

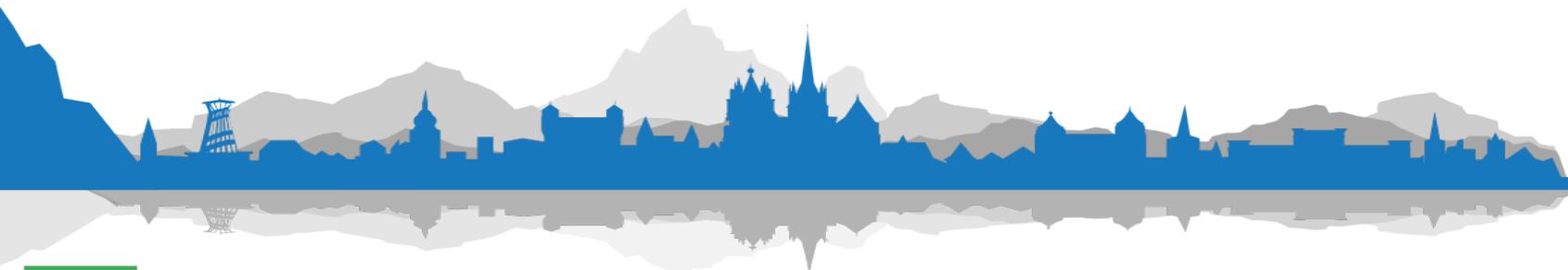
28 septembre 2023

Leçons pratiques apprises des registres AVC: pronostic, séquelles et récurrences

Dr. Davide Strambo

Médecin hospitalier

Service de Neurologie



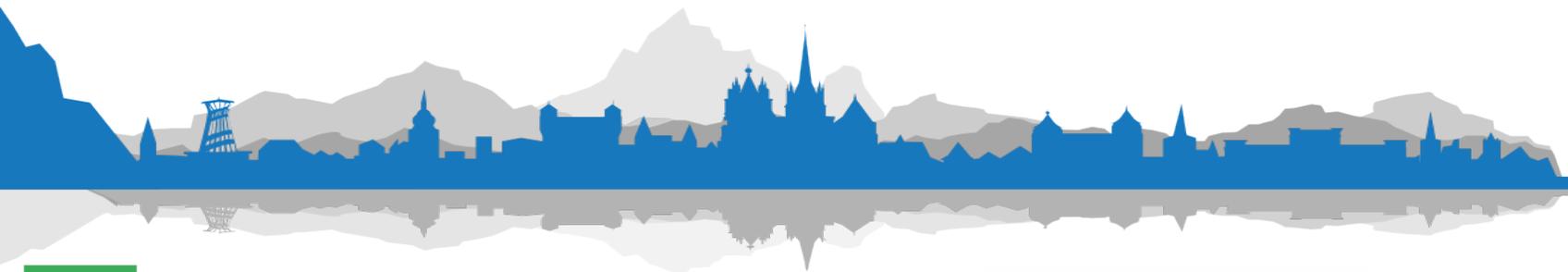
Presentation outline

- Predicting stroke prognosis
 - In any stroke
 - In specific situations
 - The role of acute imaging modality

