

Cardiogene shock op de HCK

Indicatie, behandeling en pathofysiologie



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Alkmaar | Den Helder | Heerhugowaard | Limmen | Schagen | Texel

Casus

52-jarige man

VG: onbekend

OHCA: 3 blokken. 3 x shock door ambulance. -> SR

Shockroom: Intubatie. RR 95/50 mmHg met noradrenaline

4 H's en 4 T's negatief

ECG: SR, diffuus < 1 mm ST-depressie

Spoed CAG?

NEJM QuickTake

Casus

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4 H's en 4 T's negatief

ECG: SR, diffuus < 1 mm ST-depressie

Spoed CAG?

-Nee

Casus

62-jarige man

VG: COPD gold I

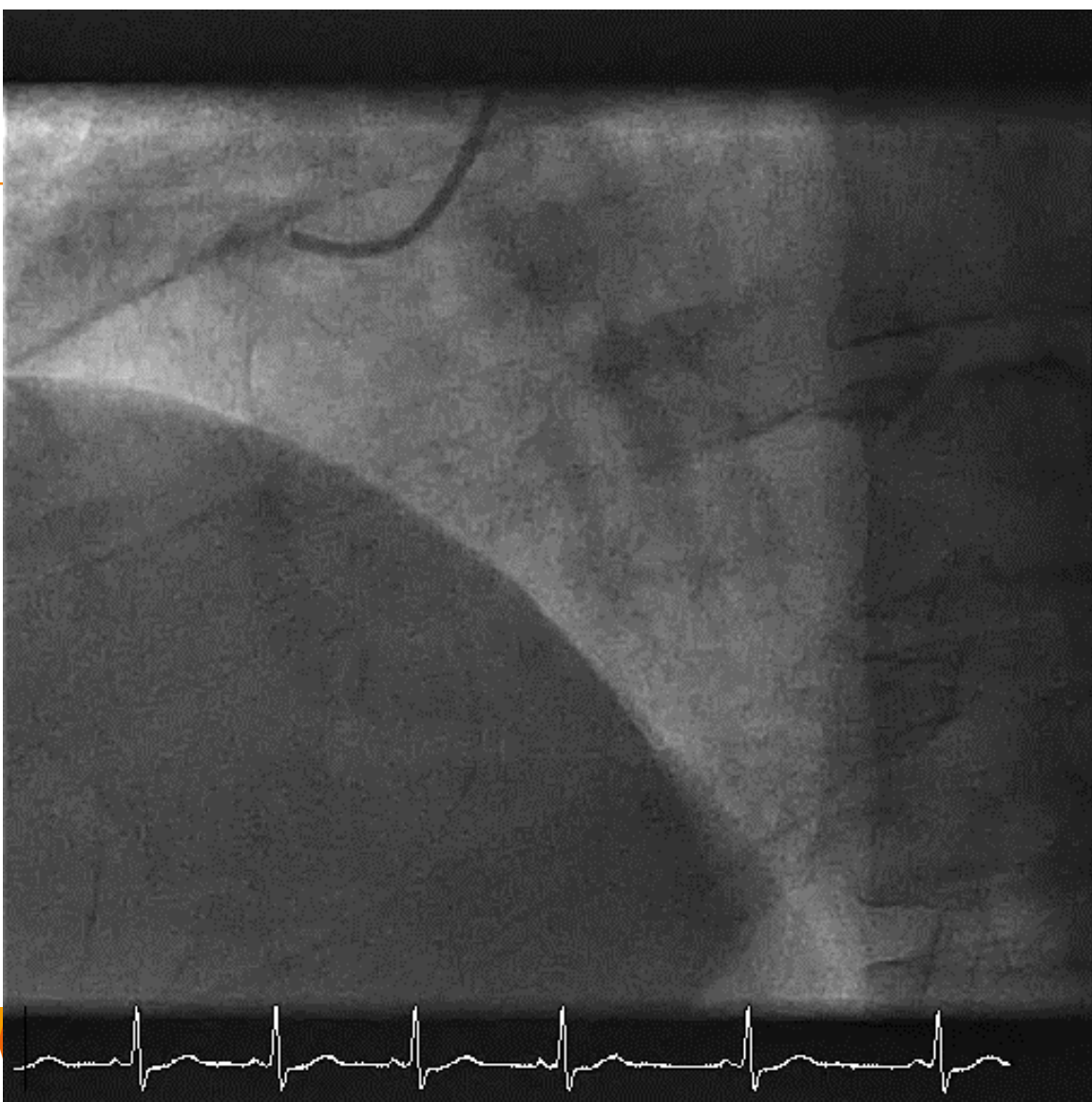
A: Sinds 40 min POB, zweten.

RR 85/37 mmHg. P94/min. Sat 80% O₂.

Shockroom: intubatie naar ICU

ECG: SR, ST elevatie lateraal. Reciproke depressie II, III, aVF

Spoed CAG?







PCI?

CULPRIT-SHOCK

PCI Strategies in Patients with Acute Myocardial Infarction and
Cardiogenic Shock

1075 Patients with acute myocardial infarction and cardiogenic shock were screened

369 Were excluded
184 Had single-vessel coronary artery disease
69 Did not provide informed consent
53 Had undergone resuscitation for >30 min
16 Had severe renal insufficiency at baseline
12 Were participating in another trial
11 Had onset of shock >12 hr earlier
8 Had indication for CABG or did not have planned PCI
5 Had concomitant severe disease associated with a life expectancy of <6 mo
3 Were >90 yr old
2 Did not have intrinsic heart action
5 Had other reasons
1 Had mechanical complication

706 Underwent randomization

351 Were assigned to culprit-lesion-only PCI

355 Were assigned to immediate multivessel PCI

344 Provided full informed consent

342 Provided full informed consent

301 Underwent culprit-lesion-only PCI
43 Underwent immediate multivessel PCI
(60 Underwent staged PCI, 1 underwent staged CABG, and 13 underwent urgent PCI)

310 Underwent immediate multivessel PCI
32 Underwent culprit-lesion-only PCI
(8 Underwent staged PCI, and 5 underwent urgent PCI)

