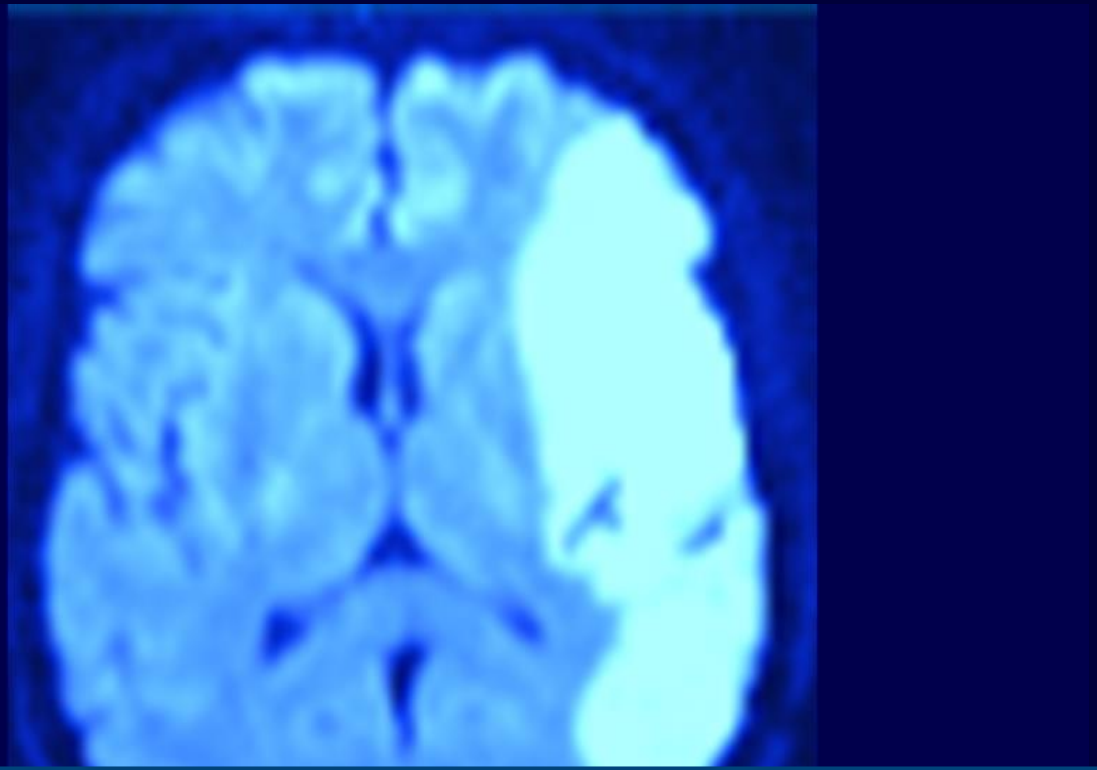
Stroke & TIA @ home: do’s & don'ts

Yves VANDERMEEREN MD, PhD

Neurology Department | Stroke Unit

Vignette clinique 1

- Patient de 87 ans
- Brutalement, troubles de la marche & hémiparésie
- Son fils téléphone au 112
- Réponse du 112 : *« Appelez votre MT »*
- Quelle attitude ?



Acute stroke management

Stroke epidemiology

World Stroke Organization

1 in 4

- **1 in 4 of us** will have a stroke in our lifetime
- Almost all strokes can be prevented
- The leading ***(1st)*** cause of lg-term disability
- **2nd** leading cause of death

In Belgium, every year

~25.000 stroke victims

BELGIAN STROKE COUNCIL

Acute stroke management

BELGIAN STROKE COUNCIL

<u>Jusqu'à preuve du contraire</u>, toute personne :

1. **qui présente un déficit neurologique brutal est victime d'un AVC**
2. **victime d'un AVC est candidate à la thrombolyse IV**
3. **victime d'un AVC est candidate à la thrombectomie**

Acute stroke management

Jusqu'à preuve du contraire, toute personne :

1. **qui présente un déficit neurologique brutal est victime d'un AVC …**

80%

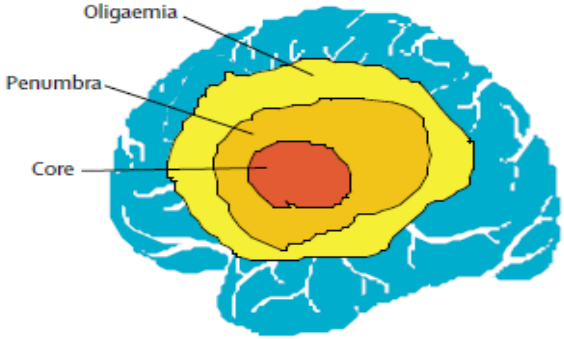
20%

Cliniquement impossible d'exclure formellement un AVC hémorragique

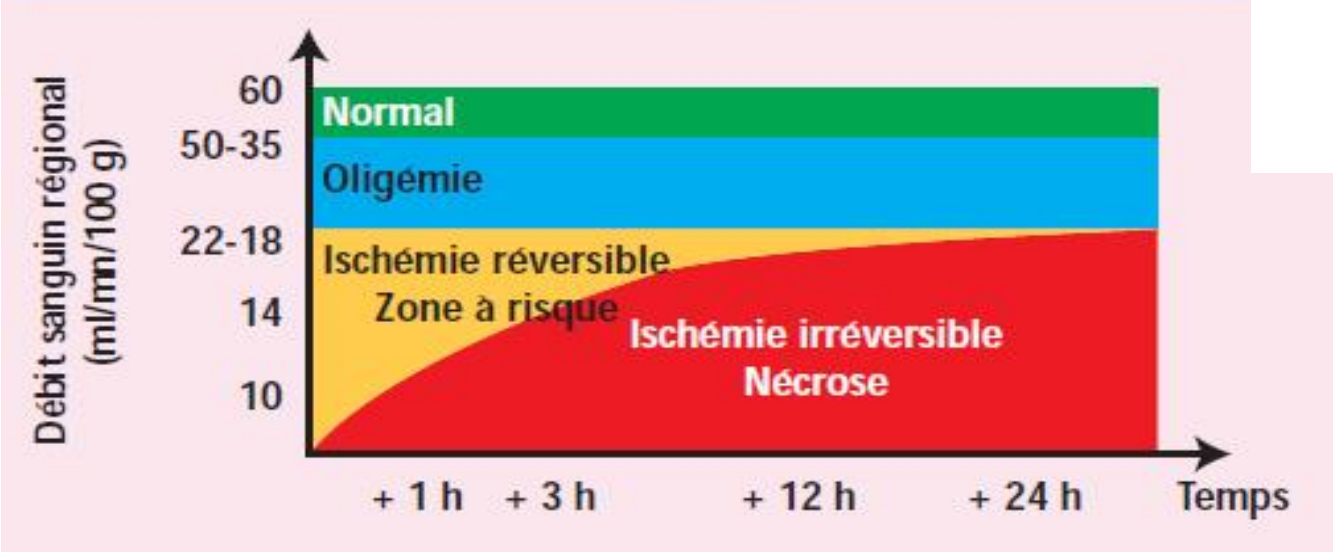
→ Imagerie cérébrale en urgence

Pathophysiology of ischemic stroke

Penumbra model



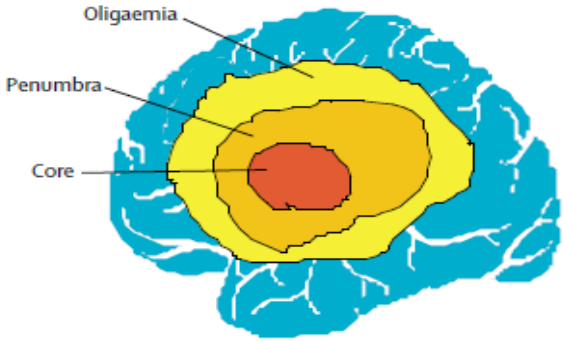
Muir et al., *Lancet Neurology* 2006;5;755-768