- Recurrences
 - After TIA
 - After any stroke



Predicting patients' prognosis

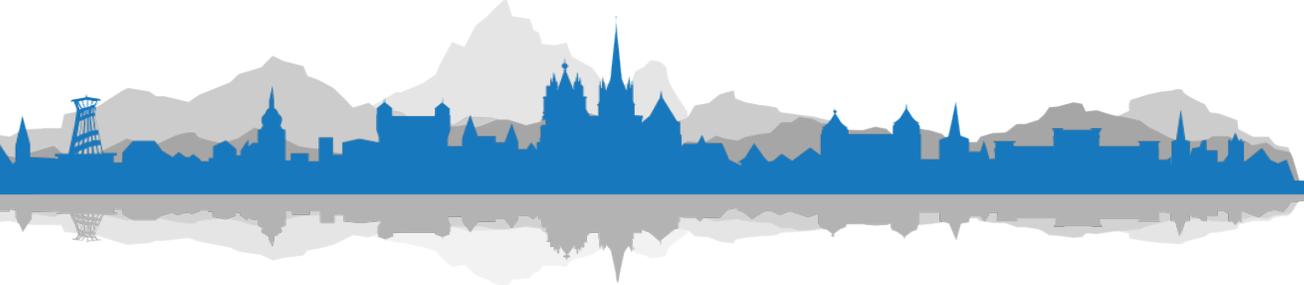




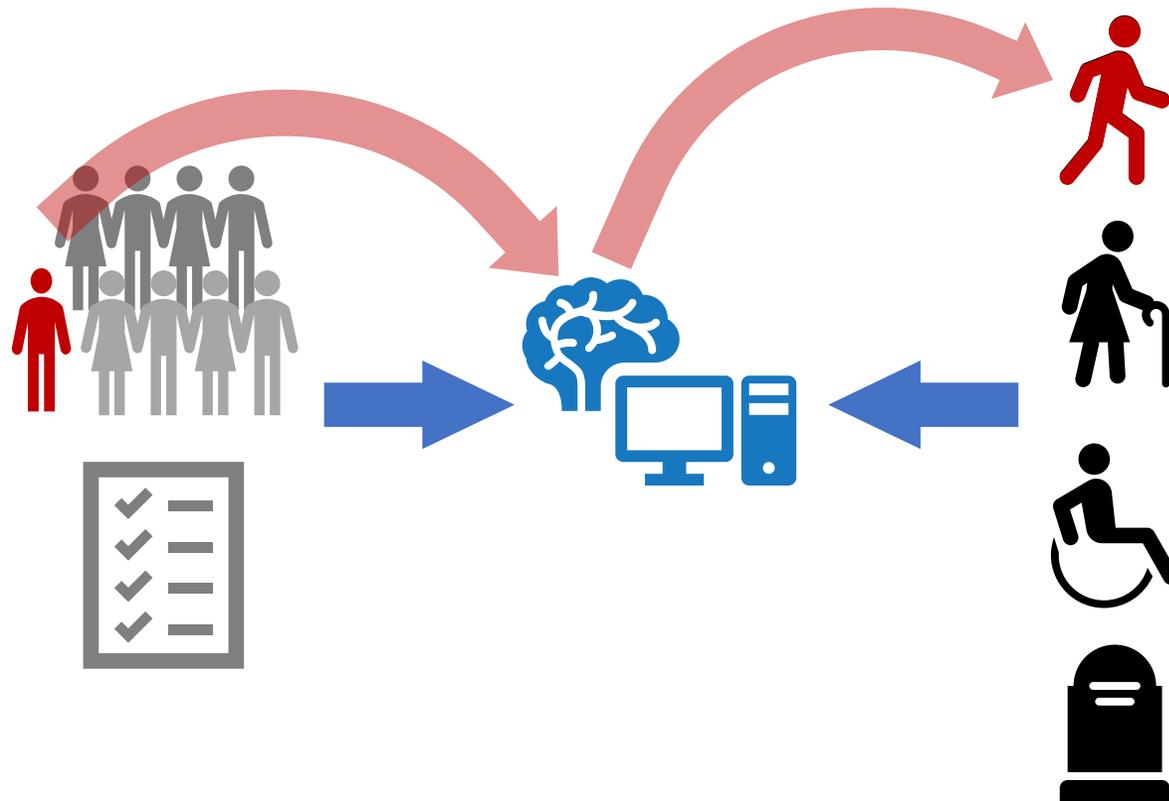
Predicting patients' prognosis after stroke: why?

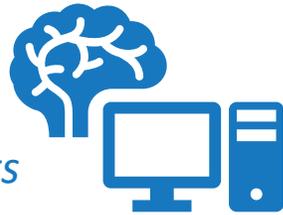
- Patients and family information
- Treatment decision and planning
- Patients' selection for clinical trials





Predicting patients' prognosis after stroke: how?