344 Had ≥30 days of follow-up

341 Had ≥30 days of follow-up
1 Was lost to follow-up

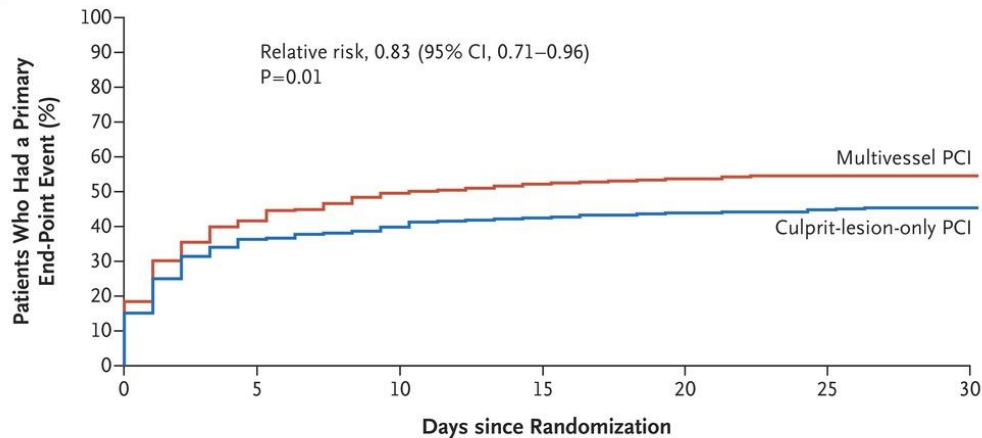
344 Were included in primary analysis

341 Were included in primary analysis

343 Had 1 yr of follow-up
1 Was lost to follow-up between 30 days and 6 mo

341 Had 1 yr of follow-up

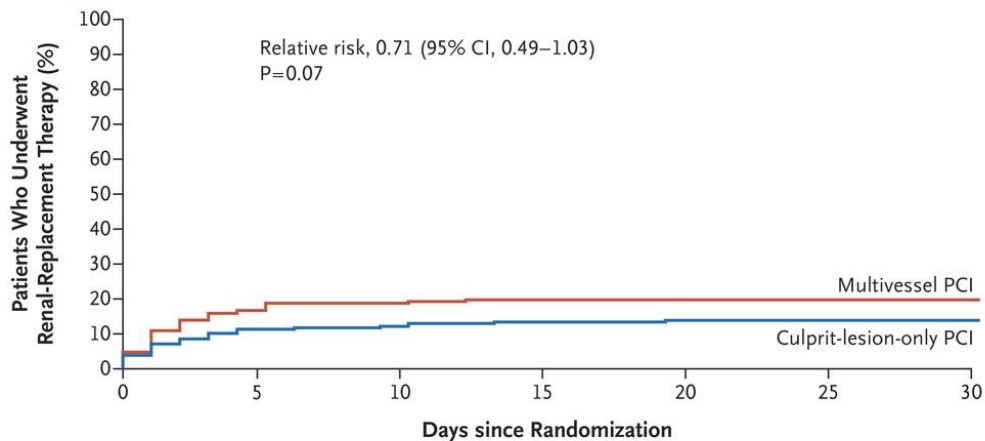
A Composite Primary End Point



No. at Risk

Multivessel PCI	341	199	172	162	156	153	152
Culprit-lesion-only PCI	344	219	207	198	192	189	184

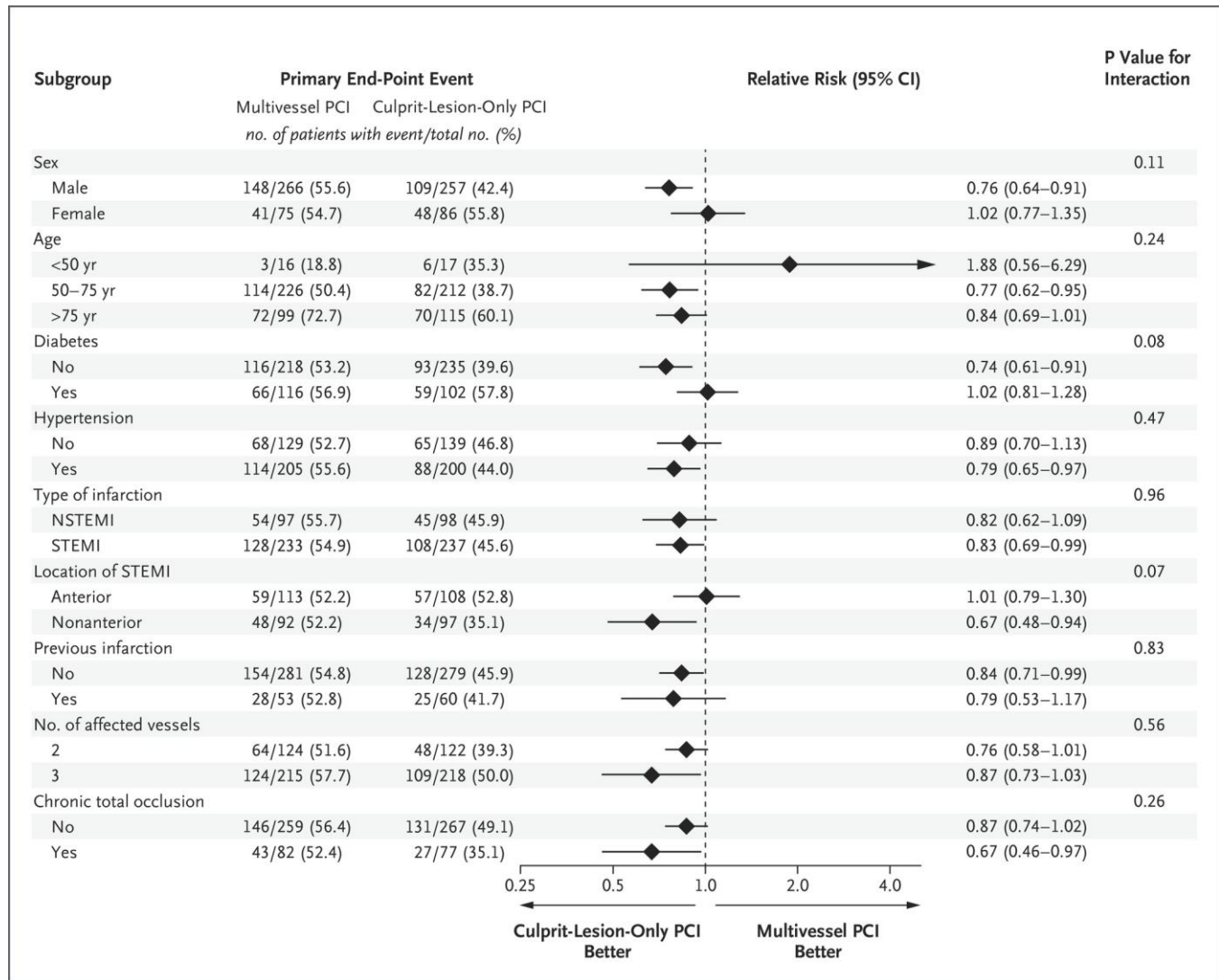
C Renal-Replacement Therapy



No. at Risk

Multivessel PCI	341	199	172	162	156	153	152
Culprit-lesion-only PCI	344	219	207	198	192	189	184

Primary end point:
Death from any cause
or severe renal failure
leading to renal-
replacement therapy



1 year Follow-up!