Nighoghossian,
Lett Neurol 2006;2;20-24

Pathophysiology of ischemic stroke

The mantra: time is brain



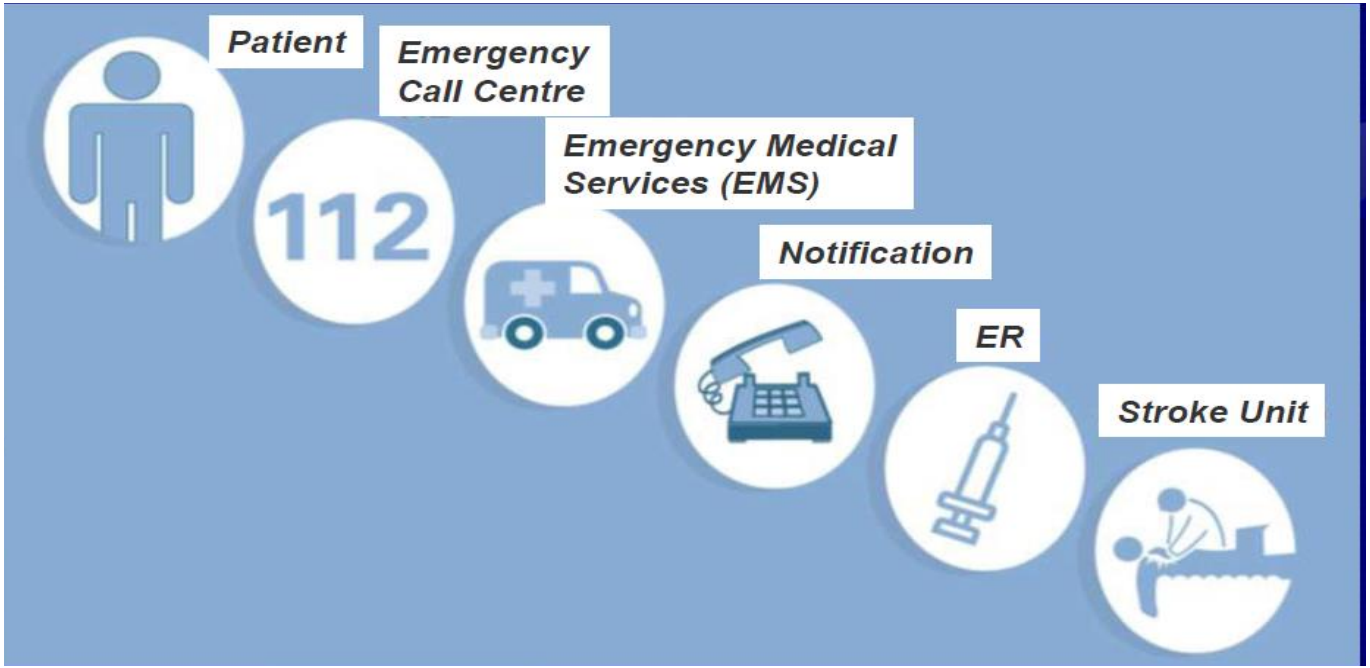
Estimated Pace of Neural Circuitry Loss in Typical Large Vessel, Supratentorial Acute Ischemic Stroke

	Neurons Lost	Synapses Lost	Myelinated Fibers Lost	Accelerated Aging
Per Stroke	1.2 billion	8.3 trillion	7140 km/4470 miles	36 y
Per Hour	120 million	830 billion	714 km/447 miles	3.6 y
Per Minute	1.9 million	14 billion	12 km/7.5 miles	3.1 wk
Per Second	32 000	230 million	200 meters/218 yards	8.7 h

Saver. *Stroke* 2006; 37: 263-266

Acute stroke management

Time is brain / chain of survival



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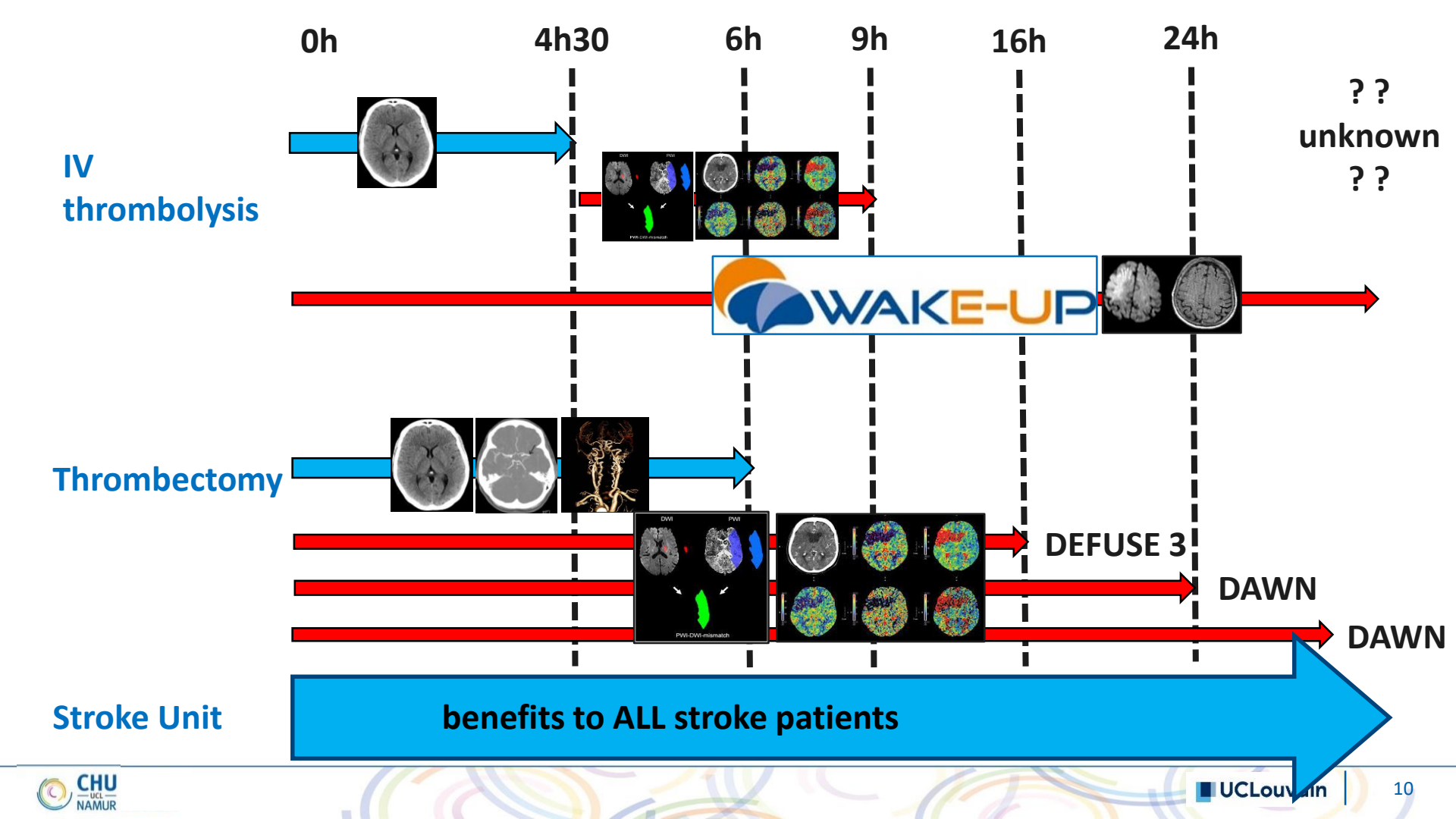

0h
4h30
6h
9h
16h
24h
? ?
unknown
? ?
IV thrombolysis
WAKE-UP
Thrombectomy
DEFUSE 3
DAWN
DAWN
Stroke Unit
benefits to ALL stroke patients

Pre-hospital acute stroke management

Referral and Patient Transfer

Guidelines for Management of Ischaemic Stroke and Transient Ischaemic Attack 2008

The European Stroke Organisation (ESO) E
ESO Writing Committee

Cerebrovasc Dis 2008;25:457–507
DOI: 10.1159/000131083

Recommendations 2008

- Transport without delay to the nearest medical centre with a **Stroke Unit** that can provide ultra-early treatment
- Dispatchers & ambulance personnel should be trained to recognise stroke ***(FAST)***
- Remote / rural areas → **helicopter** transfer / **tele-medecine** to be considered

ESO-EAN: pre-hospital management of stroke 2018

1. SaO_2 levels <95% → O_2 titrated to maintain normoxia	recommended
Routine use of O_2	**not** recommended
5. Pre-hospital treatment of **high blood pressure** in people suspected of acute stroke	**not** recommended
6. Pre-hospital administration of **insulin** in persons with suspected stroke & **hyperglycaemia**	**not** recommended
7. Pre-hospital treatment of **elevated body temperature**	**no** recommendation (?)

