empiric treatment

UZ LEUVEN

Profylactisch anticoagulatiebeleid bij gehospitaliseerde COVID-19 patiënten		
Type COVID-patiënt	Anticoagulatiebeleid	Voorwaarden
ICU opname	Clexane 1 mg/kg, verspreid over 2 giften Minstens 2 x 40 mg per dag (8 uur en 20 uur) Dus: 100 kg : advies Clexane 2x60 mg 80 kg: advies Clexane 2x40 mg	Bloedplaatjes > 50.000 Geen actieve bloeding Dagelijks anti-Xa bepaling bloedname 4h
Non-ICU opname	Clexane 0,5 mg/kg, in 1 gift Minstens Clexane 40 mg per dag Dus: 100 kg : advies Clexane 1x60 mg 80 kg: advies Clexane 1x40 mg	Bloedplaatjes > 50.000 Geen actieve bloeding Dagelijks anti-Xa bepaling bloedname 4h
ICU CrCl < 30	Clexane 0,5 mg/kg, in 1 gift Minstens Clexane 40 mg per dag Dus: 100 kg : advies Clexane 1x60 mg 80 kg: advies Clexane 1x40 mg	Bloedplaatjes > 50.000 Geen actieve bloeding Dagelijks anti-Xa bepaling bloedname 4h
Non-ICU CrCl < 30	Clexane 0,5 mg/kg, in 1 gift Minstens Clexane 40 mg per dag Dus: 100 kg : advies Clexane 1x60 mg 80 kg: advies Clexane 1x40 mg	Bloedplaatjes > 50.000 Geen actieve bloeding Dagelijks anti-Xa bepaling bloedname 4h

Zo blijvend oplopende d-dimeren onder ingestelde therapie, overwegen Clexane dosis te verhogen (obv anti-Xa meting): overleg mogelijk met dienst bloedings- en vaatziekten. Dit schema is enkel geldig voor profylactische anticoagatienood (niet bij indicaties zoals voorkamerfibrillatie, nieuwe trombus, mechanische kunstkleppen etc).

Dienst hart- en vaatziekten, UZ Leuven

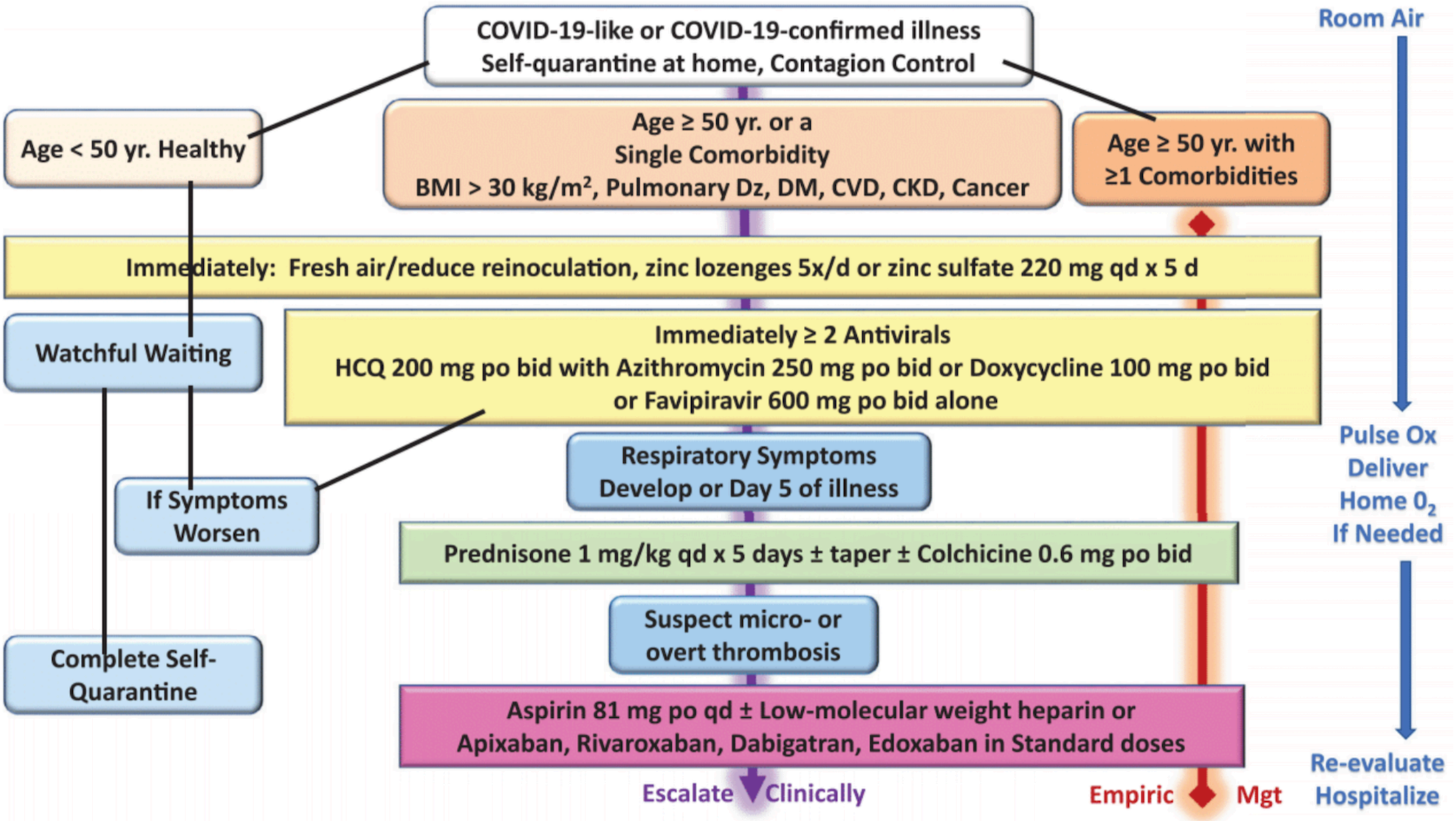


Figure 1 Treatment algorithm for COVID-19-like and confirmed COVID-19 illness in ambulatory patients at home in self-quarantine. BMI = body mass index; CKD = chronic kidney disease; CVD = cardiovascular disease; DM = diabetes mellitus; Dz = disease; HCQ = hydroxychloroquine; Mgt = management; O_2 = oxygen; Ox = oximetry; Yr = year.

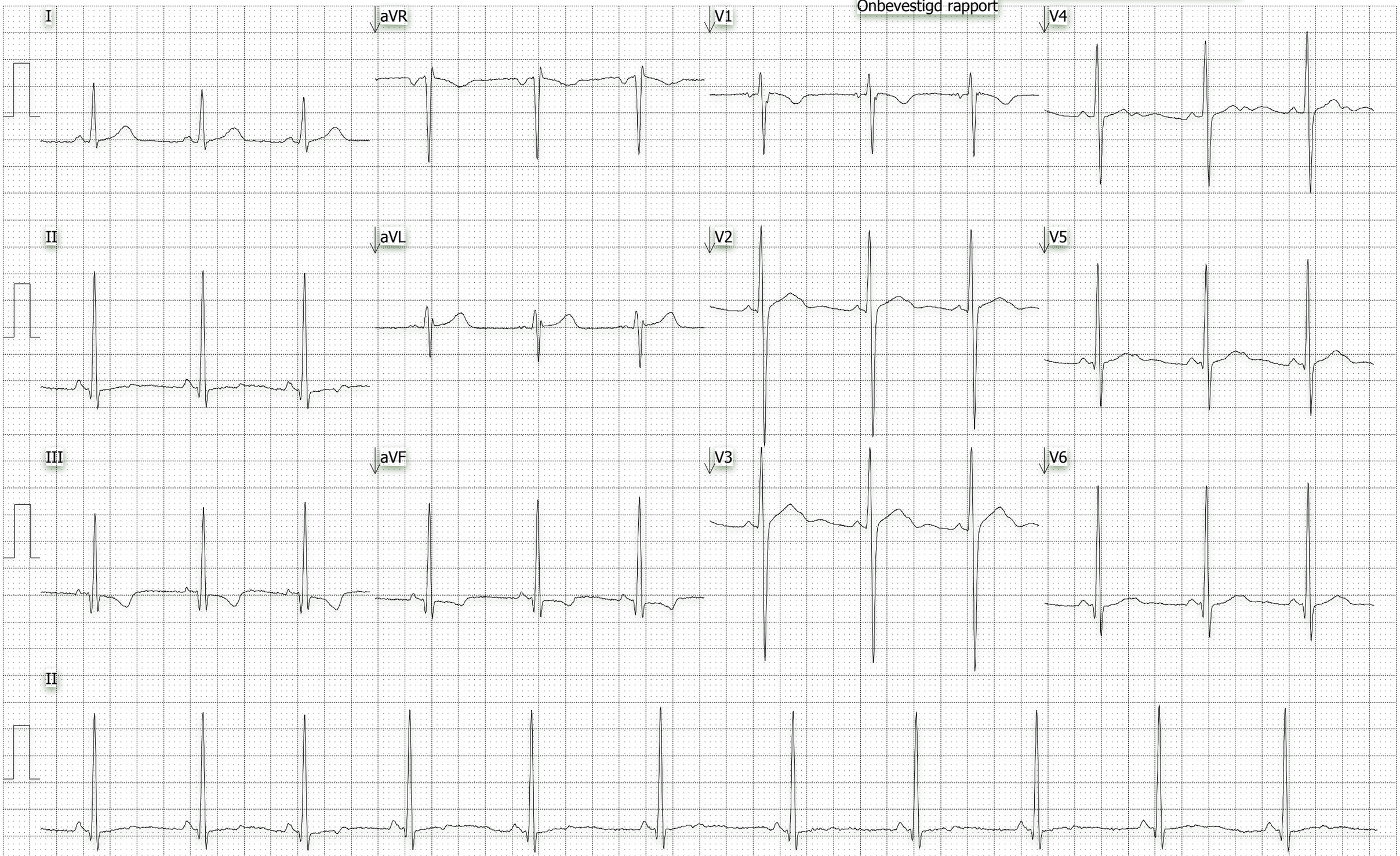
Casus 5 ECG’s

- En toch is er veel gesport in de lente…

ID:		Naam:	
Leeftijd:	26 jaar	Geslacht:	
Gewicht:		Ras:	
Lengte:			