Shock

- **Cardiogene shock**

- **Obstructieve shock: blokkade van de circulatie**

Binnen het hartvaatstelsel: longembolie, andere soort embolus (lucht, amnion vocht, vet- en beenmergembolie)

Buiten het hartvaatstelsel: harttamponade, abdominaal compartiment syndroom, spanningspneumothorax, dynamische hyperinflatie (ernstig astma), compressie vena cava (bij zwangeren in rugligging)

- **Hypovolemische shock: tekort aan effectief circulerend volume**

Haemorrhagisch:

traumatisch (grote vaten, fractuur bekken of lange pijpbeenderen, hematothorax, intra-abdominale bloeding, retroperitoneale bloeding, extern bloedverlies).

non-traumatisch (gastro-intestinale bloeding, massale epistaxis, geruptureerd AAA, ectopische zwangerschap, hemorrhagische pancreatitis, fluxus postpartum)

Vochtverlies:

gastro-intestinaal verlies (braken, diarree), overmatige diurese (diabetes insipidus, diuretica), excessieve diaforese (hyperthermie-gerelateerde ziekte), diabetische keto-acidose of hyperosmolare non-ketotische ontregeling, brandwonden, derde ruimteverlies (pancreatitis, ileus), iatrogeen (post-dialyse).

- **Distributieve shock**

Sepsis, SIRS, anafylaxie, bijnierschorsinsufficiëntie, neurogene shock, leverfalen, intoxicatie.

Cardiogenic shock

ESC Heart failure guidelines

“Ineffective cardiac output caused by a primary cardiac disorder results in both clinical and biochemical manifestations of inadequate tissue perfusion”

Cardiogenic shock

ESC Heart failure guidelines

- Persistent hypotension
 - SBP < 80 - 90 mmHg
 - MAP 30 mmHg lower than baseline
 - Clinical or laboratory signs of hypoperfusion
- Multi organ failure
 - Inadequate tissue perfusion
 - Cold extremities, oliguria, mental confusion, dizziness,
 - Laboratory disorders
 - Lung edema / Elevated filling pressures
 - WP > 15 mm Hg
- Severe reduction in the cardiac index
 - <1.8 L/min per m² without support
 - <2 to 2.2 L/min per m² with support

Causes of cardiogenic shock

- Acute myocardial infarction (80%)
 - LVF dysfunction
 - Mechanical complications
 - Acute mitral regurgitation (7%)
 - Rupture of either the VSD or free walls (5%)
- Myocarditis
- Septic CMP / Tako tsubo
- CABG / PCI (Stunning)
- End stage CMP
- Valve regurgitation / stenosis
- Miscellaneous
 - Intoxication / drug overdosis
 - Pericardial effusion
 - Pulmonary embolism
 - Arrhythmia