8. All EMS implement **a 'code stroke' protocol:** highest priority dispatch, **pre-hospital notification** & **rapid transfer** to the closest 'stroke-ready' centre

Kobayashi et al. *Eur J Neurol.* 2018, 25: 425–433

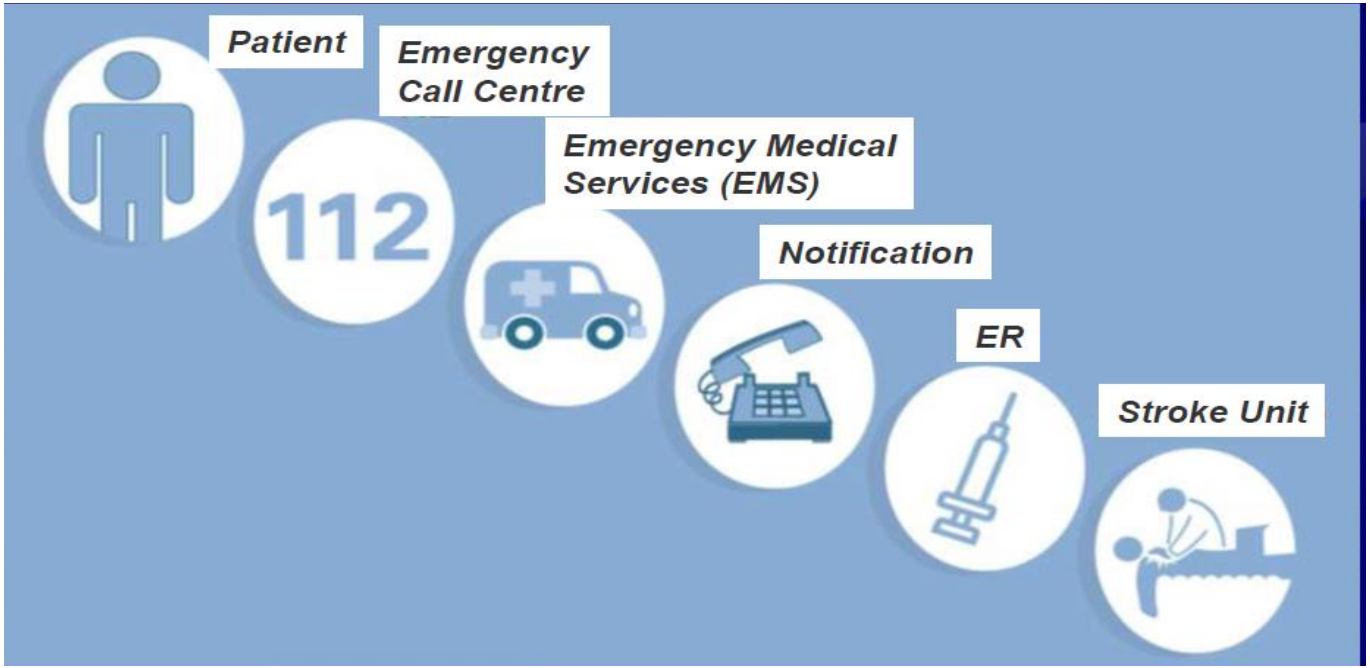
Pre-hospital acute stroke management

@ home, if stroke is the most likely diagnosis :

~~Aspirin (ASA)~~	haemorrhagic ? thrombolysis ?
~~Low molecular weight heparin~~	haemorrhagic ? thrombolysis ?
Paracetamol	if fever *(unlikely early)*
~~Blood pressure lowering drug~~	impaired cerebral hemodynamic
0° supine position (flat)	impaired cerebral hemodynamic *(→ 30°)*
Oxygen	if severe stroke
Anti-emetic	if needed

Acute stroke management

Time is brain / chain of survival



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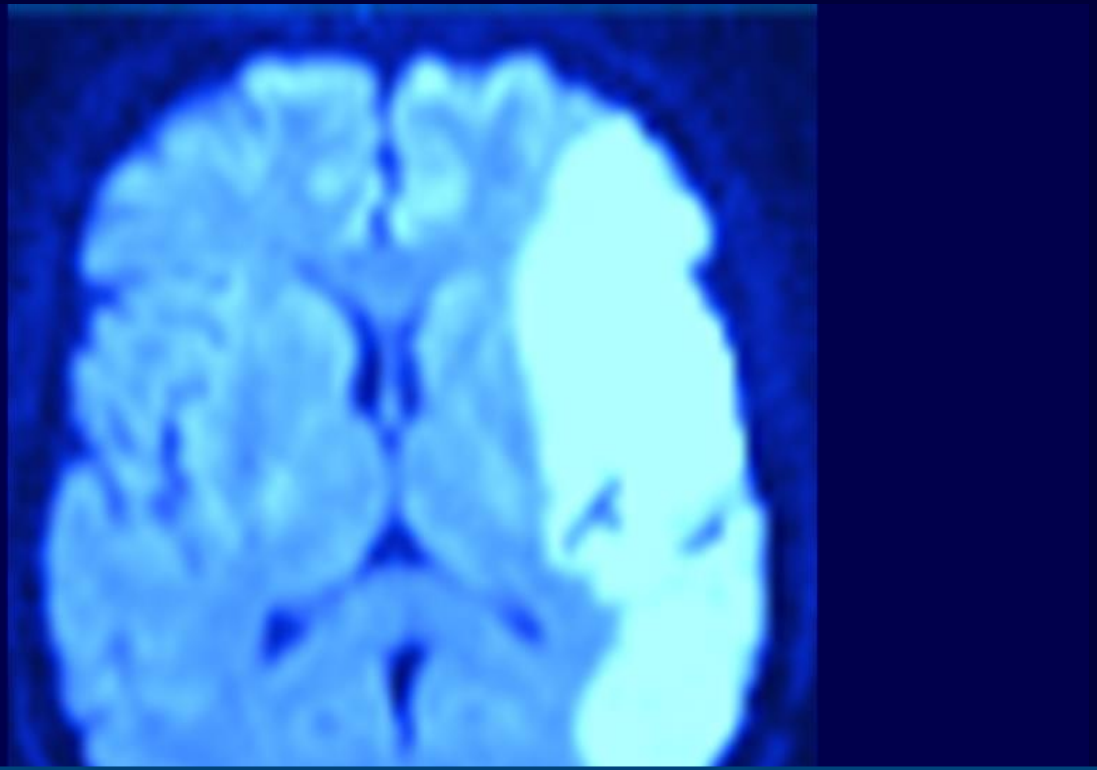
Vignette clinique 2

- Patiente de 87 ans
- Un épisode transitoire de confusion & d'aphasie **… il y a 15 j**
- Tout est rentré dans l'ordre depuis.
- Régulièrement suivie par le cardiologue.
- Bilan : biologie, CT-scan cérébral, écho-doppler vaisseaux du cou, consultation neuro.
- **15 j après** → Urgences pour déficit neuro avec perte de connaissance
- ... Nouvel AIT.



TIA management

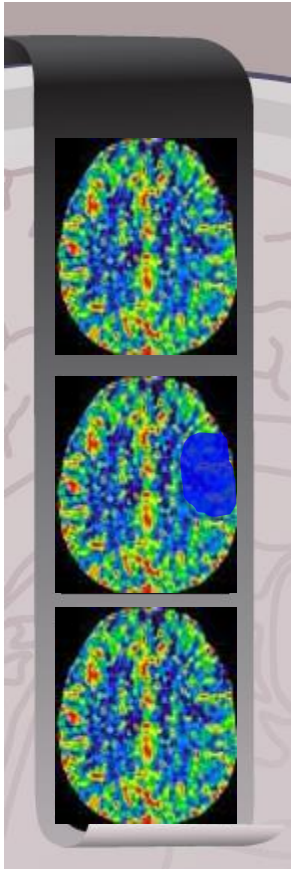
Cerebrovascular diseases: definitions

Transient ischemic attack *(TIA)*

AHA/ASA 2009 tissue-based definition:

- *"A transient episode of neurologic dysfunction caused by focal brain, spinal cord or retinal ischemia* ***without acute infarction****"*

- TIA is caused by a clot *(ischemic)*
- **Only ≠ with a stroke: the arterial blockage is transient *(temporary)***
- Most TIAs **< 5 min**, average **~1 min**
- NB. **"spells"** in cerebral amyloid angiopathy *(CAA)*



Cerebrovascular diseases: definitions

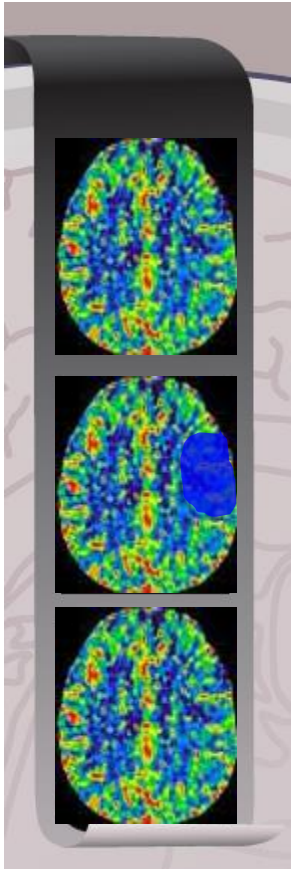
Transient ischemic attack *(TIA)*

AHA/ASA 2009 tissue-based definition:

- *"A transient episode of neurologic dysfunction caused by focal brain, spinal cord or retinal ischemia* ***without acute infarction****"*

- Even if the tissue-based definition is used,

  the diagnosis of TIA is still based on clinical grounds



TIA management

In ~25% of stroke patients, a TIA has preceded the stroke

Meta-analysis 14.889 patients, pooled stroke risk:

- @ 2 days **1,4%**
- @ 7 days **2 %**
- @ 30 days **2,8%**
- @ 90 days **3,4%**
- @ 1 year **12%**

Valls et al. *Cerebrovasc Dis.* 2017; 43: 90-98. doi: 10.1159/000452978.