P/PR:	90/114 ms
QRS:	88 ms
QT/QTc:	368/385 ms
P/QRS/T as:	40/57/-19 grd
Hartfrequentie:	66 bpm

sinusaritmie
kort PR-interval
waarschijnlijk LVH
leeftijds-gecorrigeerde Sokolowindex (SV1+RV5 of V6) = 3.4 mV
leeftijds-gecorrigeerde vectoriele R in extremiteitsafleidingen = 2.4 mV
matige repolarisatiestoring inferior als gevolg van LVH, overweeg ook ischemie
negatieve T in aVF
met negatieve T in III
bevindingen waarschijnlijk van pathologische betekenis
Onbevestigd rapport



Dr. Vanderroost Jan P.
Tiensesteenweg 180
3001 Heverlee
www.sportlableuven.be

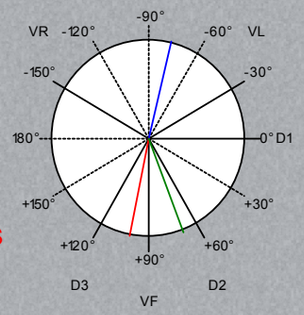
Naam :	SMETS	Sex :	M
Firstname :	Ken	Age :	30
Indentity number :		Height (cm) :	180
Date of birth :	9/01/1982	Weight (kg) :	69,4

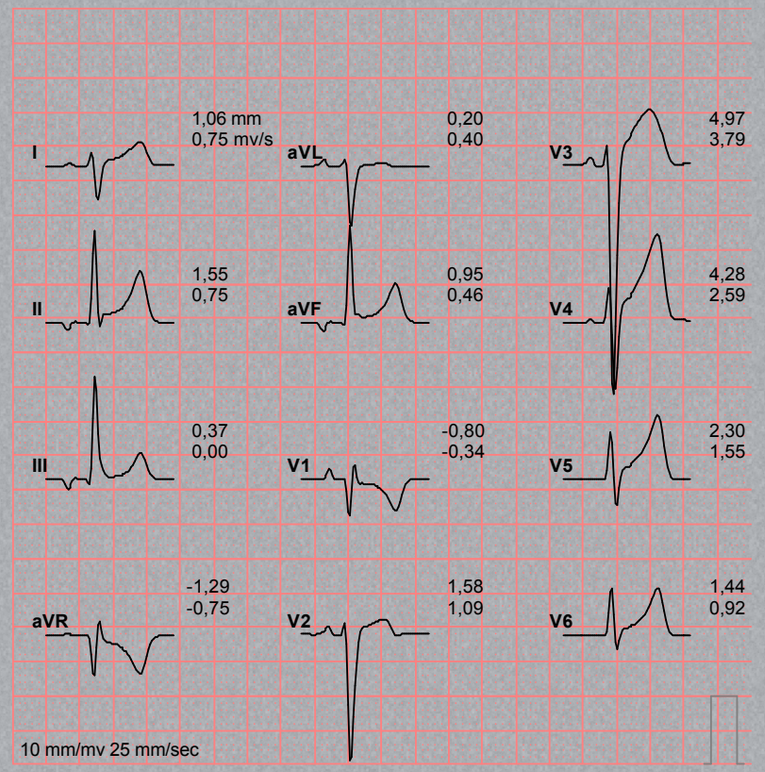
Intervals :

RR	1176 ms
P	70 ms
PQ	120 ms
QRS	126 ms
QT	406 ms
QTc	374 ms

Axis :

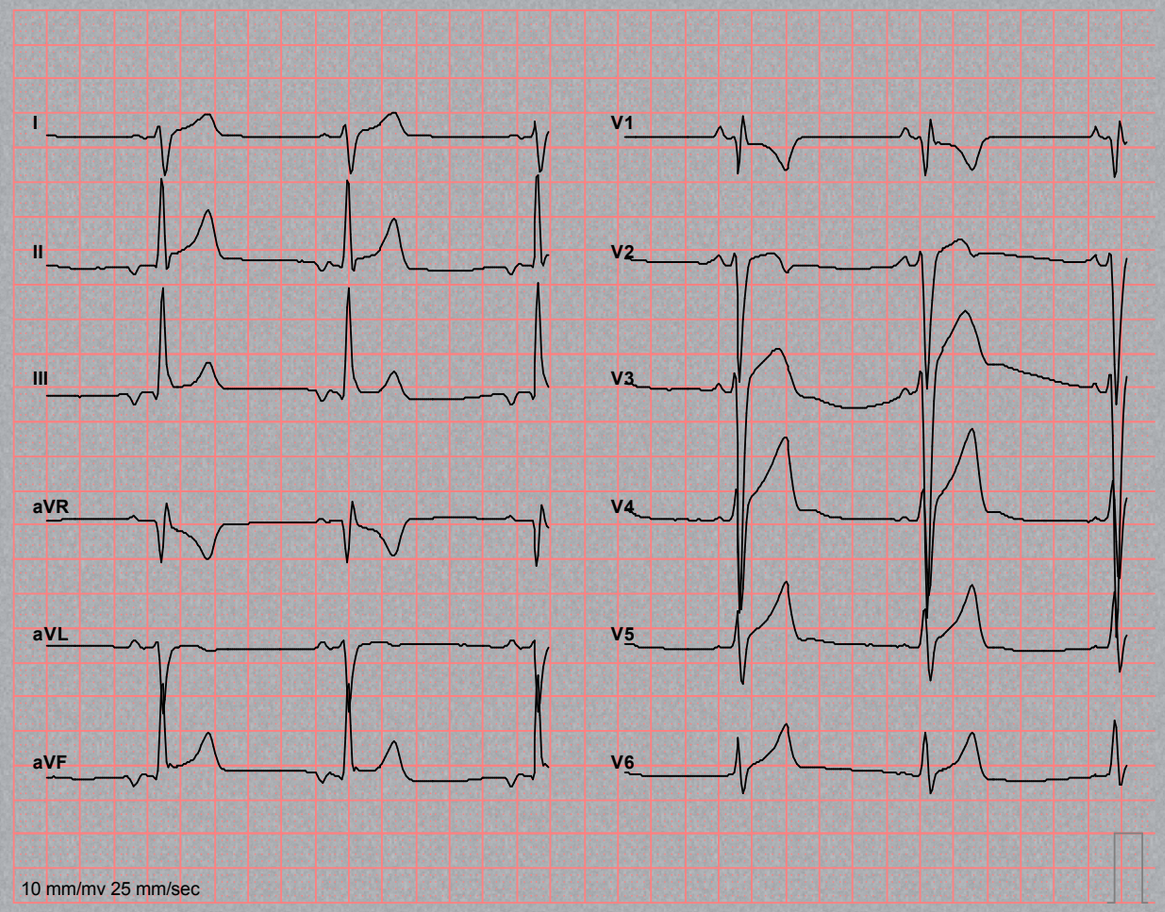
P	-76,4 °	P
QRS	101,0 °	QRS
T	69,0 °	T

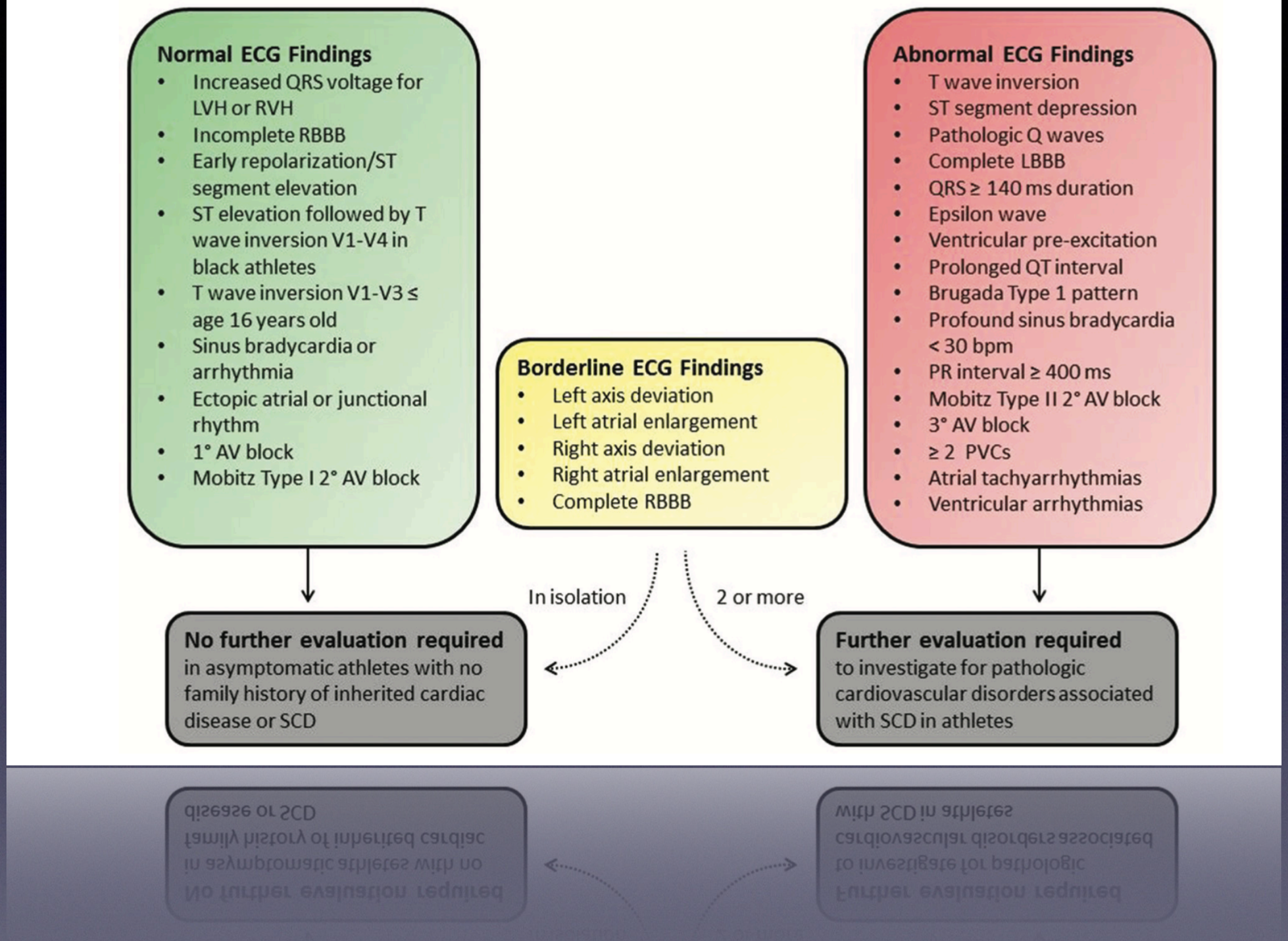




Commentaar

sinus coronarius ritme.
nl ecg verder.