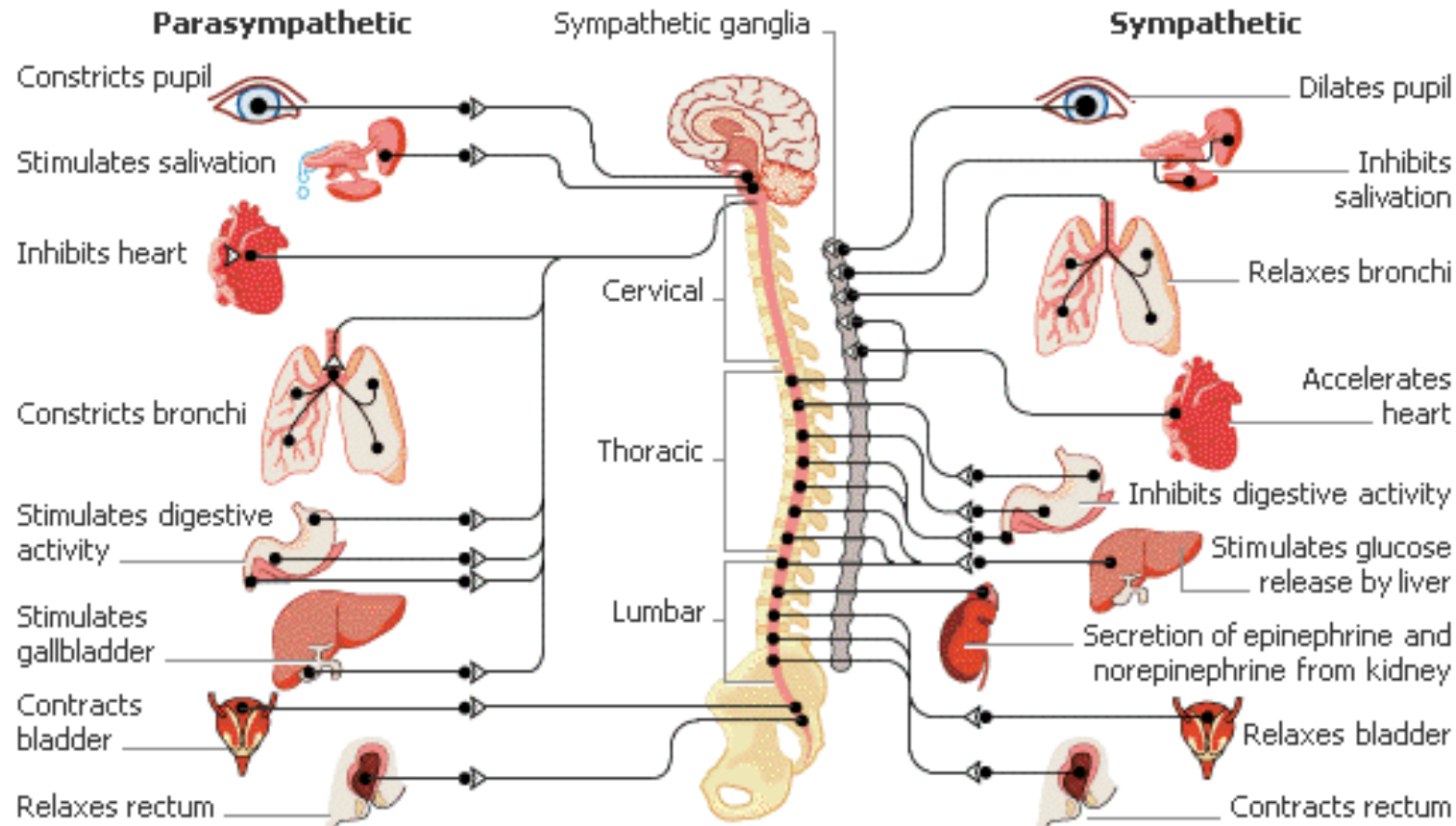
Predictors of mortality of CS in ACS

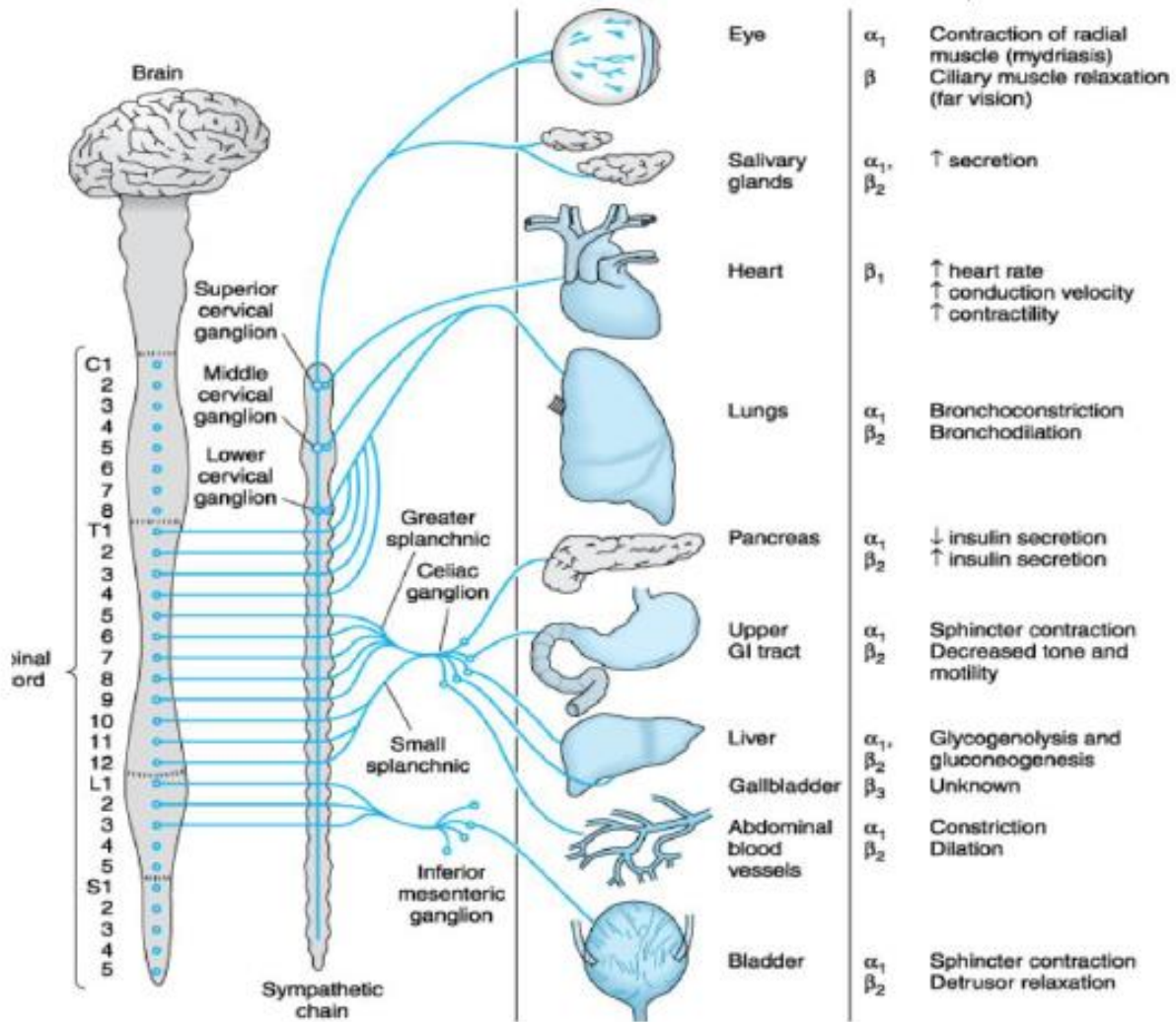
- Increasing age
- Prior MI / history of CABG
- Oliguria
- Hemodynamic parameters
 - MAP, systolic and diastolic blood pressure
 - Cardiac index
- Altered mental status
- Low LV ejection fraction
- High blood lactate levels

- In-hospital mortality 27–51%

Vasopressors / inotropica

- Goal
 - Reverse hypotension
 - Maintain vital organ perfusion
 - Maintain coronary perfusion pressures





Receptoren

- α 1 en α 2 receptoren
- β 1 en β 2 receptoren
- Dopamine 1 en 2 receptoren

α receptoren

- Vasoconstrictie
 - Bronchoconstrictie
 - Mydriasis
 - Trombocytenten aggregatie
 - Inhibitie noradrenaline release
 - Gastrointensinale relaxatie
 - Contractie blaas sfincter

β receptoren

- β_1
 - Positief chronotroop
 - Positief inotroop
 - Positief dromotroop
- β_2
 - Vasodilatatie
 - Bronchodilatatie
 - GI relaxatie
 - Blaasrelaxatie