TIA = emergency !

→ Quick management → Hospital: ER – Stroke Unit ?

→ ? TIA clinic ?

- Risk factors ?
- Etiology ?
- → 2ary prevention

Guideline

EUROPEAN STROKE JOURNAL

European Stroke Journal
2021, Vol. 6(2) CLXIII–CLXXXVI

DOI: 10.1177/2396987321992905
journals.sagepub.com/home/eso
SAGE

European Stroke Organisation (ESO) guidelines on management of transient ischaemic attack

Ana Catarina Fonseca[1,*], Áine Merwick[2,*], Martin Dennis[3], Julia Ferrari[4], José M Ferro[1], Peter Kelly[5], Avtar Lal[6], Angel Ois[7], Jean Marc Olivot[8] and Francisco Purroy[9]

ESO EUROPEAN STROKE ORGANISATION

https://eso-stroke.org/guidelines/eso-guideline-directory/

Table 1. Synoptic table of all recommendations and expert consensus statements.

Topic / PICO Question	Recommendations	Expert consensus statement
Services Organization 1.1: In patients suspected of TIA does stroke specialist review of the patient within 24 hours compared to more than 24 hours reduce TIA/stroke recurrence?	In patients with a TIA, we recommend specialist review of the patient within 24 hours after the onset of symptoms compared to assessment more than 24 hours after symptoms onset. Quality of evidence: Low ⊕⊕ Strength of recommendation: Strong for intervention ↑↑	
2.1: In patients suspected of TIA does stroke specialist review of the patient in a TIA clinic within 24 hours compared to conventional outpatient appointment more than 24 hours?	In patients with a TIA, we suggest specialist review in a TIA clinic within 24 hours over a conventional out-patient appointment more than 24 hours after the TIA. Quality of evidence: Low ⊕⊕ Strength of recommendation: Weak for intervention ↑?	
3.1: In patients suspected of high-risk TIA does stroke specialist review of the patient in a TIA clinic within 24 hours compared to hospitalization in a stroke unit reduce stroke recurrence risk?	There is insufficient evidence to provide a recommendation.	In patients suspected of high-risk TIA, 9/9 experts suggest that prompt review in a TIA clinic or hospitalization in a stroke unit are reasonable options as settings for evaluation by a stroke specialist, depending on local available resources and the patients' preferences, in the absence of evidence comparing each approach.
Risk prediction tools 4.1 In patients suspected of TIA does the use of risk prediction tools by primary care physicians compared to not using risk prediction tools reduce the risk of stroke recurrence, accurately identify high-risk patients, and improve diagnostic accuracy of TIA?	For patients with suspected TIA, we suggest not to use prediction tools alone to identify high risk patients/ make triage and treatment decisions. Quality of evidence: Very low ⊕ Strength of recommendation: Weak against intervention ↓?	
Imaging 5.1: For patients with suspected TIA does the use of MRI (DWI/PWI) or CT Perfusion vs standard CT alone decrease stroke recurrence by accurately identifying an ischaemic mechanism and therefore patients at high stroke risk?	There is insufficient evidence to provide a recommendation.	In suspected TIA patients, to confirm ischaemic pathophysiology of transient neurological symptoms, where it will influence treatment and /or there is diagnostic uncertainty, 8/9 experts suggest to use MR (multimodal) or CT perfusion, if feasible, instead of non-contrast CT.
6.1: In suspected TIA patients is the use of MR angiogram (MRA) compared to CT angiography (CTA) superior for identifying patients with large artery stenosis of 50% or greater and therefore patients with high risk of stroke recurrence?	In TIA patients, we suggest using either MRA or CTA for additional confirmation after ultrasound of large artery stenosis of 50% or greater, to guide further management. Quality of evidence: Very low ⊕ Strength of recommendation: Weak for intervention ↑?	
Secondary prevention 7.1: In patients with suspected acute TIA does "de novo" antiplatelet usage (prior to imaging) compared to delayed antiplatelet usage reduce stroke recurrence?	In patients suspected of TIA, if a wait of more than 24 hours to planned imaging is foreseen and a delay is judged to increase the risk of further ischaemic events, above the risk of starting antiplatelet medication, we suggest "de novo" antiplatelet monotherapy usage compared to not starting antiplatelet monotherapy. Quality of evidence: Low ⊕⊕ Strength of recommendation: Weak for intervention ↑?	
8.1: In patients with non-cardioembolic acute TIA does dual antiplatelet therapy (DAPT) compared to monotherapy reduce the risk of stroke recurrence?	In patients with acute non-cardioembolic high risk TIA (ABCD2 score of 4 or more), we recommend short term dual antiplatelet therapy with aspirin and clopidogrel over monotherapy, subsequently followed by monotherapy. Quality of evidence: High ⊕⊕⊕⊕ Strength of recommendation: Strong for intervention ↑↑	For patients with acute non-cardioembolic low risk TIA or uncertain TIA diagnosis, 9/9 experts voted against using dual antiplatelet therapy over monotherapy.

EUROPEAN STROKE JOURNAL

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2021, Vol. 6(2) CLXIII–CLXXXVI

DOI: 10.1177/2396987321992905
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ESO guidelines | TIA management

Recommendation

In patients with a TIA, we recommend specialist review of the patient within 24 hours after the onset of symptoms compared to assessment more than 24 hours after symptoms onset

Quality of evidence: Low ⊕⊕

Strength of recommendation: Strong for intervention ↑↑

...

Fonseca et al. *Eur Stroke J.* 2021; 6
doi: 10.1177/2396987321992905.

ESO guidelines | TIA management

Recommendation

In patients with a TIA, we recommend specialist review of the patient within 24 hours after the onset of symptoms compared to assessment more than 24 hours after symptoms onset

Quality of evidence: Low ⊕⊕

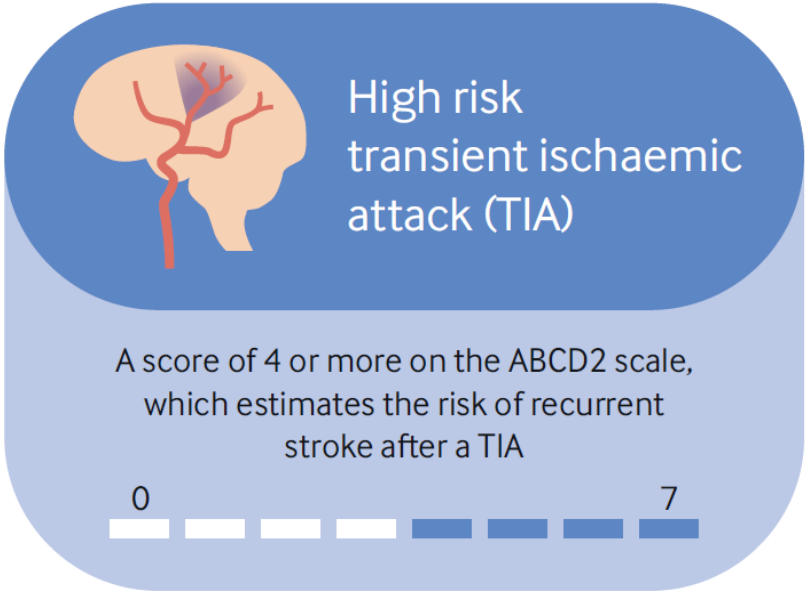
Strength of recommendation: Strong for intervention ↑↑

Fonseca et al. *Eur Stroke J.* 2021; 6
doi: 10.1177/2396987321992905.

ESO guidelines | TIA management

Dual antiplatelet therapy *(DAPT)*

ideally, within the first 24 h



Prasad et al.
BMJ 2018;363

- **Day 1 :** clopidogrel 300 mg **+** ASA 80 mg
- **Days 15-21** : clopidogrel 75 mg **+** ASA 80 mg
- **> 21 days :** clopidogrel ***OR*** ASA

ABCD²

A	**A**ge ≥ 60	1
B	s**B**P ≥ 140 mmHg d**B**P ≥ 90 mmHg	1
C	**C**linical : hemiparesis speech disturbance	2 1
D	**D**uration ≥ 60 min 10-59 min < 10 min	2 1 0
D	**D**iabetes	1

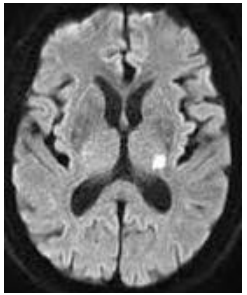
ESO guidelines | TIA management

Recommendation

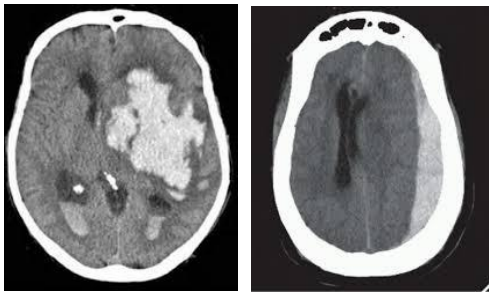
In patients suspected of TIA, if a wait of more than 24 hours to planned imaging is foreseen and a delay is judged to increase the risk of further ischaemic events, above the risk of starting antiplatelet medication, we suggest "de novo" antiplatelet monotherapy usage compared to not starting antiplatelet monotherapy.