BJSM International Criteria for ECG Interpretation_BJSM 2017

Casus 5 : Belang van wearables en hartslagmeters

Diagnose van ritmestoornissen

50 j jogger

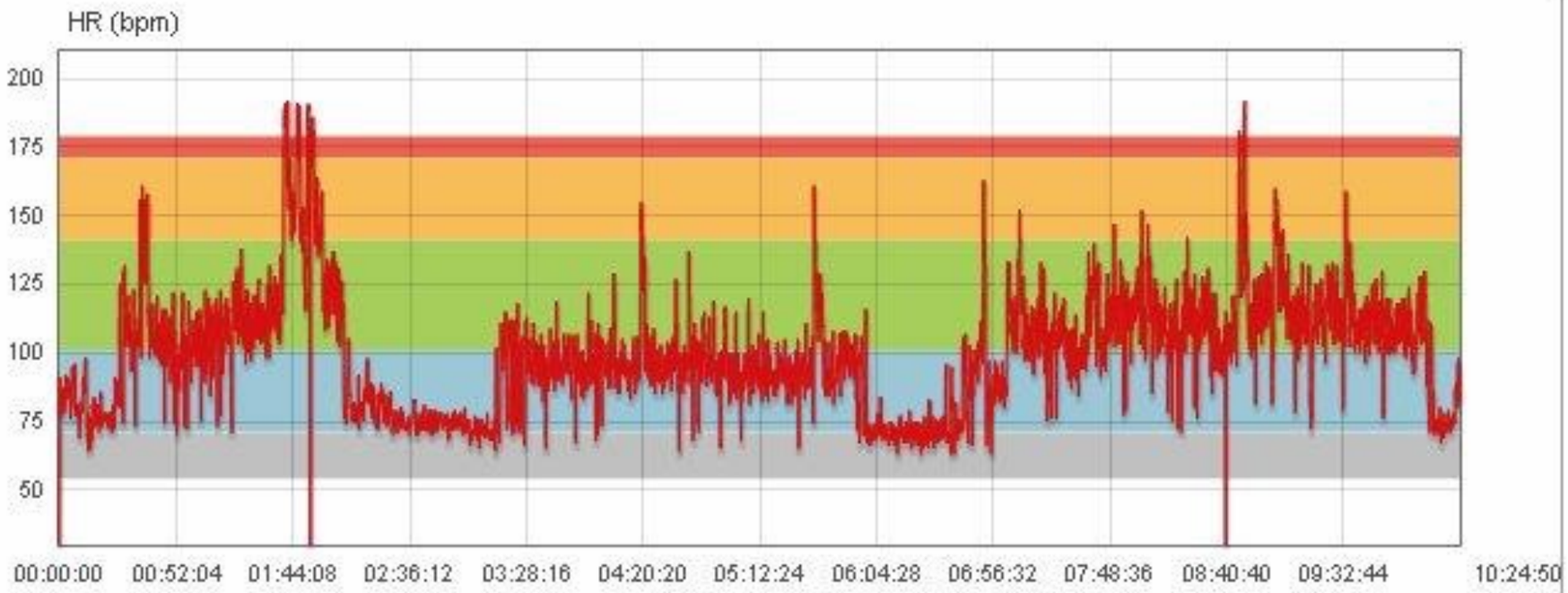
- palpitaties tijden joggen
- Polar hartslagmeter

Publish and view shared training

Running	Duration	HR Avg	HR Max	Calories	Distance	Pace Avg	Training Load
	10:24:47	99 bpm	193 bpm	3792 kcal	km	min/km	261

Overview | Curve | Data | Benefit

Curve | Settings | Reset Zoom | Full Screen



Sport Zones

Heart Rate (bpm)

179 – 171	**0 %**	00:02:29
141	**3 %**	00:18:01
101	**42 %**	04:21:17
71	**48 %**	05:02:29
54	**6 %**	00:35:44

Running	Duration	HR Avg	HR Max	Calories	Distance
	06:42:58	85 bpm	211 bpm	1415 kcal	km

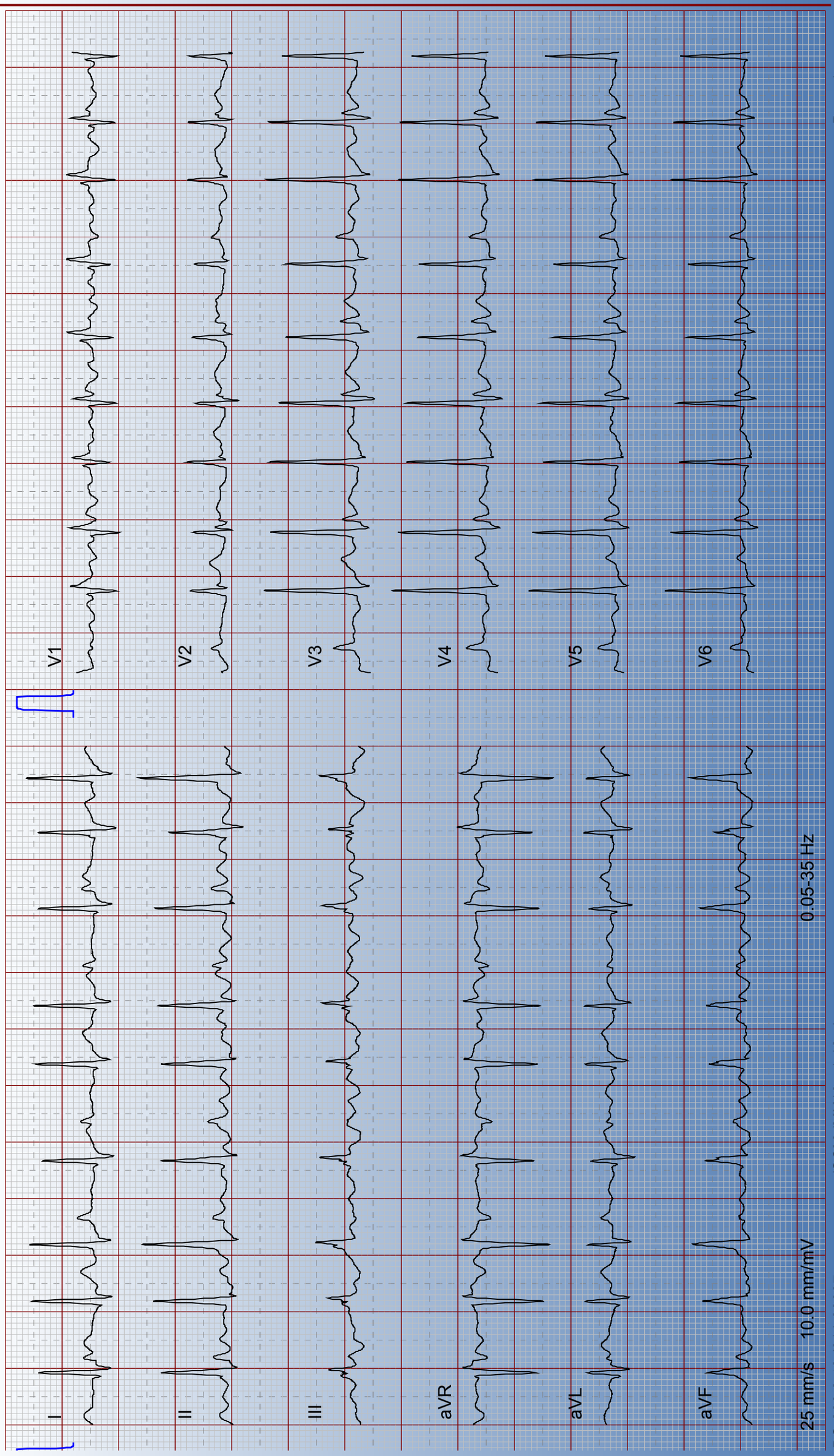
Overview | Curve | Data | Benefit

Curve | Settings | Reset Zoom | Full Screen

Validated by

5203201016

07.05.2010 08:10:33



Page 1

20j wielertoerist

abnormaal hoge hartslagfrequentie tijdens inspanning

snel kort adem

Overzicht

Afstand:	6.52 mijl
Tijd:	1:39:30
Gem. snelheid:	3.9 mijl/u
Winst hoogte:	213 ft
Calorieën:	1,449 C
Gem. temperatuur:	66.9 °F

Details

Timing

Pace Speed

Tijd:	1:39:30
Reistijd:	45:48
Elapsed Time:	1:39:30
Gem. snelheid:	3.9 mijl/u
Avg Moving Speed:	8.5 mijl/u
Max. snelheid:	39.3 mijl/u

Hoogte

Winst hoogte:	213 ft
Verlies hoogte:	224 ft
Min. hoogte:	94 ft
Max. hoogte:	244 ft

Hartslag

Gem. HS:	167 bpm
Max. HS:	204 bpm

Temperatuur

Gem. temperatuur:	66.9 °F
Min. temperatuur:	59.0 °F
Max. temperatuur:	71.6 °F

Ronden 1

Toon tussentijden

Tussentijd	Tijd	Afstand	Gem. snelheid
1	1:39:30.3	6.52	3.9
Overzicht	**1:39:30.3**	**6.52**	**3.9**