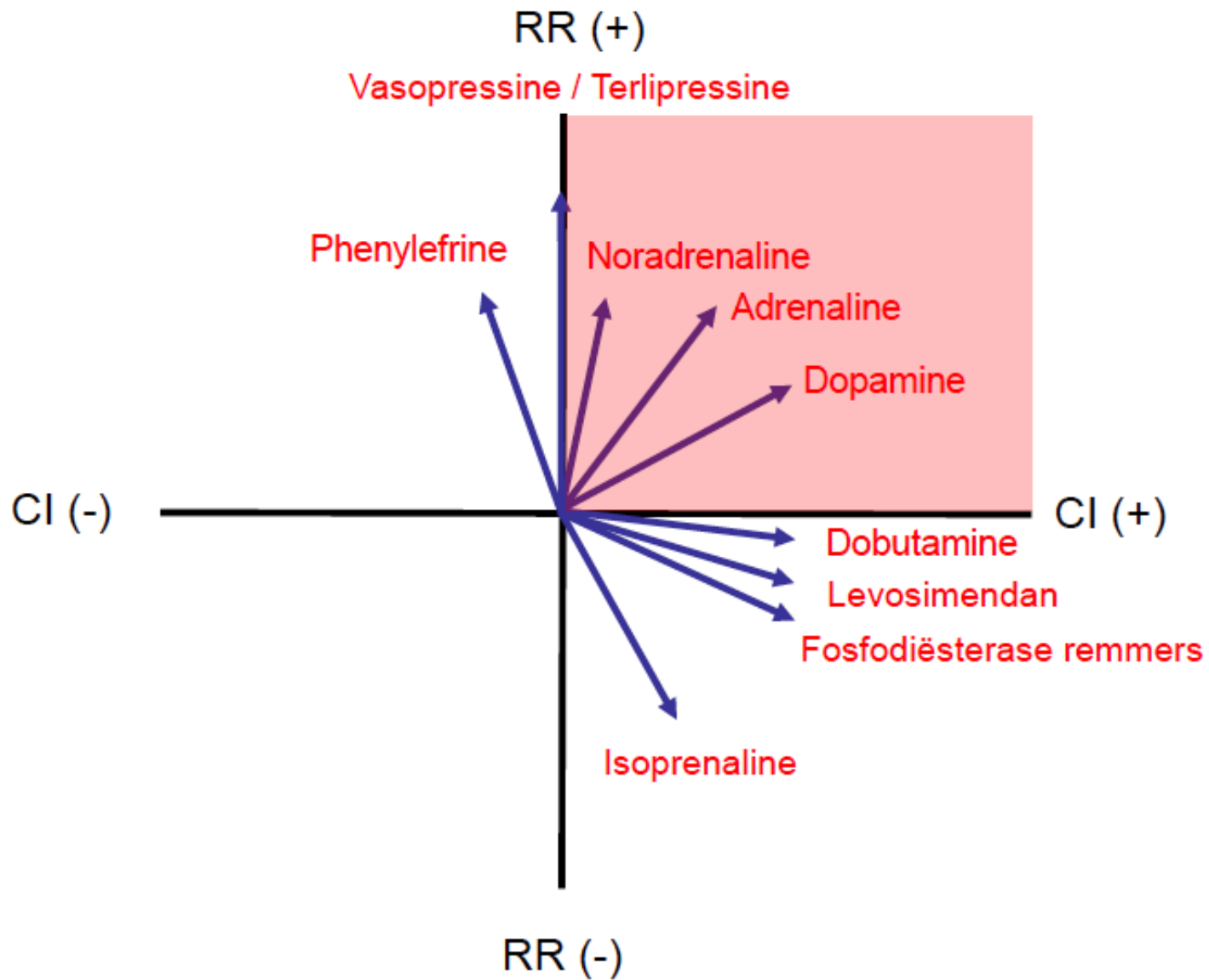
Dopamine

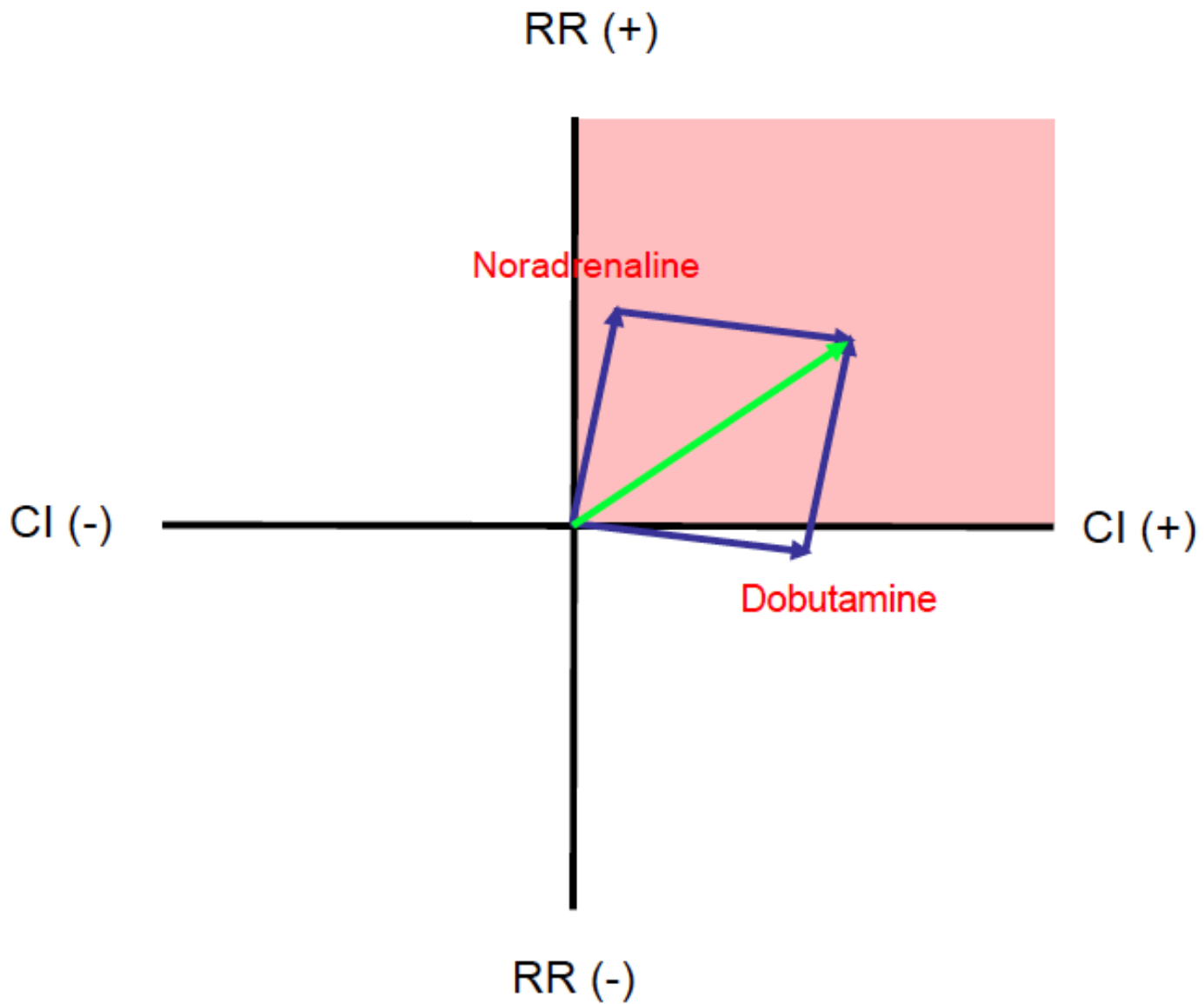
- D1
 - D2
 - D4
 - D5
-
- Doseringsafhankelijk.