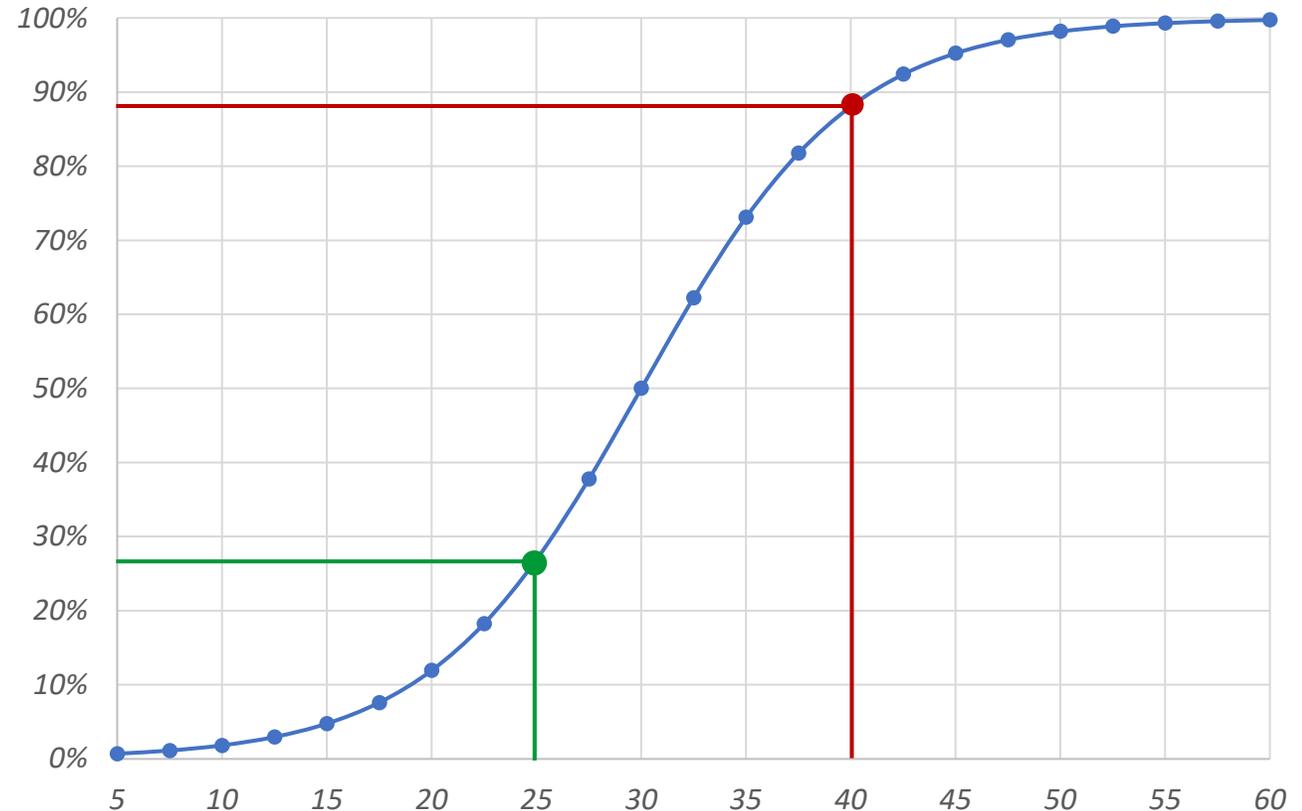


n=1'645 previously independent patients

The ~~ASTRA~~ score

Variable	Points	
Age: for every 5 years	1	12
Severity: for every NIHSS point	1	20
Time delay from onset to admission > 3 h	2	2
Range of visual field defect	2	0
Acute glucose >7.3 or <3.7 mmol/l	1	0
Level of consciousness decreased	3	0
		25

Probability of dependency (mRS >2) at 3 months



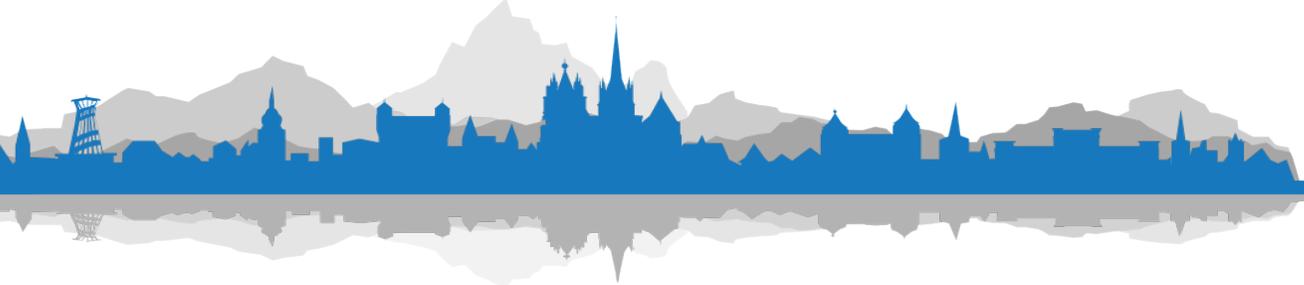
79 yo, NIHSS 20, admission at 5h, hemianopia, glucose 8.0, normal vigilance

60 yo (12p), NIHSS 11, admission at 6h, VF normal, glucose 7.0, normal vigilance

The ~~ASTRA~~ score

- Uses readily available information in the emergency room
- In the derivation cohort: $AUC= 0.85$
- Good external validation
 - Athens (n= 1'701), Vienna (n= 1'871)
 - China National Stroke Registry (n= 3'755)
 - $AUC= 0.79-0.90$