Weer

64°

Voelt aan als 64°
2 mph wind
Vochtigheid 42%

Bron: EBBE

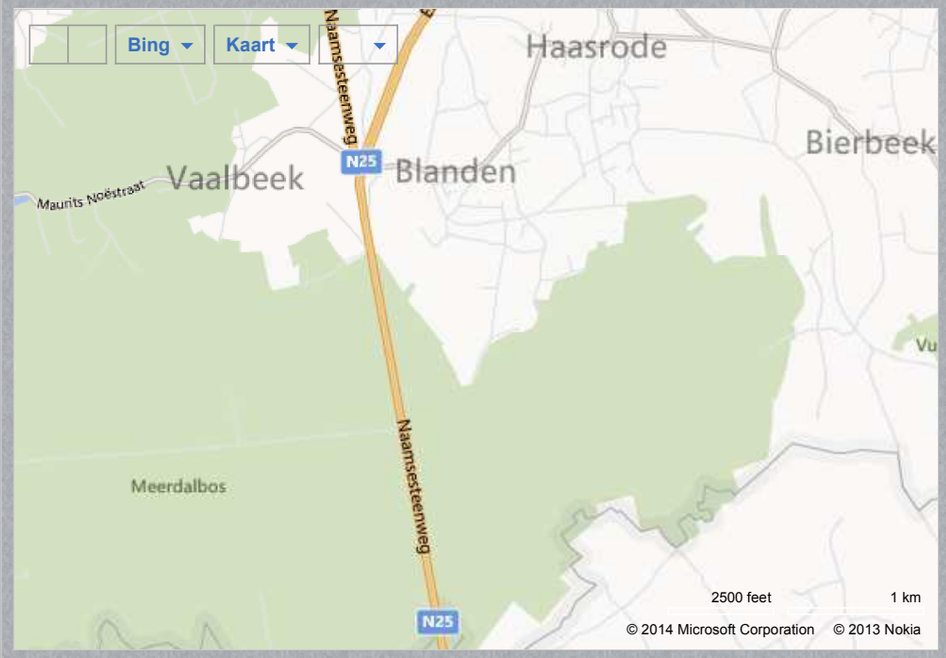
Aanvullende informatie

Toestel:
Garmin Edge 800, 2.20.0.0

Hoogtecorrecties :
Ingeschakeld

Samenvattende gegevens:
Origineel

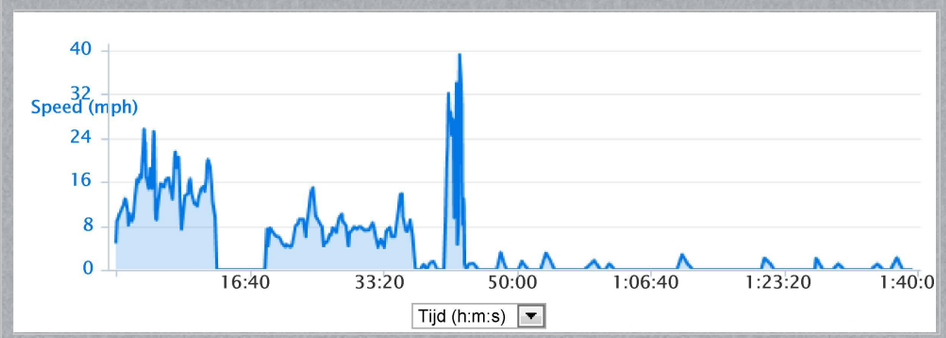
Kaart



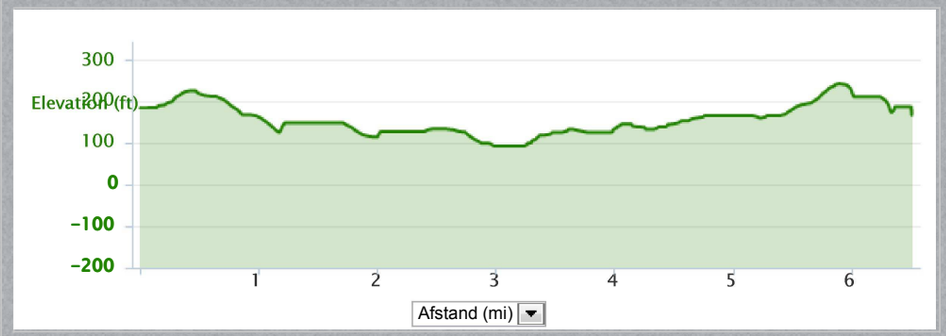
Kaarten

Gemiddeld

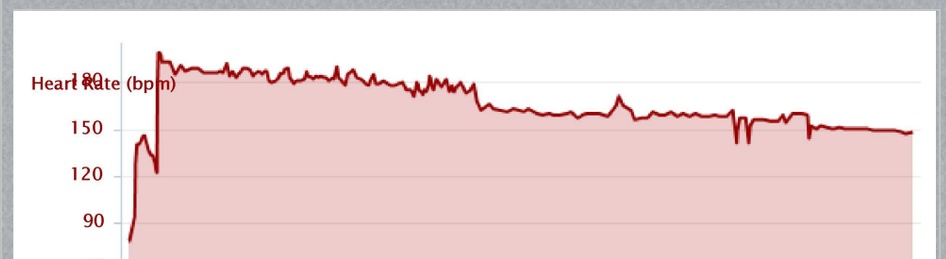
Timing



Hoogte



Hartslag



Weight: 71.0 kg
BP: - / - mmHg

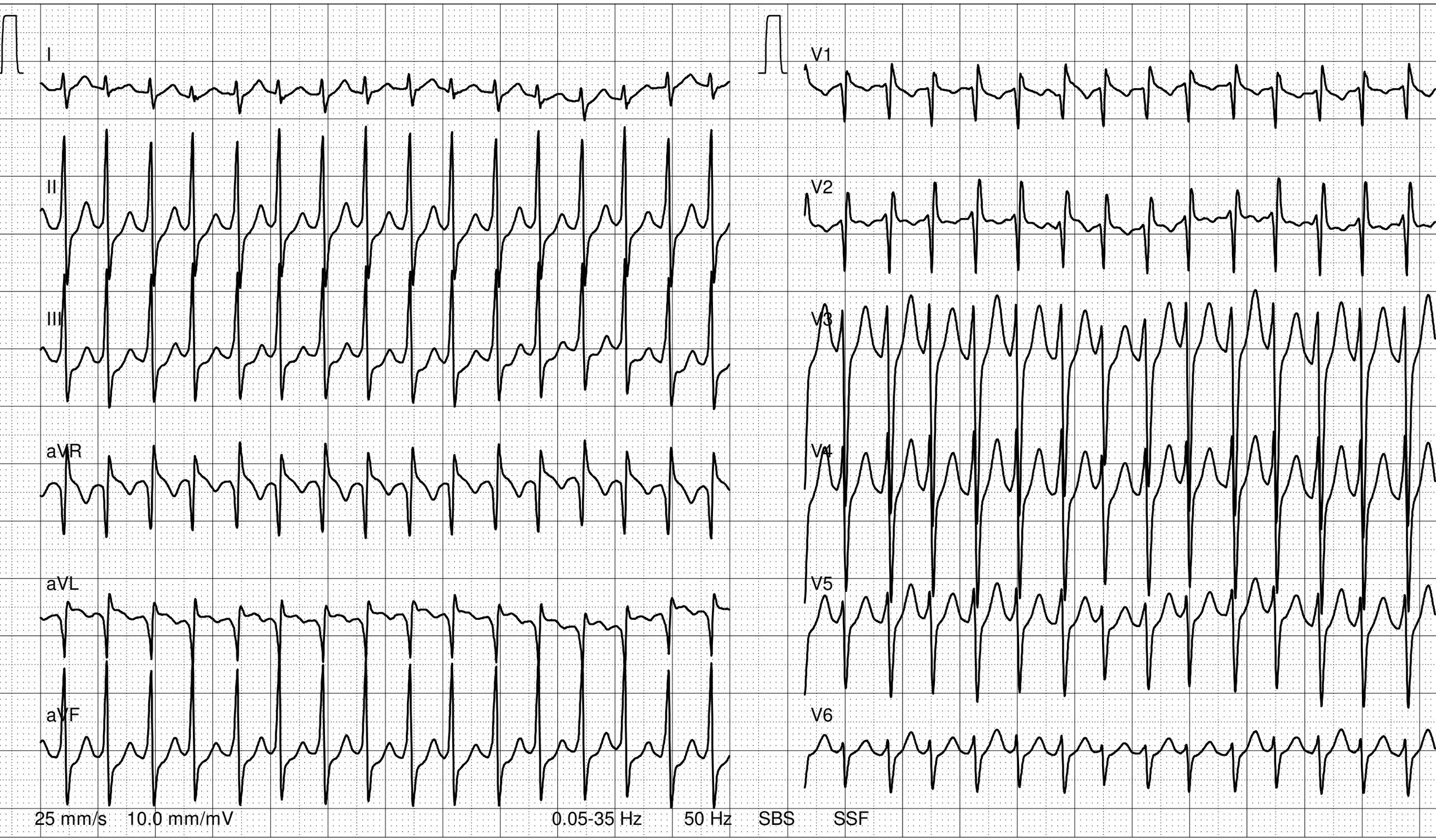
QRS 95
T 61 °

QRS 82 ms
QT 260 ms
QTc 475 ms

S1,S2,S3 PATTERN
NON SPECIFIC ST DEPRESSION

Med:
Rem:

Validated by

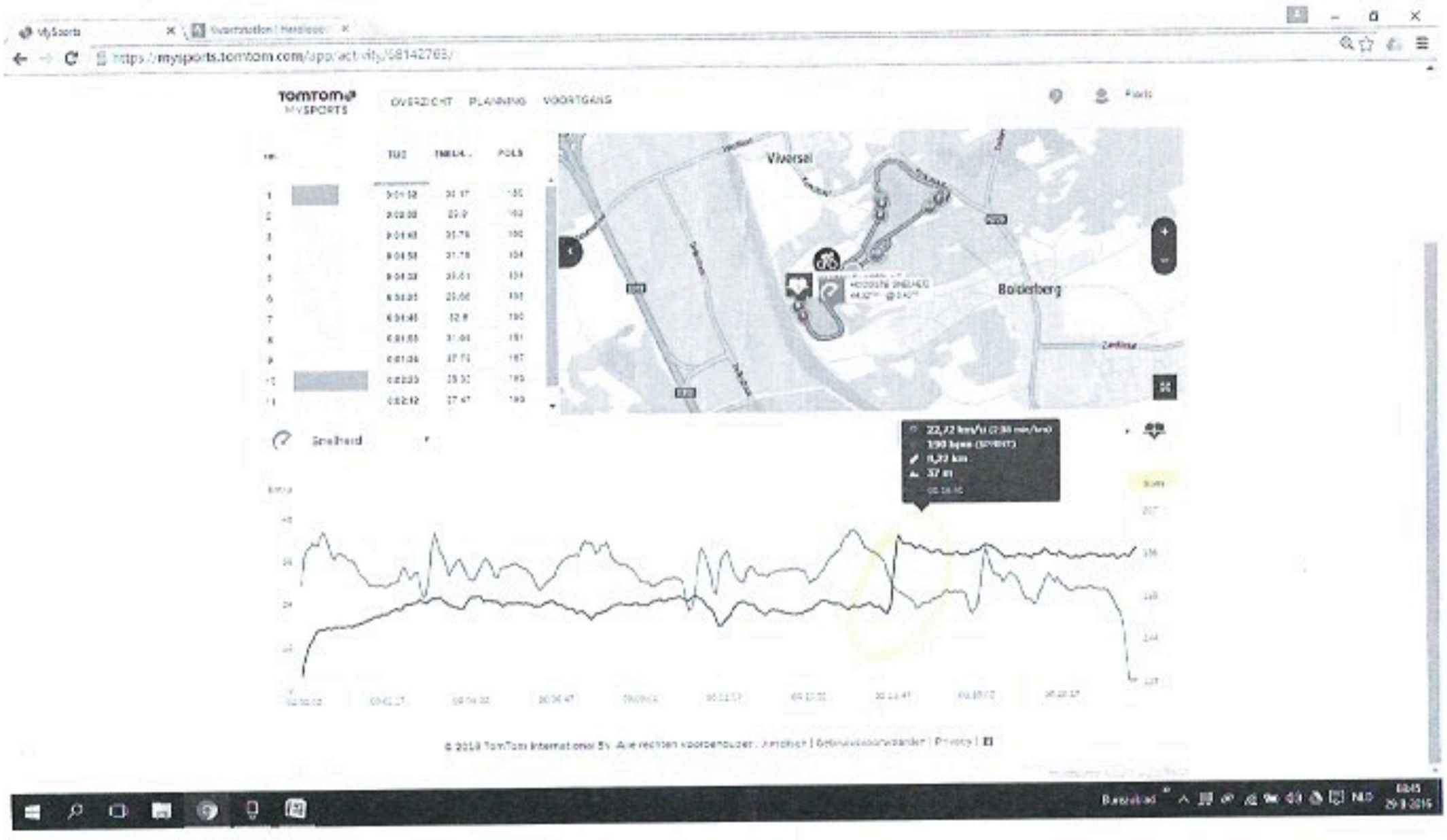


17 j sprint triatleet

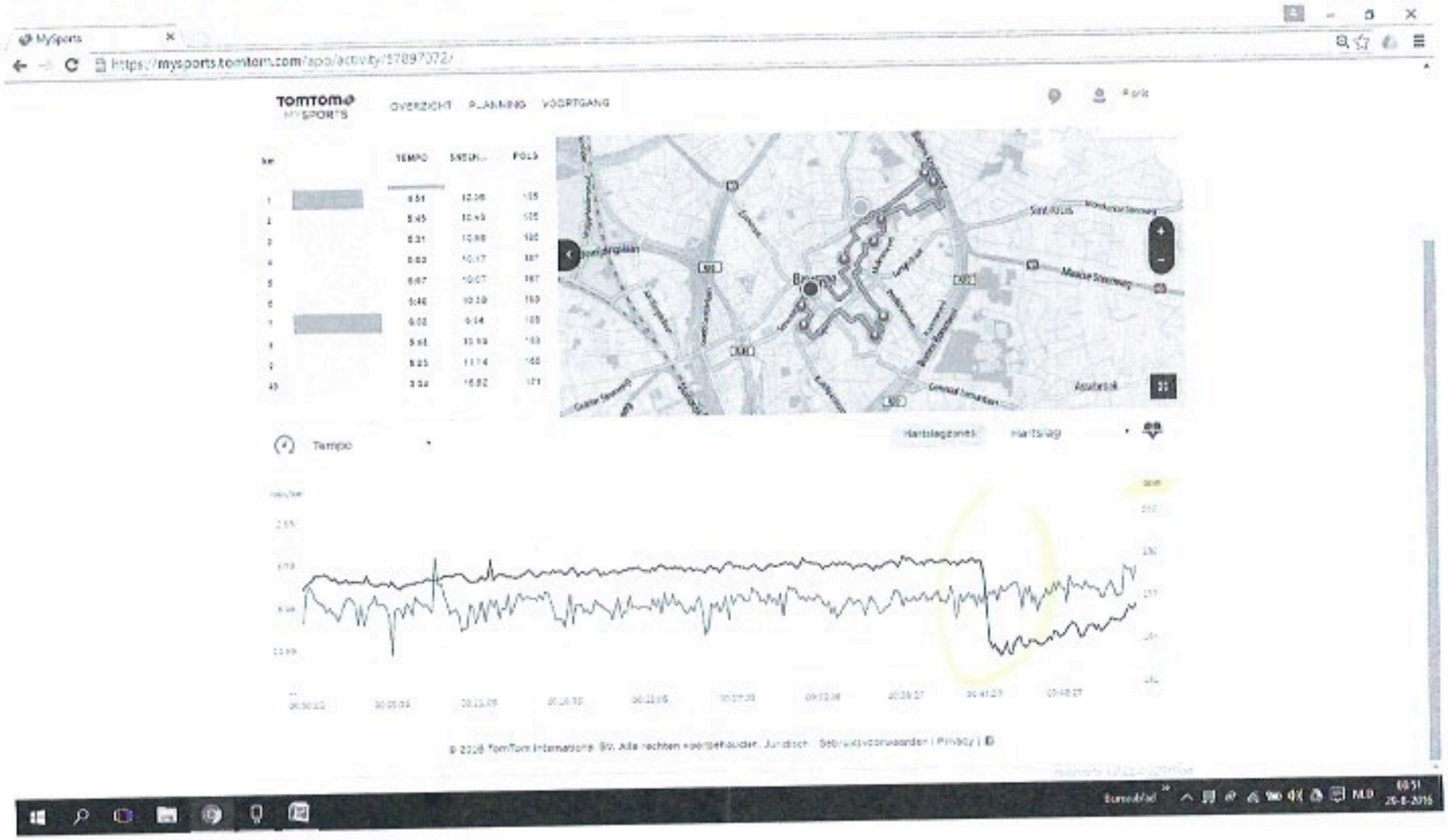
- abnormaal hoge hartslag , soms abrupt hartslagsnelheid vermindering

- geen syncope, 2 X wedstrijd onderbroken

Fietsrondes op parcours van Zolder. Plotse verhoging van hartslag tot 190 bpm.



TRIATLON: 10 km lopen. Tot bijna het einde hartslag rond 190 bpm. Dan plotse terugval.



43 jarige marathon loopster

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Large-Scale Assessment of a Smartwatch to Identify Atrial Fibrillation

Marco V. Perez, M.D., Kenneth W. Mahaffey, M.D., Haley Hedlin, Ph.D., John S. Rumsfeld, M.D., Ph.D., Ariadna Garcia, M.S., Todd Ferris, M.D., Vidhya Balasubramanian, M.S., Andrea M. Russo, M.D., Amol Rajmane, M.D., Lauren Cheung, M.D., Grace Hung, M.S., Justin Lee, M.P.H., Peter Kowey, M.D., Nisha Talati, M.B.A., Divya Nag, Santosh E. Gummidipundi, M.S., Alexis Beatty, M.D., M.A.S., Mellanie True Hills, B.S., Sumbul Desai, M.D., Christopher B. Granger, M.D., Manisha Desai, Ph.D., and Mintu P. Turakhia, M.D., M.A.S., for the Apple Heart Study Investigators*

Geboortedatum: 30 sep. 1961 (Leeftijd 57)

Opgenomen op 3 apr. 2019 om 22:20

❤️ **GEM. 65 SPM**

Dit ecg toont geen tekenen van atriumfibrilleren.

25 mm/s, 10 mm/mV, Afleiding I, 511 Hz, iOS 12.4, watchOS 5.2, Watch4,2 - De golfvorm lijkt op een ecg met afleiding I. Raadpleeg de gebruiksaanwijzing voor meer informatie.