Inotropica

- **Digoxin**
- **Catecholaminen**
 - Dobutamine
 - Dopamine
 - Isoprenaline
 - (Nor)adrenaline
 - Ephedrine / Phenylephrine
- **Fosfodiesterase remmers**
 - Milrinone
 - Enoximone (Perfan)
- **Calcium sensitizers**
 - Levosimendan

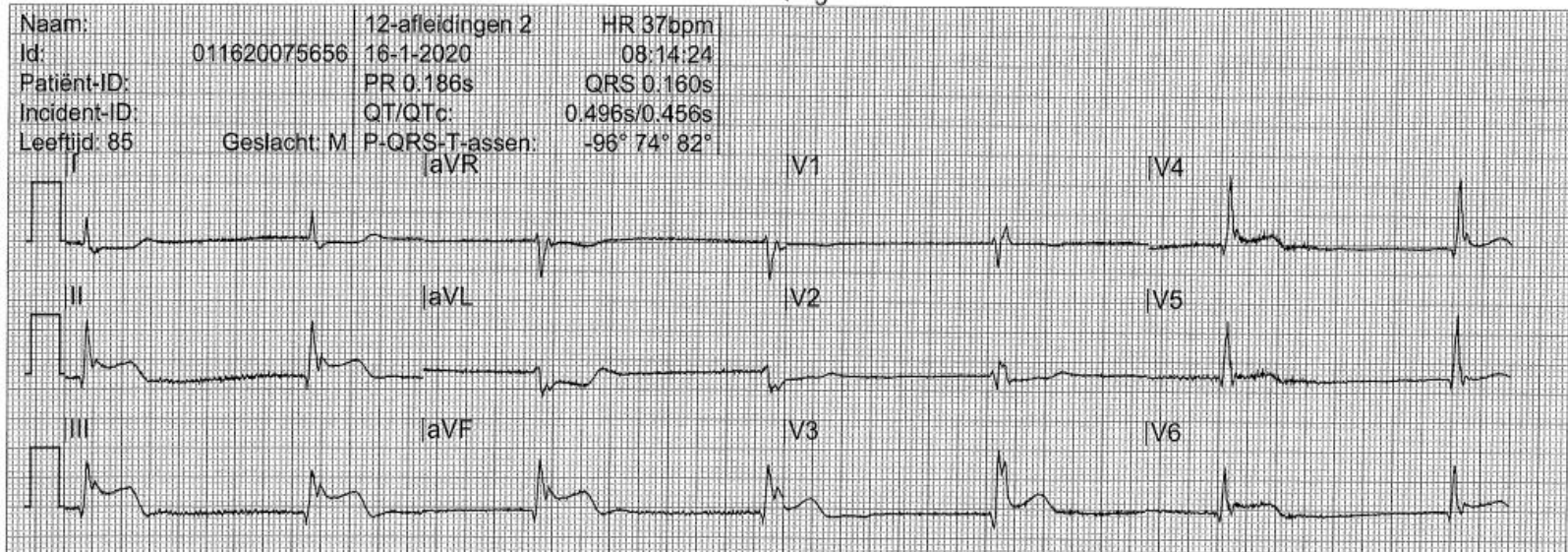
Hemodynamica	HF	HMV	BD	wiggedruk	nier
Dopamine	→↑	↑↑	→↑↑	→↑	↑
Dobutamine	↑	↑↑↑↑	→↓	→↓	→
Isoprenaline	↑↑↑↑	↑↑↑↑	→↓↓	↓	→
Adrenaline	↑↑↑	↑↑↑	↑↑	→↑	↓
Noradrenaline	→↑	→↑	↑↑↑	→↑	↓↓





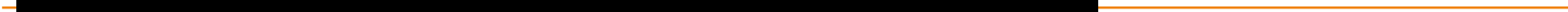
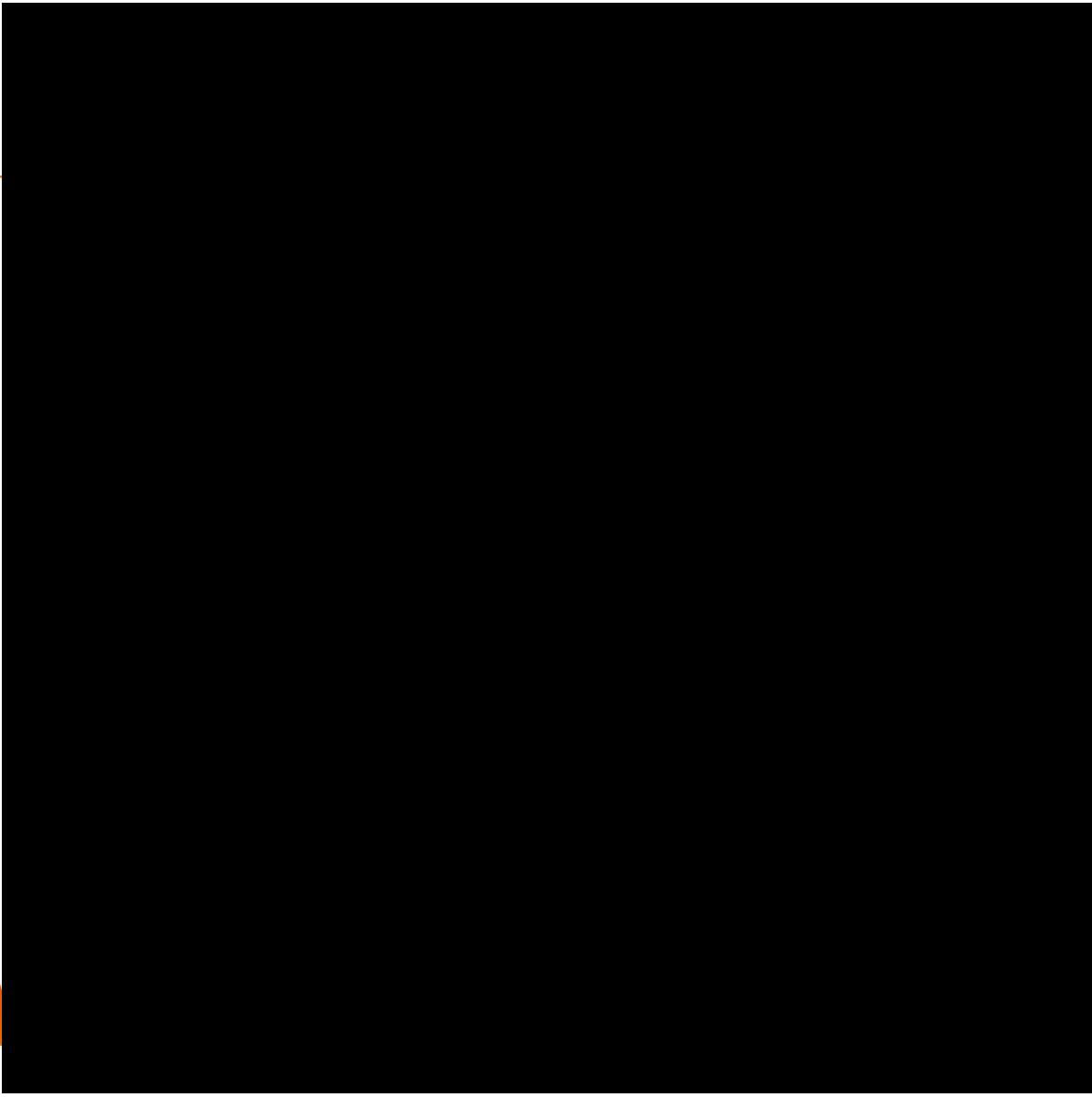
Casus