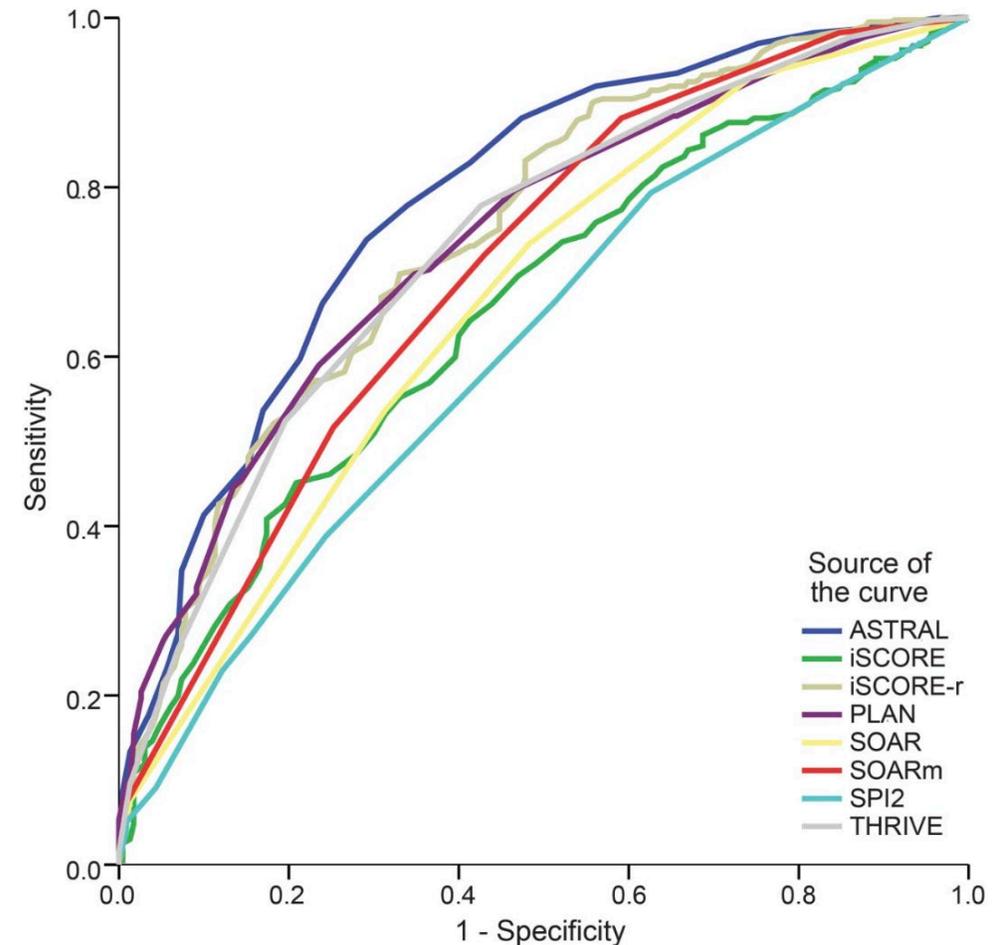
Other prognostic scores



- ASTRAL
- iSCORE/iSCORE-r (Canadian Stroke Network, n=12'686)
- PLAN (Canadian Stroke Network, n=9'847)
- SOAR/SOARm (Anglia Stroke and Heart Clinical Network, n=1002)
- SPI-2 (RCTs populations, n~600)
- THRIVE (MERCIEVT trial, n=305)

ASTRAL vs. other prognostic scores

- ASTRAL score does better than the other scores
- Scores do better than doctors :
 - Major disability correctly predicted in 86% vs. 57% of cases
- «Even the best performing scale had prognostic accuracy not sufficient as a basis for clinical decision-making»



~~ASTRAL~~ score plus neuroimaging data

Variable

Odds Ratio

Significant arterial pathology



1.49 (1.08-2.05)

AUC 0.849 vs. 0.850

ASPECTS ≤ 5

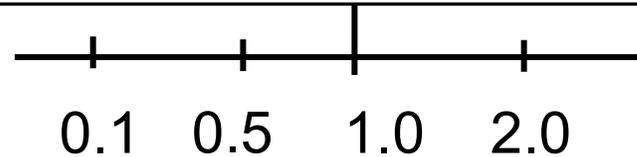


1.95 (1.21-3.12)