I watch Serie 4

Ik Van Vaerenbergh

Geboortedatum: 23 feb. 1968 (Leeftijd 52)

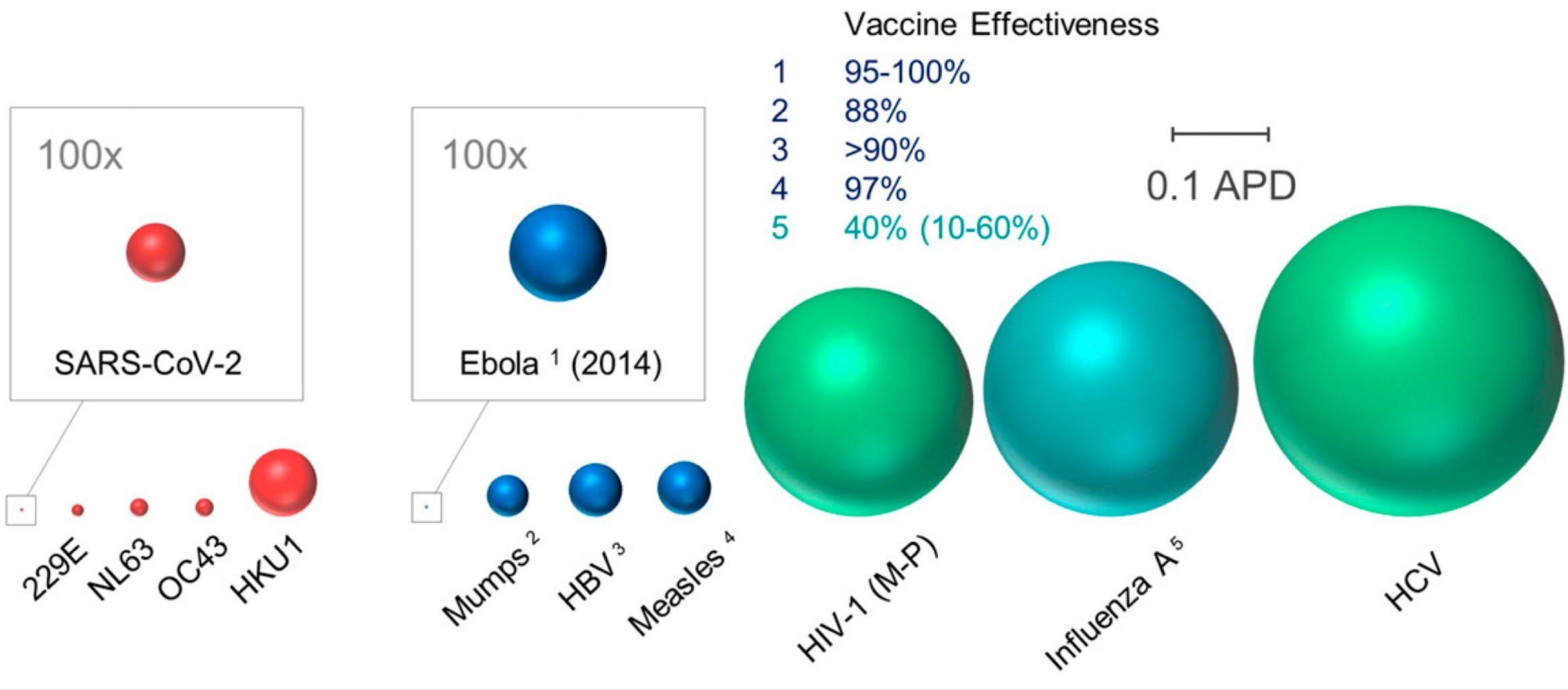
Opgenomen op 13 aug. 2020 om 06:48

Atriumfibrilleren — ❤️ GEM. 117 SPM

Dit ecg toont tekenen van atriumfibrilleren.

Als dit een onverwacht resultaat is, neem je contact op met je huisarts.

Vaccinatie effectiviteit



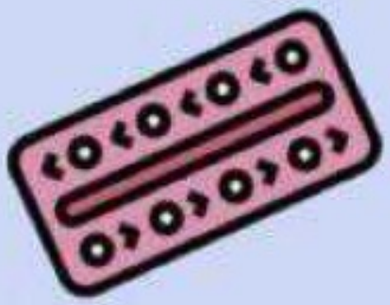
Hoe groter bol, hoe meer genetische variëteit

RNA			
Pfizer (BioNTech)			-80 to -60°C (6 months) and 2 to 8°C (for up to 5 days)
Moderna			-25 to -15°C (6 months) and 2 to 8°C (for 30 days)
Viral vector			
Oxford-AstraZeneca			2 to 8°C (6 months)
Sputnik V (Gamaleya)			-18.5°C (liquid form) 2 to 8°C (dry form)
Johnson & Johnson (Janssen)			2 to 8°C (3 months)
Inactivated virus			
CoronaVac (Sinovac)			2 to 8°C
Sinopharm			2 to 8°C
Covaxin (Bharat Biotech)			2 to 8°C
Protein-based			
Novavax			2 to 8°C

Source: Wellcome Trust, BBC research

BBC

Risk of Blood Clots

AstraZeneca Vaccine	Birth Control Pill	Smoking	COVID Infection
			
4 cases in 1,000,000 Vaccines	500 - 1200 cases in 1,000,000 women	1,763 cases in 1,000,000 Smokers	165,000 cases in 1,000,000 Cases
0.0004%	0.05% to 0.12%	0.18%	16.5%

Maria Leonor Ramos | Médica Interna de Medicina Geral e Familiar

Fontes: Agência Europeia do Medicamento; Suh YJ, Hong H, Ohana M et al. Pulmonary Embolism and Deep Vein Thrombosis in COVID-19: A Systematic Review and Meta-Analysis. Radiology 2021; Chang, Yun-Jau & Liu, Zhi-Hao & Yao, et al. (2013). Current and Former Smoking and Risk for Venous Thromboembolism: A Systematic Review and Meta-Anal

Varianten

✓ B.1.351 (S Africa)
B 1.1.298 (Denemarken)
✓ P.1 (Brazilië en Japan)
✓ B.1.1.7 (UK)
✓ B.1.526 (NY)
✓ B.1.429 (CA
B.1.617(India)

COVID-19 vaccine efficacy against variants

	ORIGINAL VIRUS	B.1.1.7	B.1.351	P.1
Pfizer-BioNTech	95%	Same efficacy	Reduced antibody levels	Same efficacy
Moderna	94%	Same efficacy	Reduced antibody levels	More data needed
J&J	72%*	Same efficacy	Reduced efficacy (in South Africa trials)	Reduced efficacy (in Latin America trials)
AstraZeneca	60-90%	Same efficacy	Reduced efficacy	Same efficacy
Sinovac	50%	Same efficacy	Reduced antibody levels	Reduced antibody levels

Note: *In US trials. Average of 66% efficacy with South Africa and Latin America trials included.

Source: UW Medicine; Reuters; Lancet; Lancet Preprint; Biorxiv; Moderna; Nature; New England Journal of Medicine; Imperial College London; CDC;CoV-lineages.org.

INSIDER

Weighing up the potential benefits and harms of the Astra-Zeneca COVID-19 vaccine

For 100,000 people with medium exposure risk*

Potential benefits: ICU admissions due to COVID-19 prevented **every 16 weeks:**	Age group	Potential harms: Serious harms due to the vaccine:
2.2	20-29yr	1.1
8.0	30-39yr	0.8
16.7	40-49yr	0.5
31.0	50-59yr	0.4
41.3	60-69yr	0.2

* Based on coronavirus incidence of 6 per 10,000: roughly UK in F

Weighing up the potential benefits and harms of the Astra-Zeneca COVID-19 vaccine

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41.3	60-69yr	0.2

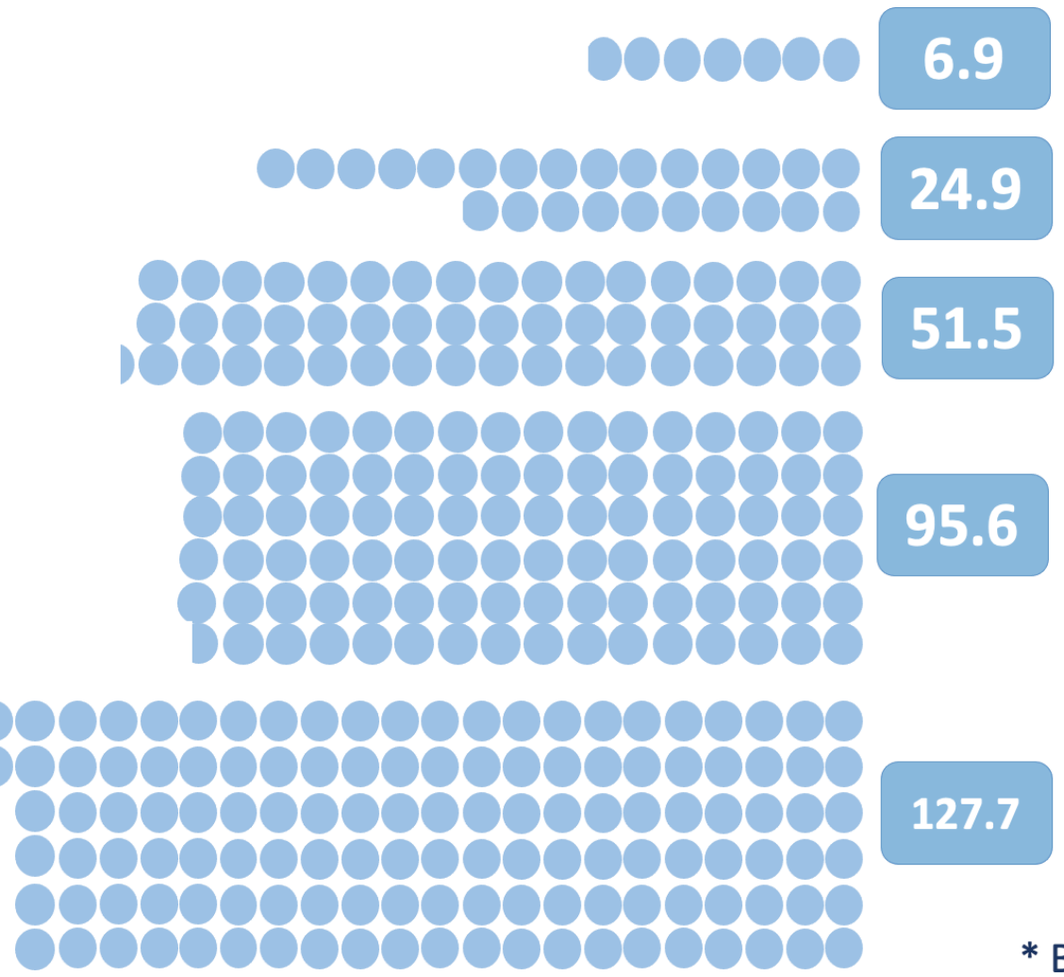
* Based on coronavirus incidence of 6 per 10,000: roughly UK in February