Quality of evidence: Low ⊕⊕

Strength of recommendation: Weak for intervention ↑?



> ?



Fonseca et al. *Eur Stroke J.* 2021; 6
doi: 10.1177/2396987321992905.

Guidelines | TIA management

Impact of treatments

Treatment	Spared stroke
Antiplatelet drugs	**- 25%**
Antihypertensive drugs	**- 24%**
Statins	**- 17%**
Anticoagulation for AFib	**- 62%**
Thromboendarterectomy	**- 50%**

Guidelines | TIA management

1. Manage Blood Pressure
2. Control Cholesterol
3. Reduce Blood Sugar
4. Get Active
5. Eat Better
6. Lose Weight
7. Stop Smoking

AMERICAN HEART ASSOCIATION JOURNALS

2020 AHA STATISTICAL UPDATE
Heart Disease & Stroke Statistics - 2020 Update
Circulation. 2020;141:e139-e596.

Guidelines | TIA management

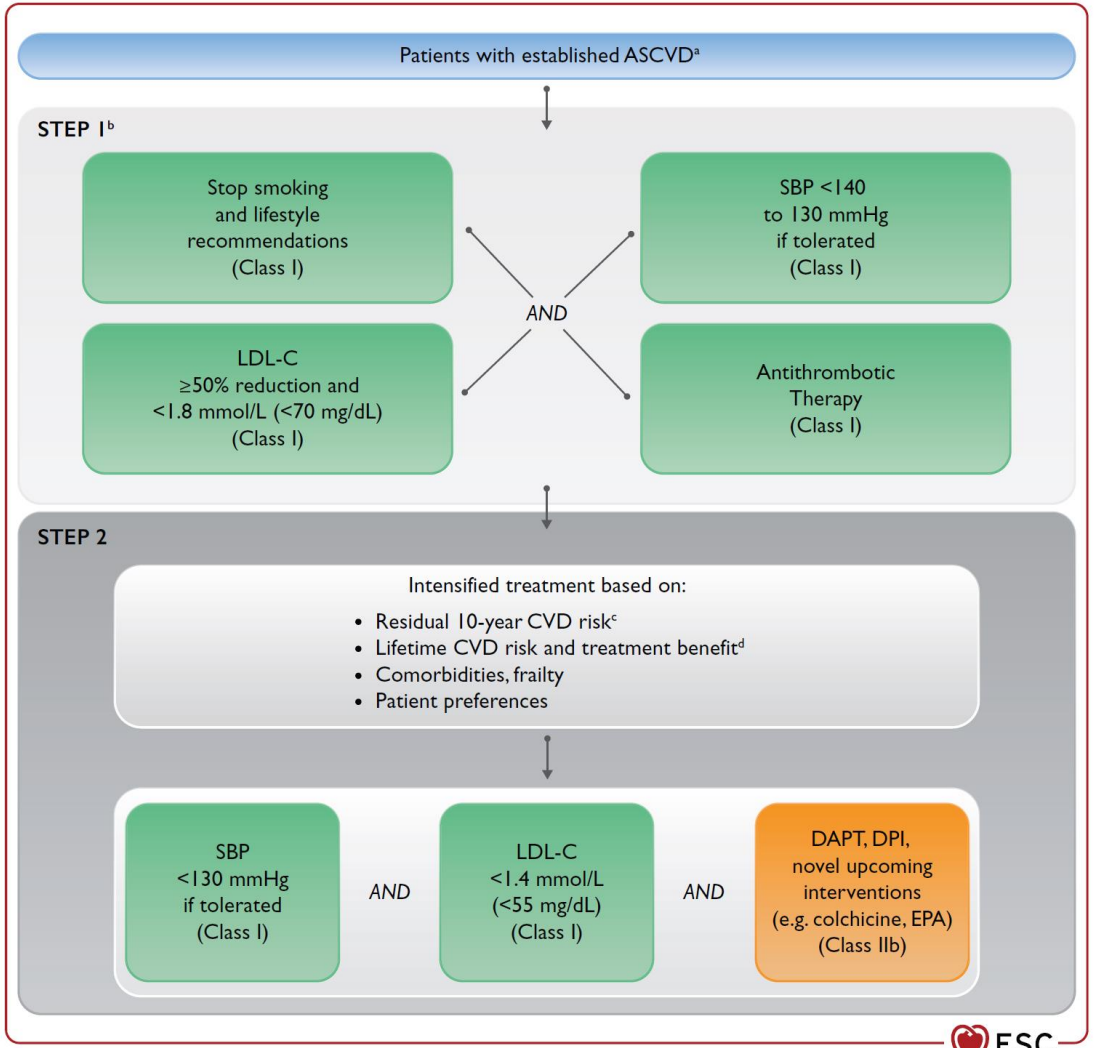
ESC European Society of Cardiology
European Heart Journal (2021) 00, 1–111
doi:10.1093/eurheartj/ehab484

ESC GUIDELINES

2021 ESC Guidelines on cardiovascular disease prevention in clinical practice

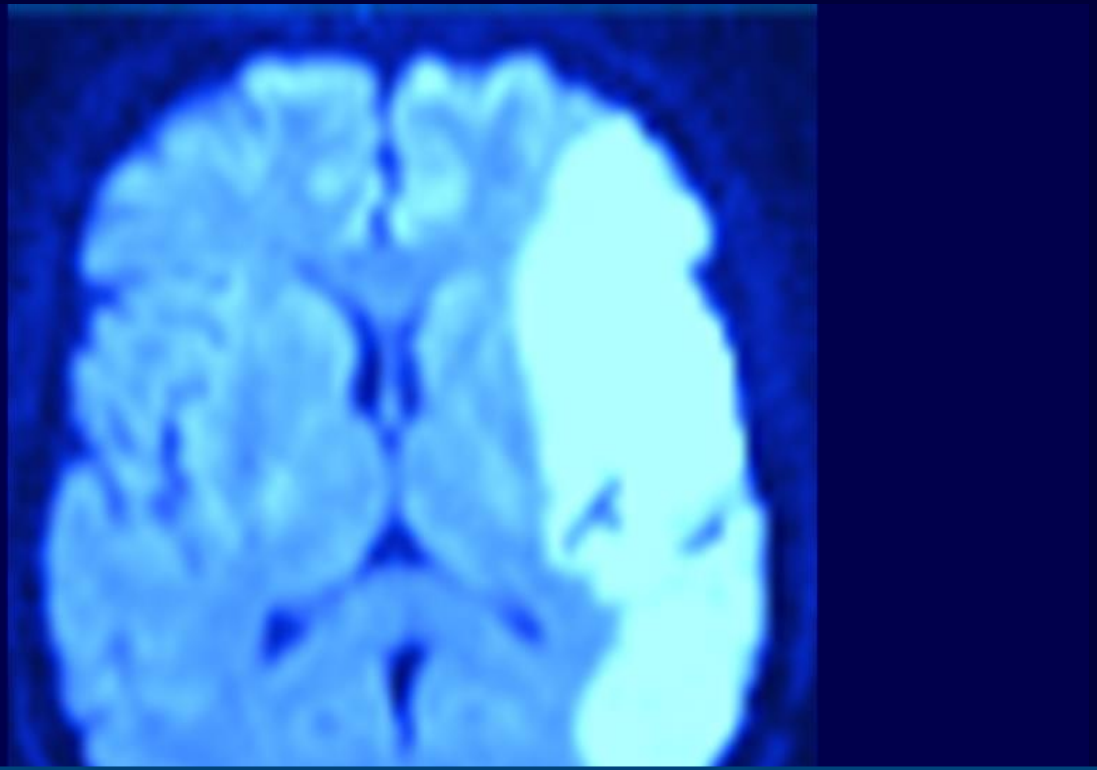
Developed by the Task Force for cardiovascular disease prevention in clinical practice with representatives of the European Society of Cardiology and 12 medical societies

With the special contribution of the European Association of Preventive Cardiology (EAPC)



CHU UCL NAMUR

ESC



Conclusion

Conclusions

1. **Déficit neurologique brusque faisant suspecter un AVC :**
   - Que faire ? → appeler le **112** / stabiliser le patient *(voies respiratoires)*
     → **Stroke Unit**
   - Que **NE PAS** faire ? → ~~antiagrégant plaquettaire~~, ~~héparine~~, ~~anti-hypertenseur~~

2. **Déficit neurologique d'une durée de qlqs min = AIT :**
   - Bilan, quel délai ? → **le + court possible !** **< 24 h**
     → Stroke Unit / TIA clinic

3. **Déficit neurologique d'une durée de qlqs min = AIT … il y a 15 jours :**
   - Bilan, quel délai ? → **le + court possible !** ... urgence relative ...
     → ? Antiagrégant plaquettaire ?