AUC 0.857 vs. 0.856

Neuroimaging parameters are independent predictors of worse outcome

Their addition to ASTRAL score does not improve outcome prediction

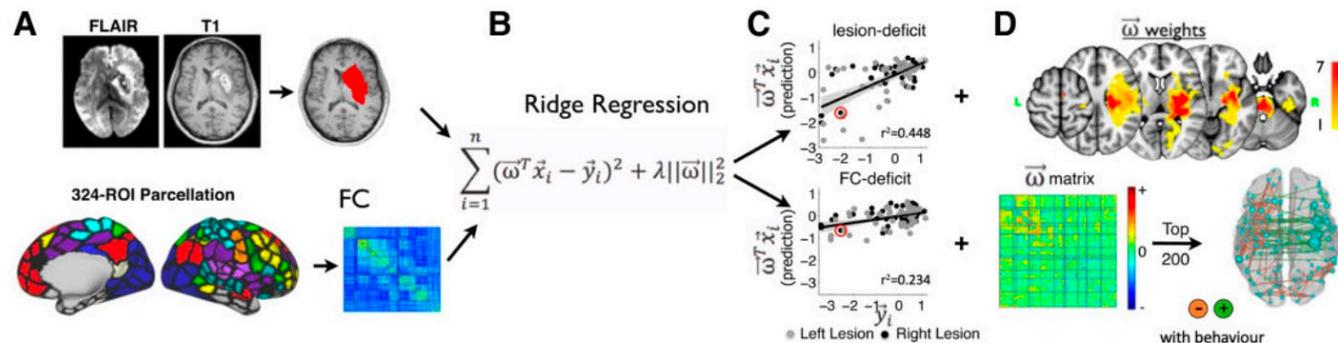


Better outcome \leftarrow

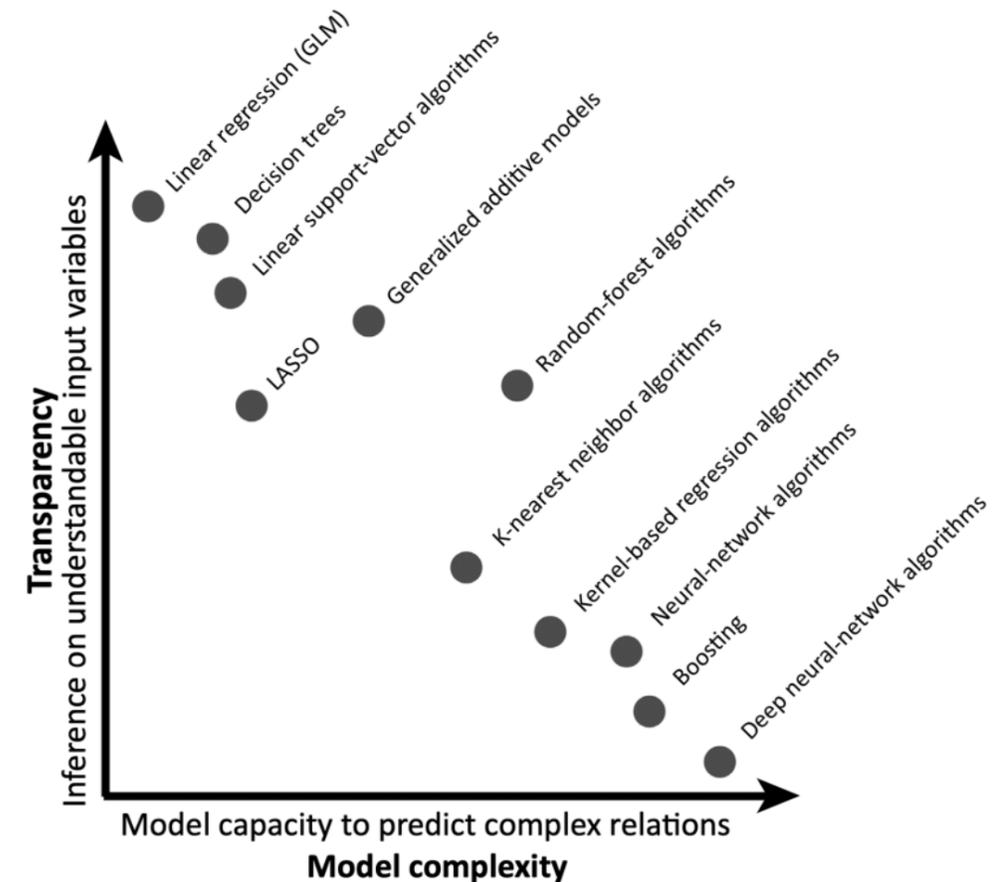
\rightarrow Worse outcome

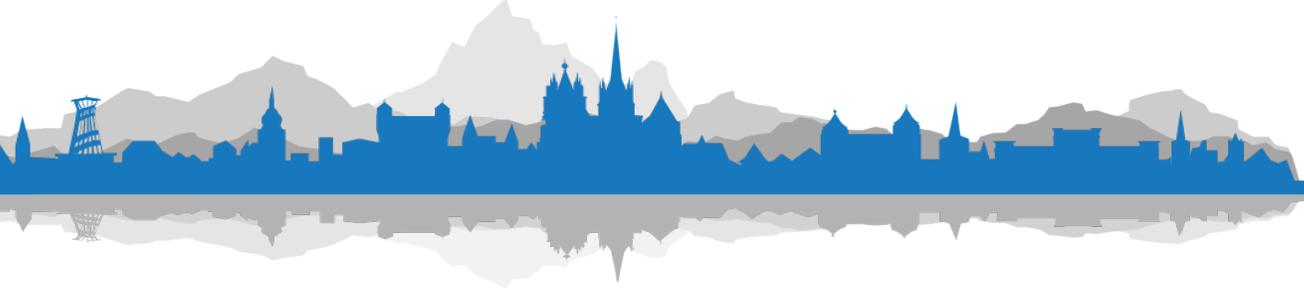
Future directions

- Use more complex models (machine learning)
- Integrate in the models:
 - Neuroimaging



- Biomarkers





Predicting patients' prognosis

- Several existing prognostic models
- Still limited use in clinical practice
 - Too complex / information not always available
 - Good prediction performance but still not sufficiently accurate
 - Not relevant for treatment decision
 - More sophisticated model in the future
- Heterogeneous population → Prognosis in specific situations

Posterior circulation stroke

ASTRAL score

Variable	Points
Age: for every 5 years	1
Severity: for every NIHSS point	1
Time delay from onset to admission > 3 h	2
Range of visual field defect	2
Acute glucose >7.3 or <3.7 mmol/l	1
Level of consciousness decreased	3

AUC 0.85

pc-ASTRAL score

Variable	Points
Age: for every 10 years	1
Severity: for every NIHSS point	1
Pre stroke disability (mRS >0)	4
Early ischemic signs on first imaging	2
Leukoaraiosis	2
Large vessels occlusion	3
Acute glucose per 1 mmol/l increase	1