Weighing up the potential benefits and harms of the Astra-Zeneca COVID-19 vaccine

For 100,000 people with high exposure risk*

Potential benefits

ICU admissions due to COVID-19 prevented **every 16 weeks:**



Age group	Serious harms due to the vaccine:
20-29yr	1.1
30-39yr	0.8
40-49yr	0.5
50-59yr	0.4
60-69yr	0.2

Potential harms

* Based on coronavirus incidence of 20 per 10,000: roughly UK at peak of second wave

COVID-19 vaccine recipients

BNT162b2 (Pfizer)

1 dose

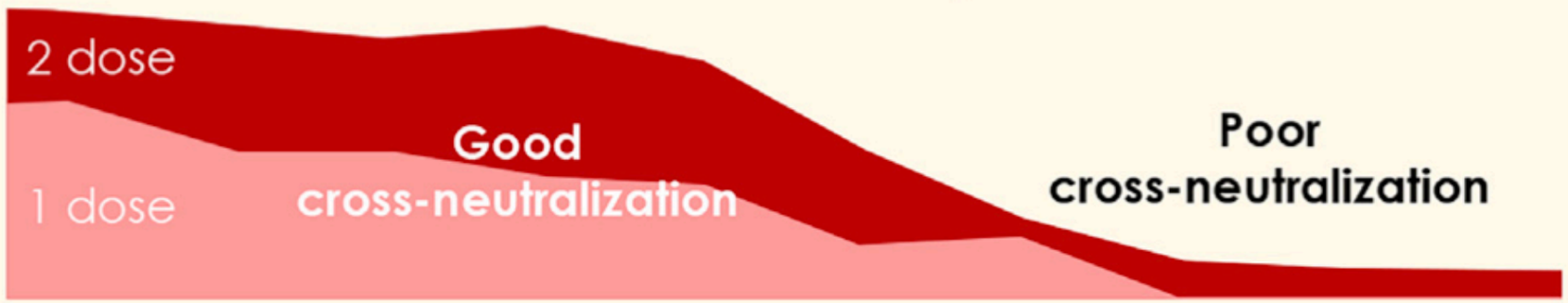
2 dose

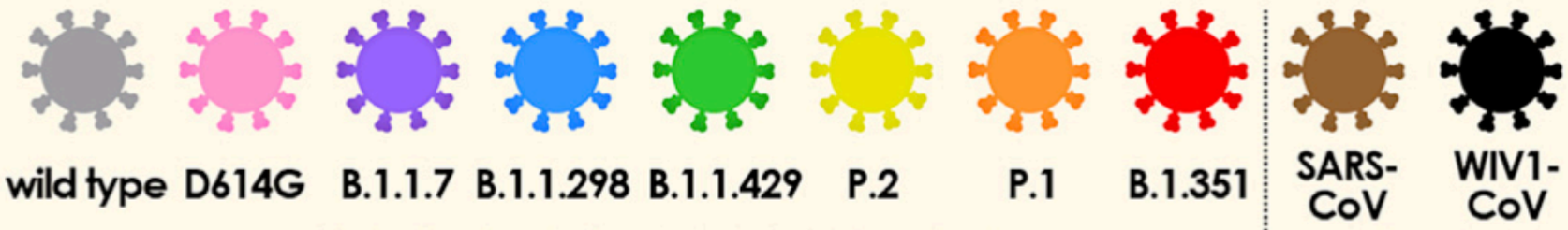
mRNA-1273 (Moderna)