Merci pour votre attention

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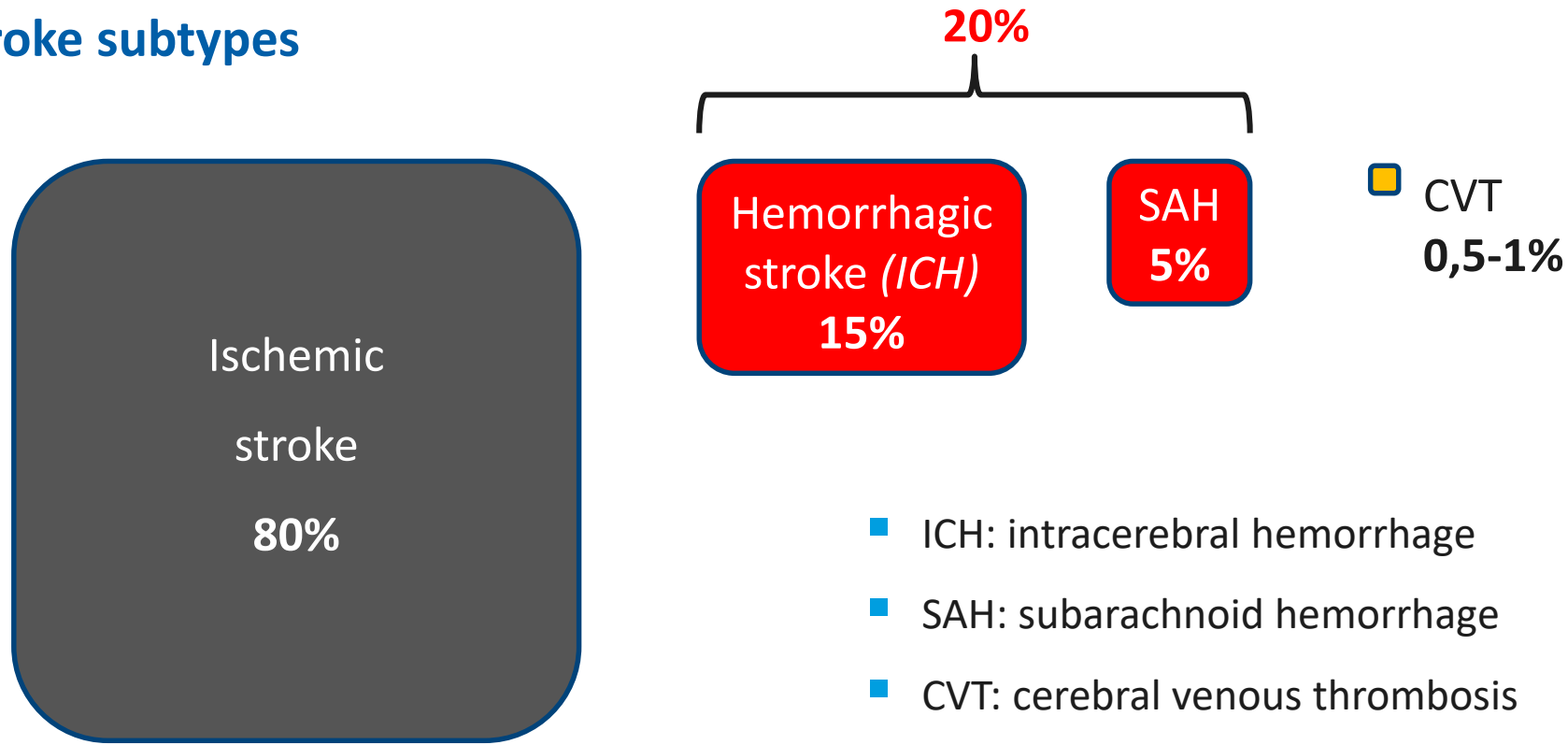
Stroke & TIA @ home: do’s & don'ts

Yves VANDERMEEREN MD, PhD

Neurology Department | Stroke Unit

Cerebrovascular diseases: definitions

Stroke subtypes



- ICH: intracerebral hemorrhage
- SAH: subarachnoid hemorrhage
- CVT: cerebral venous thrombosis

Pre-hospital acute stroke management

ESO-EAN Practical guidance for pre-hospital management of stroke 2018

1. Educational campaigns to increase the awareness of immediately calling EMS for people with suspected stroke are recommended.

2. It is recommended that all EMS technicians & paramedics are familiar with a simple pre-hospital stroke scale to identify potential stroke patients.

3. There is insufficient evidence to recommend a pre-hospital stroke scale to predict large vessel occlusion.

4. In patients with **SaO_2 levels <95%** the administration of O_2 titrated to maintain normoxia is recommended.

   Routine use of O_2 is **not** recommended.

Kobayashi et al. *Eur J Neurol.* 2018, 25: 425–433

Pre-hospital acute stroke management

ESO-EAN Practical guidance for pre-hospital management of stroke 2018

5. **Pre-hospital treatment of high blood pressure** in people suspected of acute stroke is **not** recommended.

6. Because of safety concerns pre-hospital administration of **insulin** in persons with suspected stroke and hyperglycaemia is **not** recommended.

7. In the absence of clinical studies **no** recommendations can be made on pre-hospital interventions for lowering **elevated body temperature**.

8. It is recommended that all EMS implement **a 'code stroke' protocol,** including highest priority dispatch, **pre-hospital notification** & **rapid transfer** to the closest 'stroke-ready' centre.

Kobayashi et al. *Eur J Neurol.* 2018, 25: 425–433

Pre-hospital acute stroke management

ESO-EAN Practical guidance for pre-hospital management of stroke 2018

9. **No** recommendation on the additional value of **pre-hospital telemedicine** can be made.

10. The routine use of **mobile emergency stroke units** is **not** recommended because there is insufficient evidence that they lead to a better functional outcome.

11. **No** recommendation can be made on the **pre-hospital use of POC laboratory** analysis of blood count & INR.

12. **No** recommendation can be made on the use of currently available **biomarkers** in persons with a suspected stroke.

Kobayashi et al. *Eur J Neurol.* 2018, 25: 425–433

Pre-hospital acute stroke management

Jusqu'à preuve du contraire, toute personne :

1. ***avec un déficit neurologique brutal subit un AVC***

→ ***Pré-notification : appeler la Salle d'Urgence***

- **NOM + PRENOM + date de naissance ?**
- Médicaments antiagrégants/coagulants ?
- **Heure de l'AVC ?** **…H… ?**
  (début des symptômes)
- *Vu bien pour la dernière fois à …H… ?*
- *Retrouvé symptomatique à …H… ?*
- **Arrivée estimée à …H… ?**

TIA management

- In ~25% of stroke patients, a TIA has preceded the stroke
- Meta-analysis 14.889 patients, pooled stroke risk:
  - @ 2 days **1,36% *(95% CI 1.15-1.59)***
  - @ 7 days **2,06% *(95% CI 1.83-2.33)***
  - @ 30 days **2,78% *(95% CI 2.47-3.12)***
  - @ 90 days **3,42% *(95% CI 3.14-3.74)***
  - @ 1 year **12%**

Valls et al. *Cerebrovasc Dis.* 2017;43(1-2):90-98. doi: 10.1159/000452978.

TIA = an emergency !

→ **quick management** → Hospital: ER – Stroke Unit ?

→ ? TIA clinic ?

- Risk factors ?
- Etiology ?
- 2^{ary} prevention

TIA management

Cohorts > 10.000 TIA → stroke risk =

- @ 2 days **3%**
- @ 7 days **5%**
- @ 1 year **12%**

Risk of stroke early after transient ischaemic attack: a systematic review and meta-analysis

Matthew F Giles, Peter M Rothwell

Lancet Neurol 2007; 6: 1063–72

TIA = an emergency !

→ quick management → Hospital: ER – Stroke Unit ?

→ ? TIA clinic ?