AUC 0.86

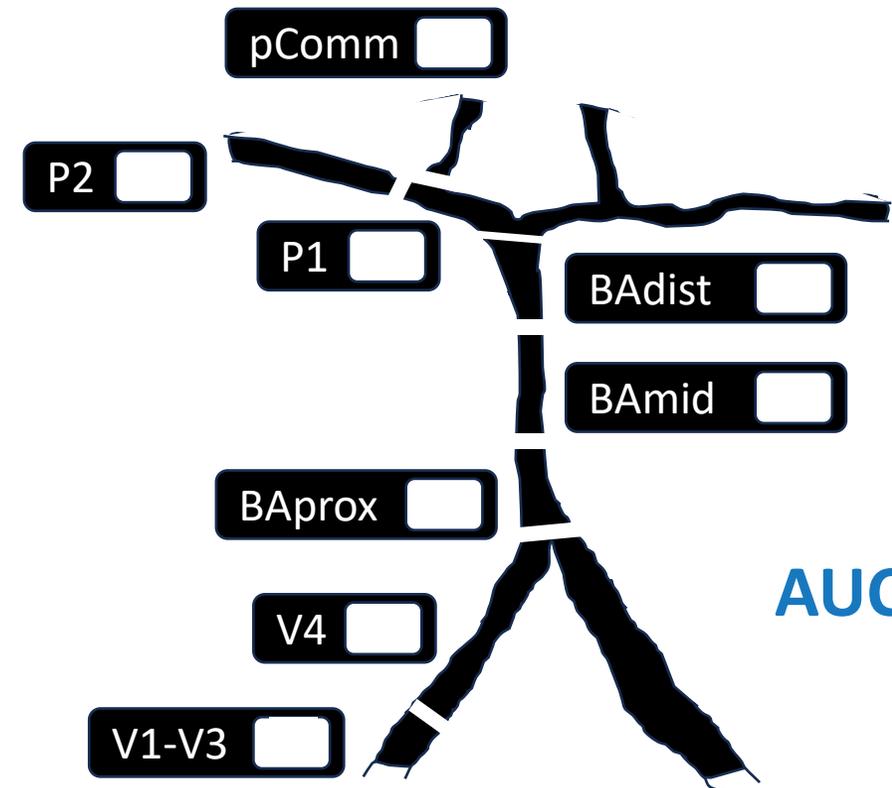
Arterial occlusion in the posterior circulation

Anterior circulation



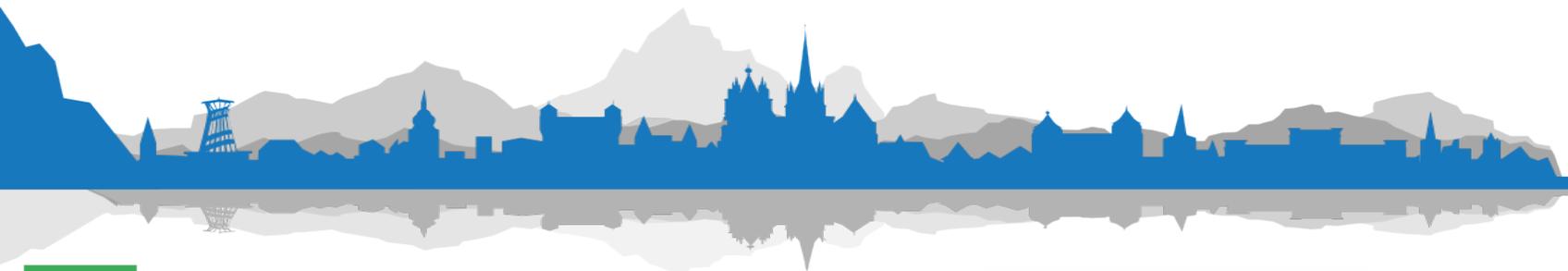
Puetz et al. Int J Stroke 2008

Posterior circulation



AUC=0.69

Acute imaging modality and stroke prognosis



Acute CT modality (multimodal vs. plain CT) in any stroke

Outcome

Odds Ratio

Independency at 3 months

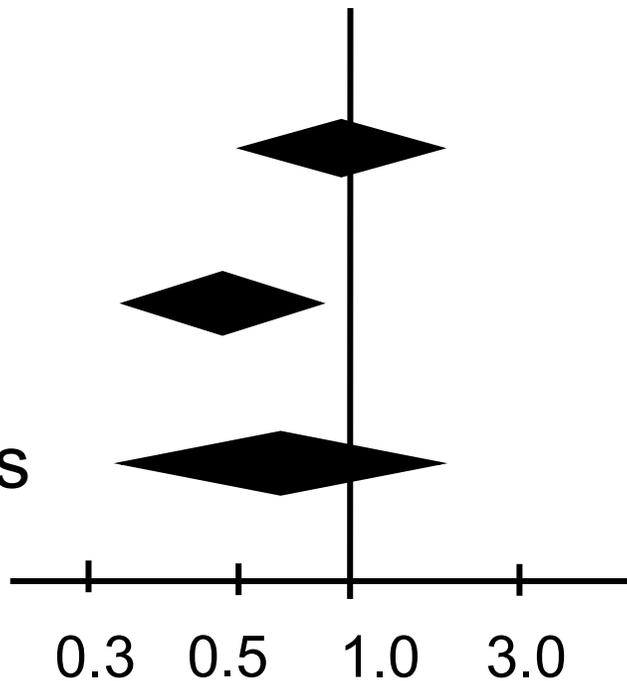
0.97 (0.64-1.45)

12-month mortality

0.48 (0.35-0.67)

12-month stroke recurrences

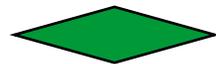
0.74 (0.33-1.25)



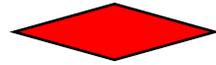
Multimodal CT better ← → *Plain CT better*