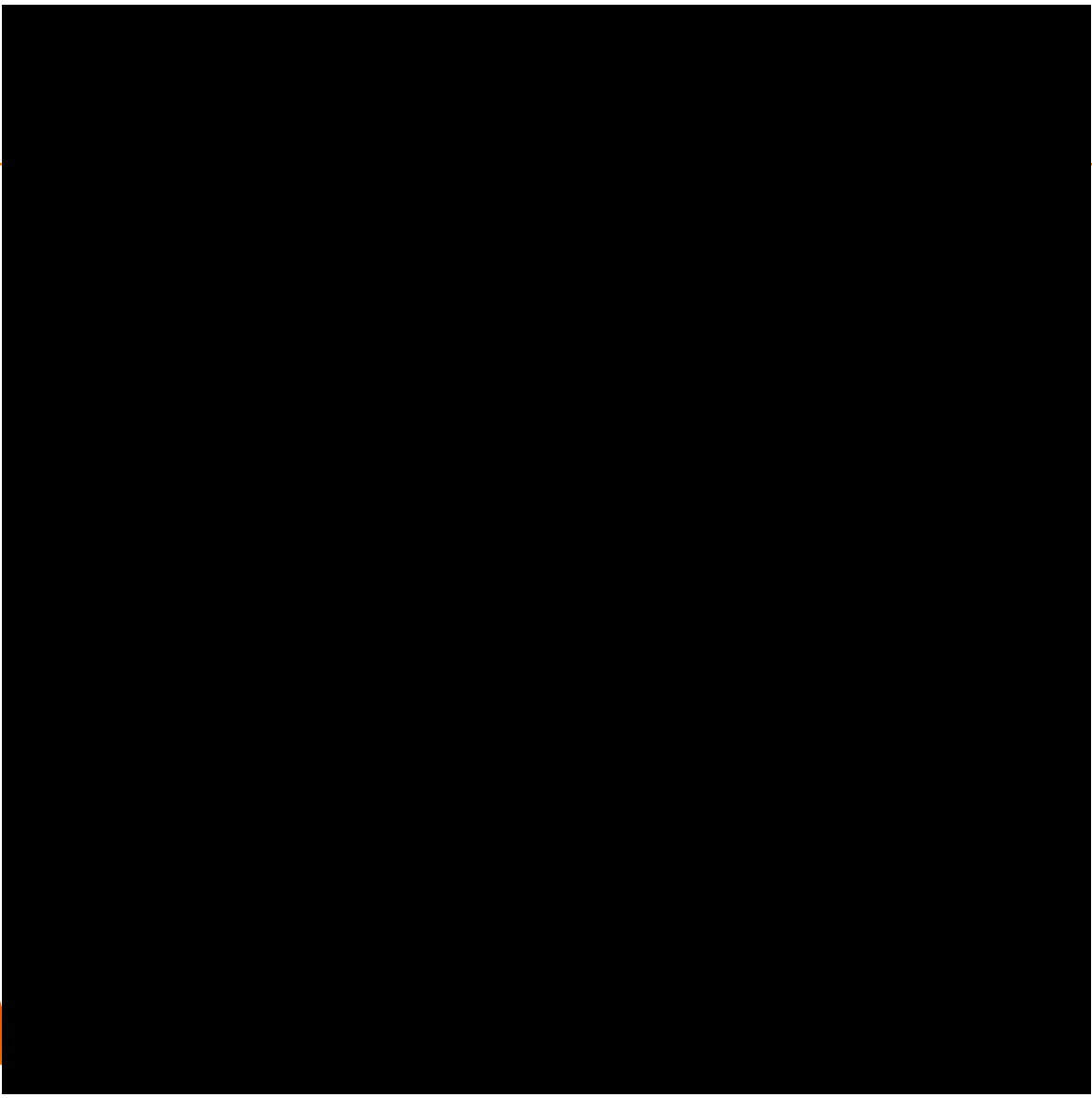
84-jarige man
VG: 2005 CVA zonder restlijden.



Aangetroffen op de vloer. Def +, RR 50/30 mmHg.