- Risk factors ?
- Etiology ?
- 2^{ary} prevention

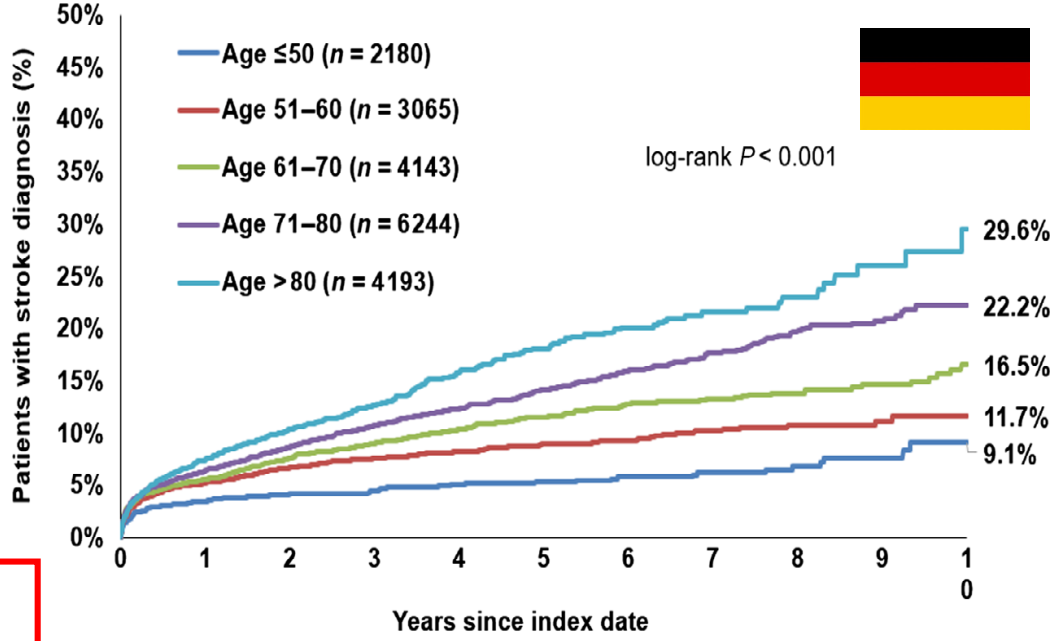
TIA management

- Cohort of 19.824 TIA patients
- **18,3%** diagnosed with stroke within 10 years after TIA index event
- ↔ Age, male sex, hypertension, diabetes mellitus, ischemic heart diseases

TIA = an emergency !

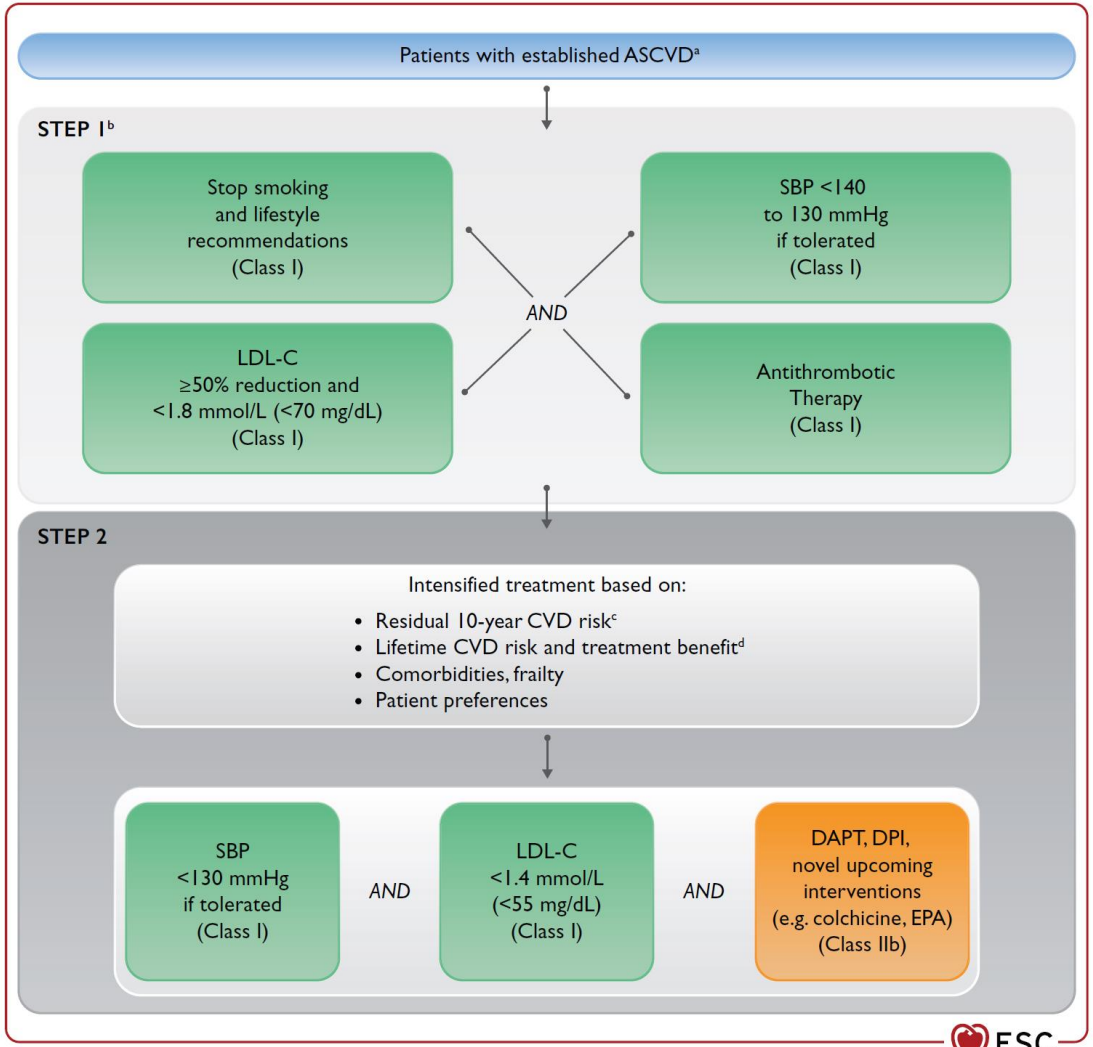
→ quick management → hospital ?

→ ? TIA clinic ?



Jacob et al., *European J of Neurology* 2020, 27: 723–728

Guidelines | TIA management



stroke / TIA : 2ary prevention

statin

RÉSUMÉ DES RECOMMANDATIONS 2019 DE L'ESC/EAS POUR LA PRISE EN CHARGE DES DYSLIPIDÉMIES

ÉVALUATION DES RISQUES	TRÈS HAUT RISQUE	HAUT RISQUE	RISQUE MODÉRÉ	RISQUE FAIBLE
Historique Cardio-vasculaire	MCVAS (clinique/imagerie)			-
Diabète	• Atteinte d'organe (microalbuminurie, rétinopathie ou neuropathie) • Avec ≥ 3 facteurs de risque majeurs ***ou*** • DT1 depuis > 20 ans	• Sans atteinte d'organe • Avec ≥ 1 facteur de risque ***ou*** • Depuis ≥ 10 ans (DT1 ou DT2)	Patients jeunes • DT1 < 35 ans • DT2 < 50 ans avec durée du diabète < 10 ans sans autres facteurs de risque	-
Fonction rénale	eGFR < 30 mL/min/1,73m²	eGFR 30-59 mL/min/1,73m²	-	-
Facteur hérité	HF & MCVAS ou un autre facteur de risque majeur	HF sans autres facteurs de risque majeur	-	-
Facteurs de risque isolés	-	• PA > 180/110 mmHg ***ou*** • CT > 310 mg/dL ***ou*** • LDL-C > 190 mg/dL	-	-
SCORE *Risque CV fatal sur 10 ans*	≥ 10%	≥ 5% et < 10%	≥ 1% et < 5%	< 1%
1ère CIBLE **LDL-C**	**< 40** mg/dL ÉVÈNEMENT RECURRENT**	**< 55** mg/dL ET ≥ **50% réduction***	**< 70** mg/dL ET ≥ **50% réduction***	**< 100** mg/dL	**< 116** mg/dL
2ème CIBLE Non-HDL-C	**< 85** mg/dL	**< 100** mg/dL	**< 130** mg/dL	
ou ApoB	**< 65** mg/dL	**< 80** mg/dL	**< 100** mg/dL	
Intervention	1. **Changement de mode de vie ET statine de haute intensité** 2. **ÉZÉTIMIBE**/fibrate (↑TG) 3. **Inhibiteur PCSK9** Les taux de lipides doivent être réévalués 4 à 6 semaines après le SCA.	1. **Changement de mode de vie** 2. **Statine de haute intensité** 3. **ÉZÉTIMIBE**/fibrate (↑TG)	1. **Changement de mode de vie** 2. **Statine**	**Conseils de style de vie**