1 dose

2 dose

Pseudovirus neutralization by vaccinee sera

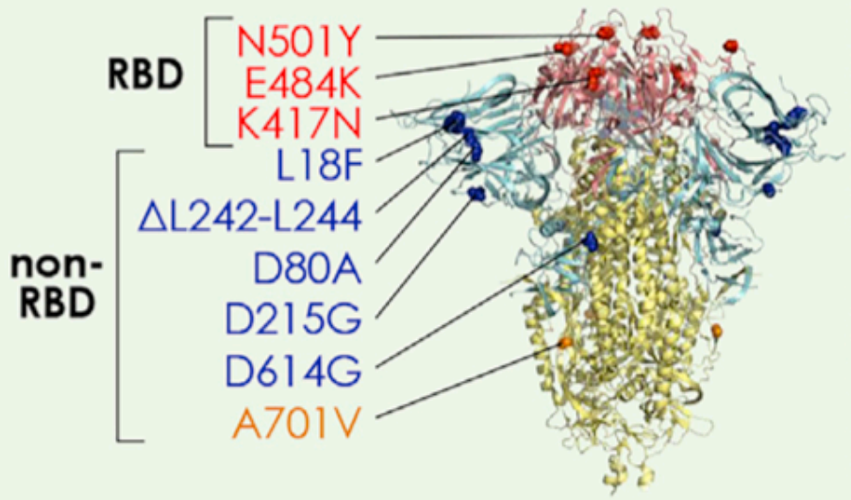




Globally circulating SARS-CoV-2 variants

Other CoVs

B.1.351 spike mutations



Neutralization

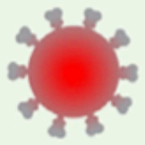
Good

wild type

Poorest

B.1.351

Slightly decreased



B.1.351 non-RBD mutations only

Poor

B.1.351 RBD mutations only

A

Jan ‘20

Apr ‘20

Jul ‘20

Oct ‘20

Jan ‘21

A

B.1.1.7

B.1.1.298

B.1.429

P.2

P.1

B.1.351

SARS-CoV

WIV1-CoV

adapted from nextstrain.org

B

Emergence of SARS-CoV-2 variant worldwide

C

Naturally occurring mutations in SARS-CoV-2 spike trimer

RBD

S1

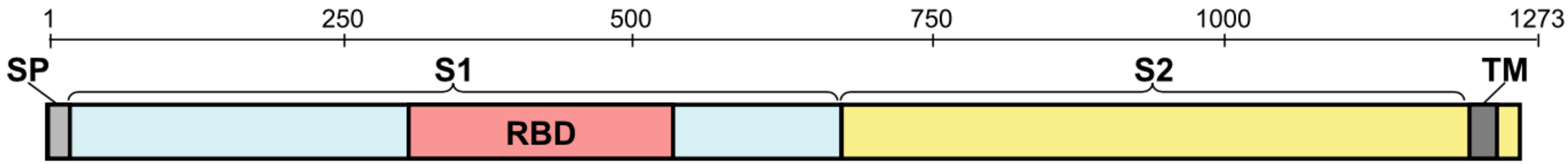
S2

90°

Top

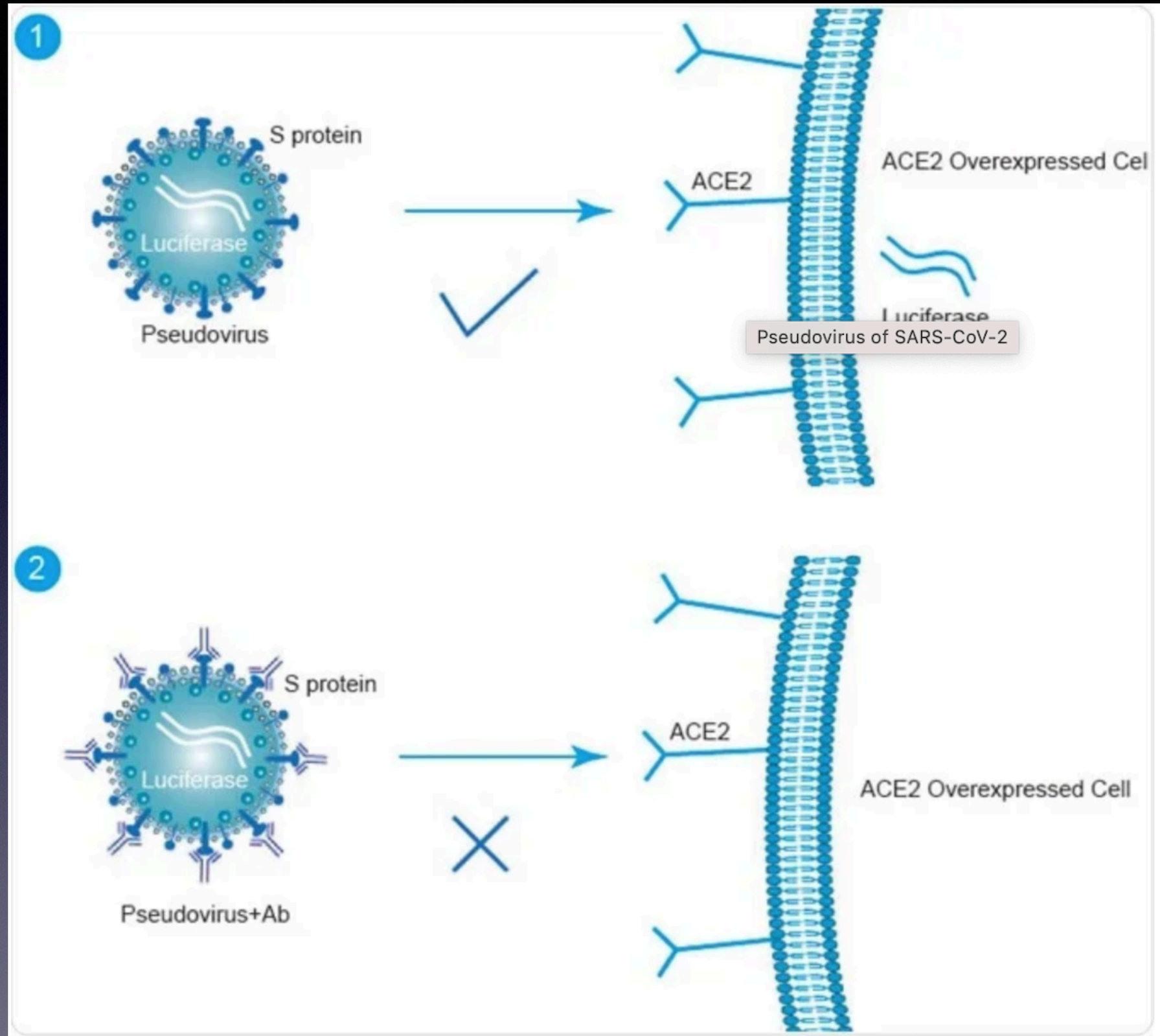
Side

SARS-CoV-2 spike protein structure



Naturally occurring variants by strain

Position	13	18	20	26	69	70	80	138	145	152	190	215	242	243	244	246	417	452	453	484	501	570	614	655	681	692	701	716	982	1027	1118	1176	1229
wild type	S	L	T	P	H	V	D	D	Y	W	R	D	L	A	L	R	K	L	Y	E	N	A	D	H	P	I	A	T	S	T	D	V	M
D614G	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	G	·	·	·	·	·	·	·	·	·	·
B.1.1.7	·	·	·	·	–	–	·	·	–	·	·	·	·	·	·	·	·	·	·	·	Y	D	G	·	H	·	·	I	A	·	H	·	·
B.1.1.298	·	·	·	·	–	–	·	·	·	·	·	·	·	·	·	·	·	·	F	·	·	·	G	·	·	V	·	·	·	·	·	·	I
B.1.429	I	·	·	·	·	·	·	·	·	C	·	·	·	·	·	·	·	R	·	·	·	·	G	·	·	·	·	·	·	·	·	·	·
P.2	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	K	·	·	G	·	·	·	·	·	·	·	·	F	·
P.1	·	F	N	S	·	·	·	Y	·	·	S	·	·	·	·	·	T	·	·	K	Y	·	G	Y	·	·	·	·	·	I	·	F	·
B.1.351 v1	·	·	·	·	·	·	A	·	·	·	·	G	–	–	–	·	N	·	·	K	Y	·	G	·	·	·	V	·	·	·	·	·	·
B.1.351 v2	·	F	·	·	·	·	A	·	·	·	·	G	–	–	–	·	N	·	·	K	Y	·	G	·	·	·	V	·	·	·	·	·	·
B.1.351 v3	·	·	·	·	·	·	A	·	·	·	·	·	–	–	–	I	N	·	·	K	Y	·	G	·	·	·	V	·	·	·	·	·	·
SARS-CoV	75.6% homology to SARS-CoV-2																																
WIV1-CoV	76.5% homology to SARS-CoV-2																																


1
S protein
Luciferase
Pseudovirus
ACE2
ACE2 Overexpressed Cel
Luciferase
Pseudovirus of SARS-CoV-2
2
S protein
Luciferase
Pseudovirus+Ab
ACE2
ACE2 Overexpressed Cell

A

B

BNT162b2 (Pfizer)

mRNA-1273 (Moderna)

Country where variant first described

UK DK US BR/JP SA

2 dose

1 dose

Pseudovirus neutralization (pNT50)

wild type D614G B.1.1.7 B.1.1.298 B.1.429 P.2 P.1 B.1.351 v1 B.1.351 v2 B.1.351 v3 SARS-CoV WIV1-CoV

SARS-CoV-2

SARS-CoV-2 variants of concern

Other CoVs

C

D

BNT162b2 (Pfizer)

mRNA-1273 (Moderna)

2 dose

Fold decrease in pseudovirus neutralization (rel. to wild type)

wild type	D614G	B.1.1.7	B.1.1.298	B.1.429	P.2	P.1	B.1.351 v1	B.1.351 v2	B.1.351 v3	SARS-CoV	WIV1-CoV
1.0	1.2	2.1	1.4	2.0	5.8	6.7	34.5	41.2	42.4	43.8	44.3
1.0	1.2	2.3	1.3	2.0	2.9	4.5	27.7	20.8	19.2	33.5	26.5

Variant	1st Identified	Vaccines	Lab Studies	Randomized Clinical Trials	Real World Evidence
B.1.1.7	UK	mRNA, AZ, Novavax	✓	✓	Israel, UK
B.1.351	South Africa	J&J, Novavax mRNA*	✓	✓	—
P.1	Brazil	Sinovac BBIBP-CorV* mRNA*	✓	✓	Chile
B.1.526	New York	mRNA	✓	—	—
B.1.429	California	mRNA	✓	—	—
B.1.617	India	Bharat	✓	—	—

* Lab studies only, mRNA=Pfizer/BioNtech and Moderna

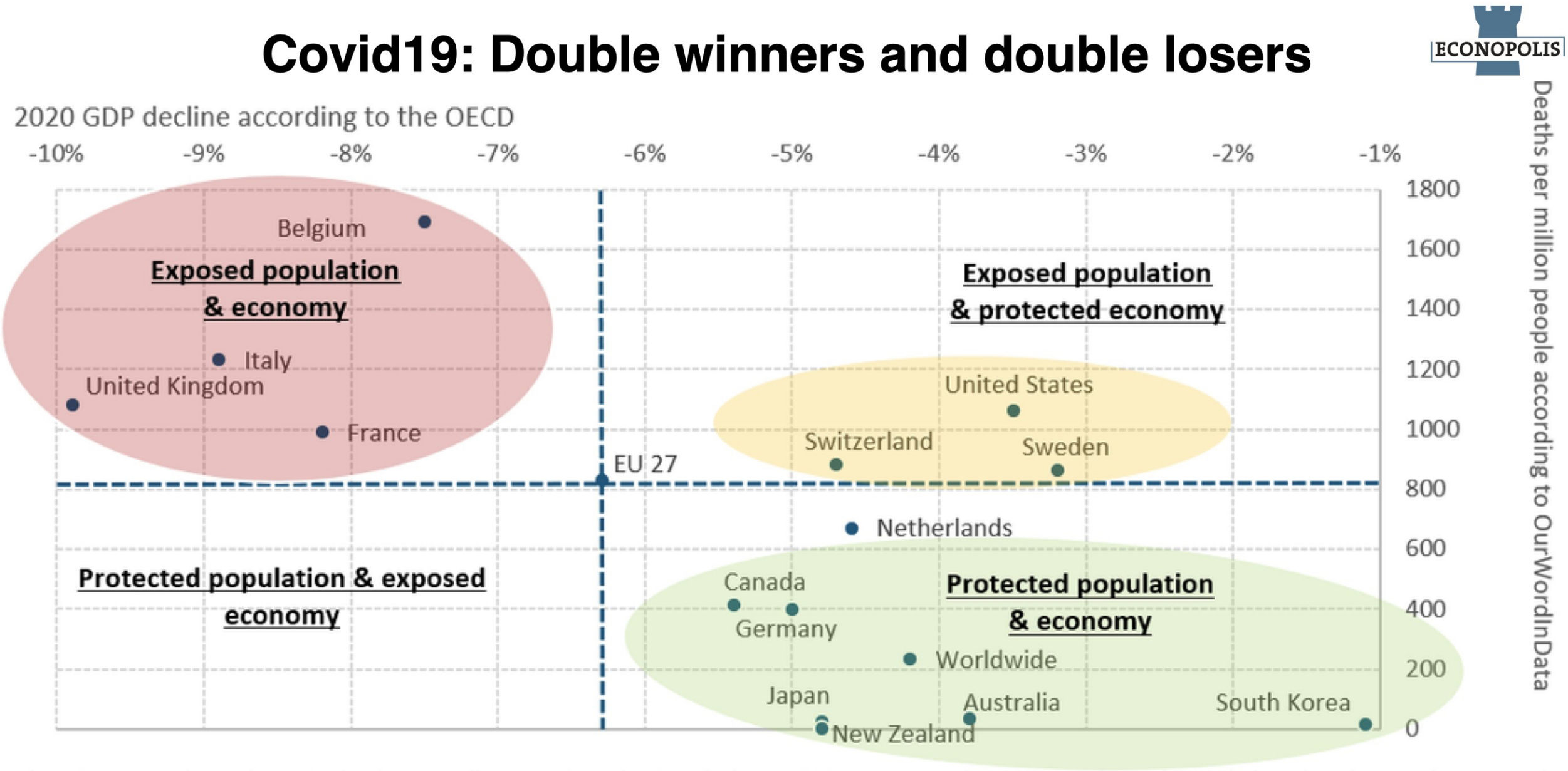
Teleconsultatie

- Video consultatie zeker geen succes, wel tele
- Wie ?
- Intercollegiaal advies : zorgzaam Leuven

Wat is er fout gelopen?

- Eerste golf : gebrek aan huisbezoek, laattijdige consultatie patiënten bij huisarts
- Tweede golf : uitgestelde zorg
- Derde golf : uitgestelde zorg, laattijdige consultatie bij huisarts
- Wat met preventieve geneeskunde en revalidatie
- Taakafspraken specialisten en huisartsen

Toekomst ?



Reading: France, with neatly 1,000 deaths per million people and a GDP decline in 2020, is among the countries that safeguarded neither the population nor the economy.

Sources: OECD forecasts of real annual GDP growth, 2019-2020 (December 2020 or February 2021) and OurWorldInData (Cumulative confirmed COVID-19 deaths, per million people).

Deelnemende artsen / disciplines

- Huisartsen Zorgzaam Leuven: (50 artsen, 9 haio's)
  - Huisartsen Tweewaters (4 artsen, 2 haio's)
  - Huisartsenpraktijk Minnepoort (3 artsen)
  - Huisartsengroep Bleyenbergh (5 artsen, 2 haio's)
  - Huisartsenpraktijk Keizersberg (5 artsen, 1 haio)
  - Huisartsen Blauwput
  - WGC De Central
  - Huisartsen Brugberg (4 artsen, 2 haio's)
  - Huisartsen Wijngaardlaan (3 artsen)
  - Groepspraktijk Blom (5 artsen)
  - Groepspraktijk De Flint (6 artsen, 1 haio)
  - Huisartsen UGP (7 artsen)
  - Huisartsen Hoogveld (3 artsen, 1 haio)
  - Huisartsen Terbank (3 artsen)

Ronde “tafel”

- Hoe verbeteren?
- Eigen ervaring ?