MRI vs. CT

Odds ratio of good functional outcome

 **ASTRAL**

n = 2'972

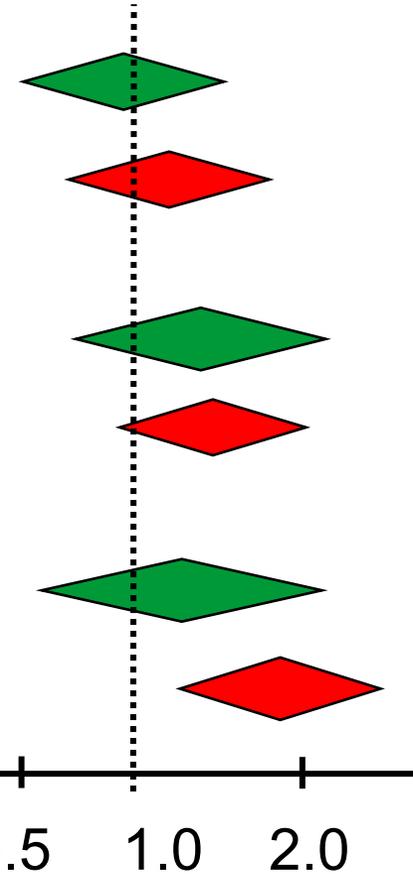
 **Swiss Stroke Registry**
n = 11'049



Any stroke

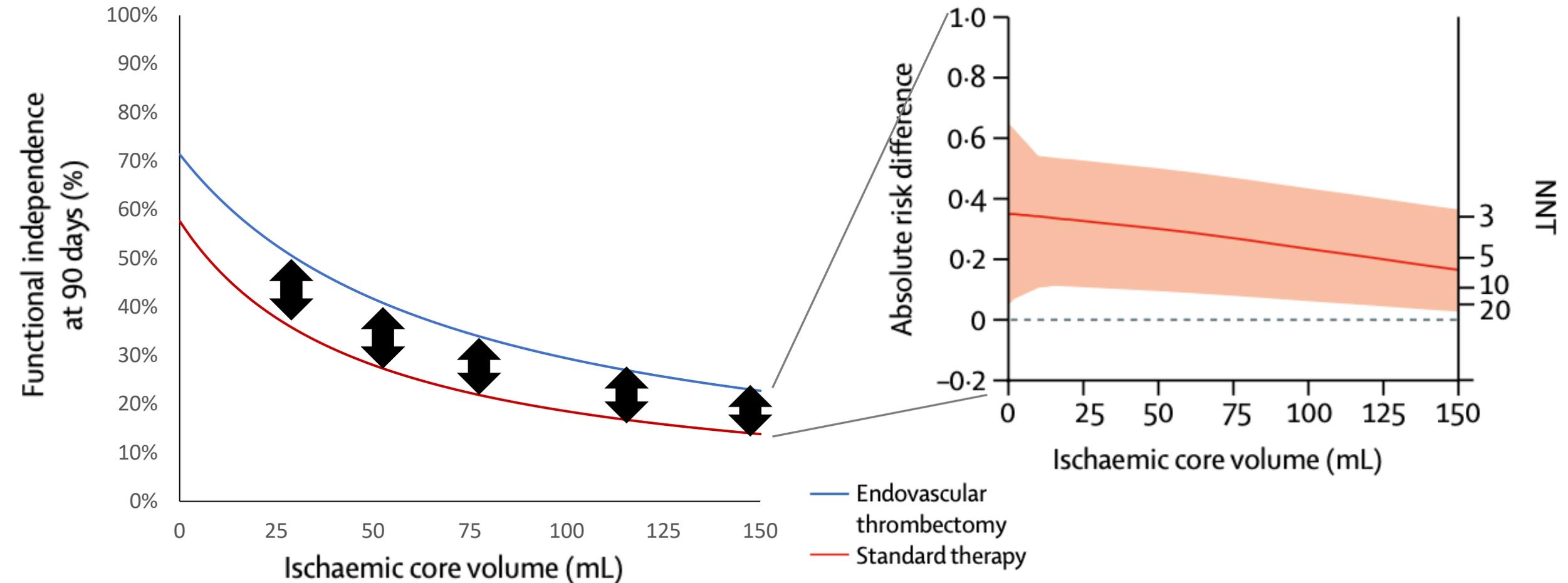
IVT-treated

EVT-treated

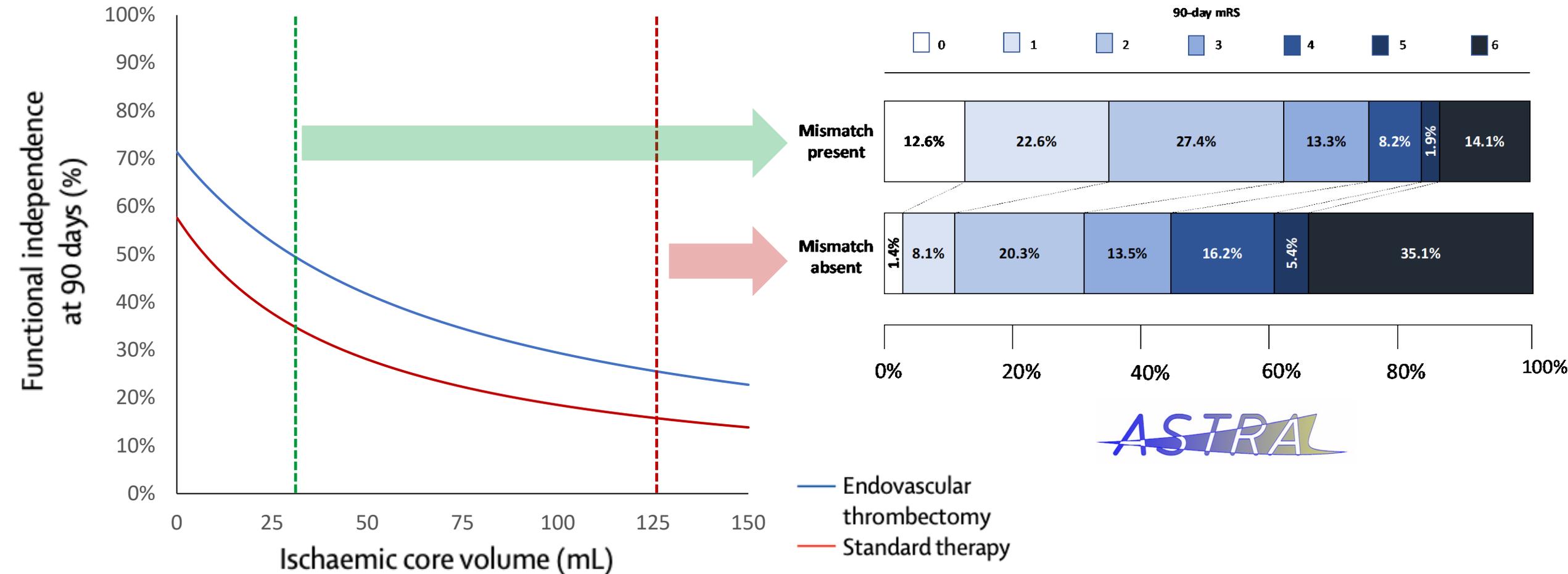


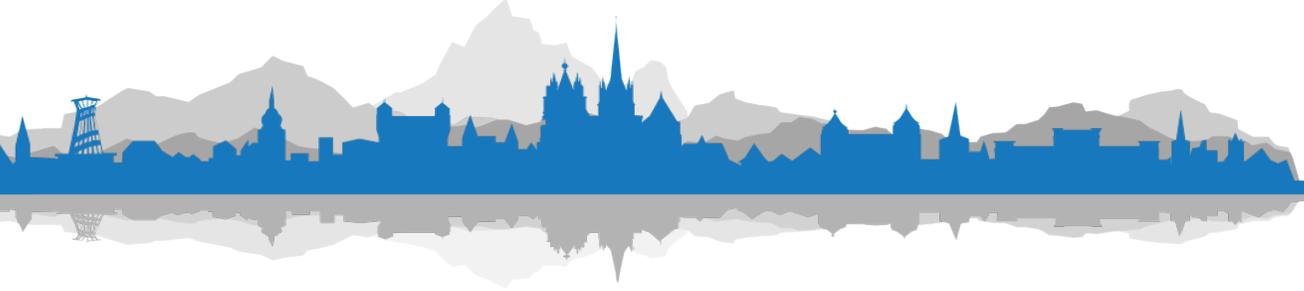