Casus

Triple lumen CVC

7 Fr Lies

PCI RCA 3 x DES

Periprocedurele ondersteuning

1500 ml NaCl 0,9%

O2 non-rebreather masker

Dobutamine en noradrenaline iv

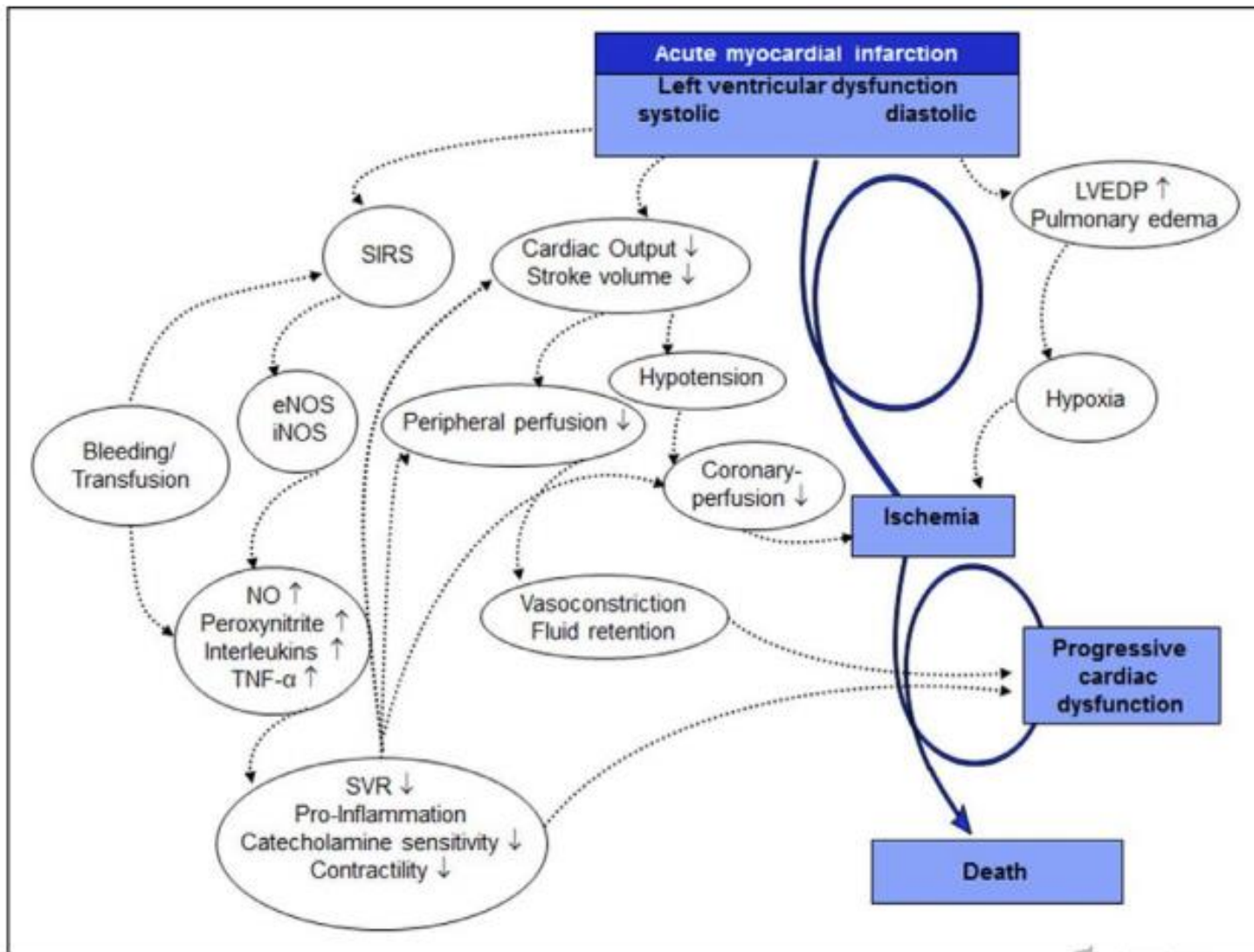


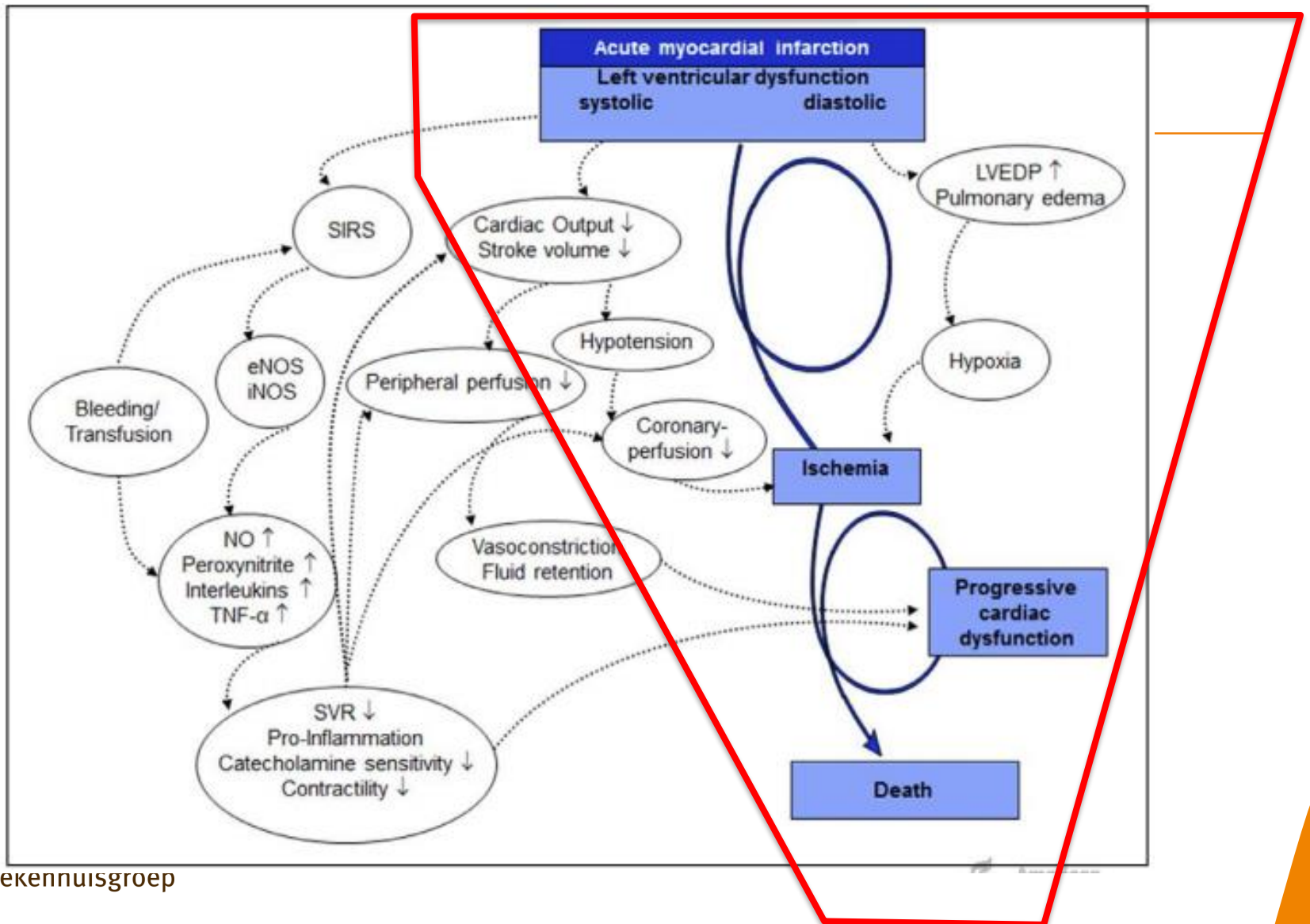
Pathophysiology shock

- Combination of
 - Reduced LVF due to myocardial ischemia / injury
 - Inadequate systemic vasoconstriction
 - Results from a systemic inflammatory response to the myocardial damage

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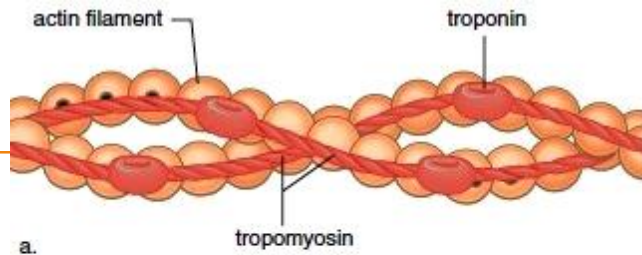
- Reduced SV and reduced CO
- Low blood pressure and coronary perfusion
- Further coronary ischemia followed by additional reductions in contractility





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- <https://www.khanacademy.org/science/health-and-medicine/circulatory-system/pressure-volume-loops/v/drawing-a-pressure-volume-loop>
 - Harvi.online

Vragen??



Ca^{2+}