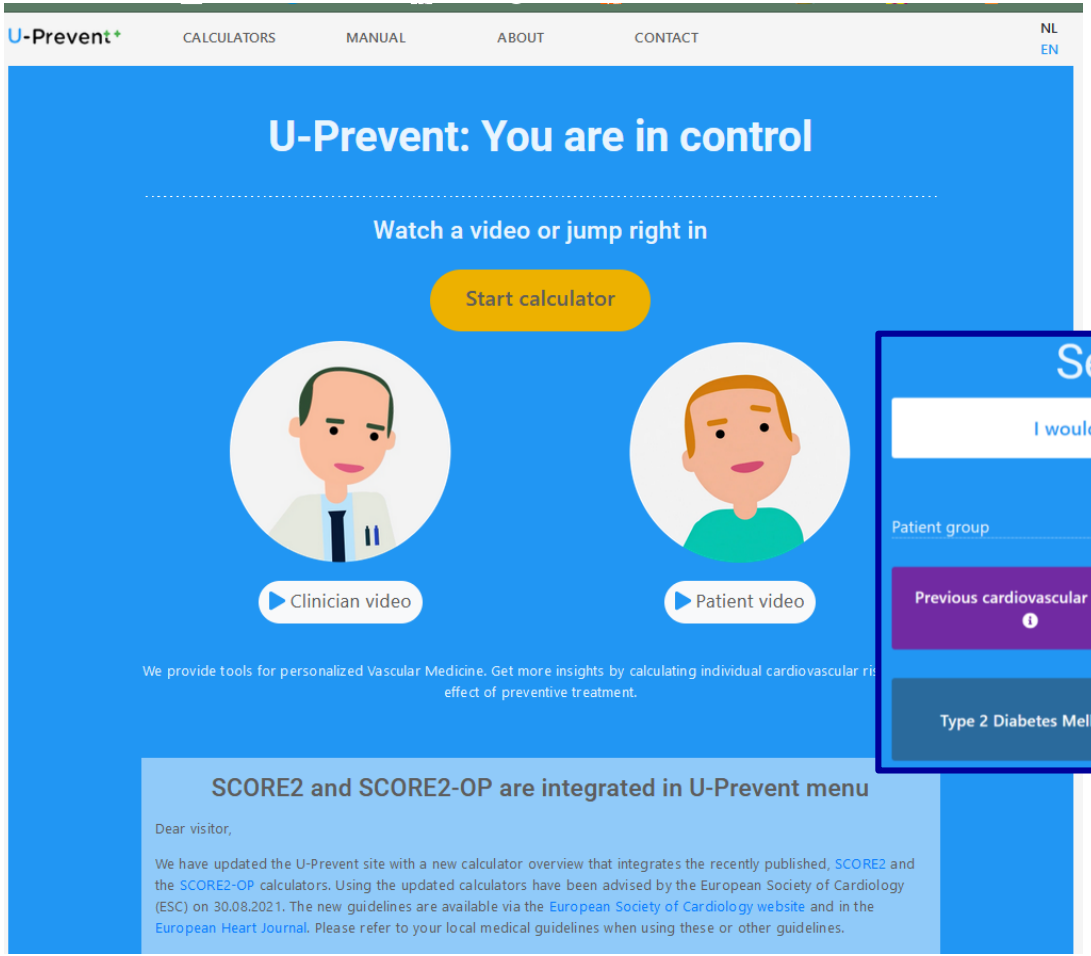
SABE.ZEN.20.01.0025

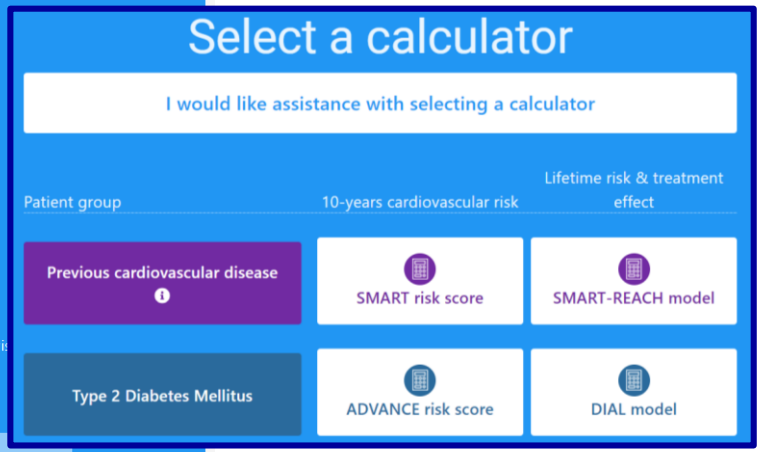
* par rapport à la valeur non-traitée. / ** MCVAS avec 2ème événement vasculaire < 2 ans.
MCVAS: maladie cardiovasculaire athéroscléreuse.

Réalisé par Sanofi en collaboration avec Prof O. Descamps, JAN 2020.

CHU UCL NAMUR

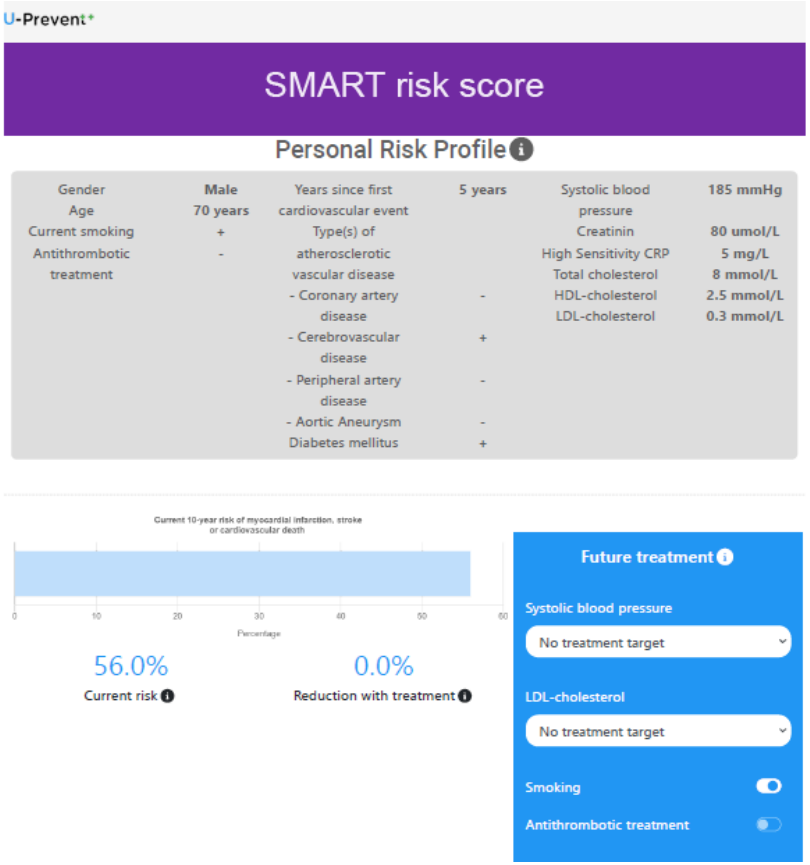
stroke / TIA : 2ary preve ntion





www.u-prevent.com

stroke / TIA : 2^{ary} prevention



stroke / TIA : 2ary prevention

U-Prevent+

SMART risk score

Personal Risk Profile

Gender	**Male**	Years since first cardiovascular event	**5 years**	Systolic blood pressure	**185 mmHg**
Age	**70 years**	Type(s) of atherosclerotic vascular disease		Creatinin	**80 umol/L**
Current smoking	+	- Coronary artery disease	-	High Sensitivity CRP	**5 mg/L**
Antithrombotic treatment	-	- Cerebrovascular disease	+	Total cholesterol	**8 mmol/L**
		- Peripheral artery disease	-	HDL-cholesterol	**2.5 mmol/L**
		- Aortic Aneurysm	-	LDL-cholesterol	**0.3 mmol/L**
		Diabetes mellitus	+		

56.0%
Current risk

0.0%
Reduction with treatment

Future treatment

Systolic blood pressure: No treatment target

LDL-cholesterol: No treatment target

Smoking

Antithrombotic treatment

U-Prevent+

SMART risk score

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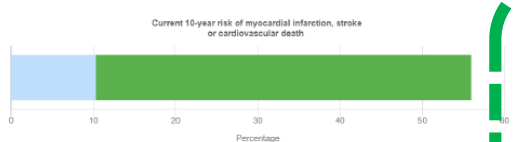
		Diabetes mellitus	+		



56.0%
Current risk

45.7%
Reduction with treatment

2
10-years NNT

Future treatment

Systolic blood pressure: < 120 mmHg

LDL-cholesterol: < 1.0 mmol/L / < 39 mg/dL

Smoking

Antithrombotic treatment