CT better ← → MRI better

Multimodal imaging before endovascular treatment in the early (<6h) time window



Multimodal imaging before endovascular treatment in the early (<6h) time window

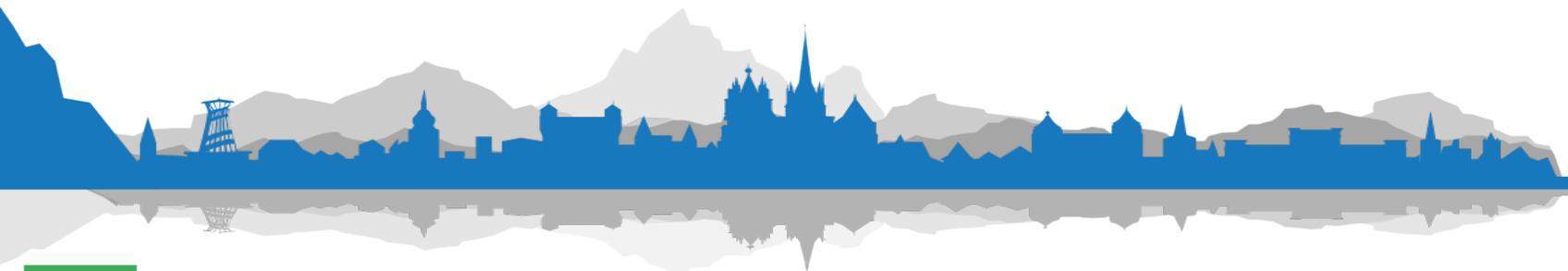




Acute imaging modality and stroke prognosis

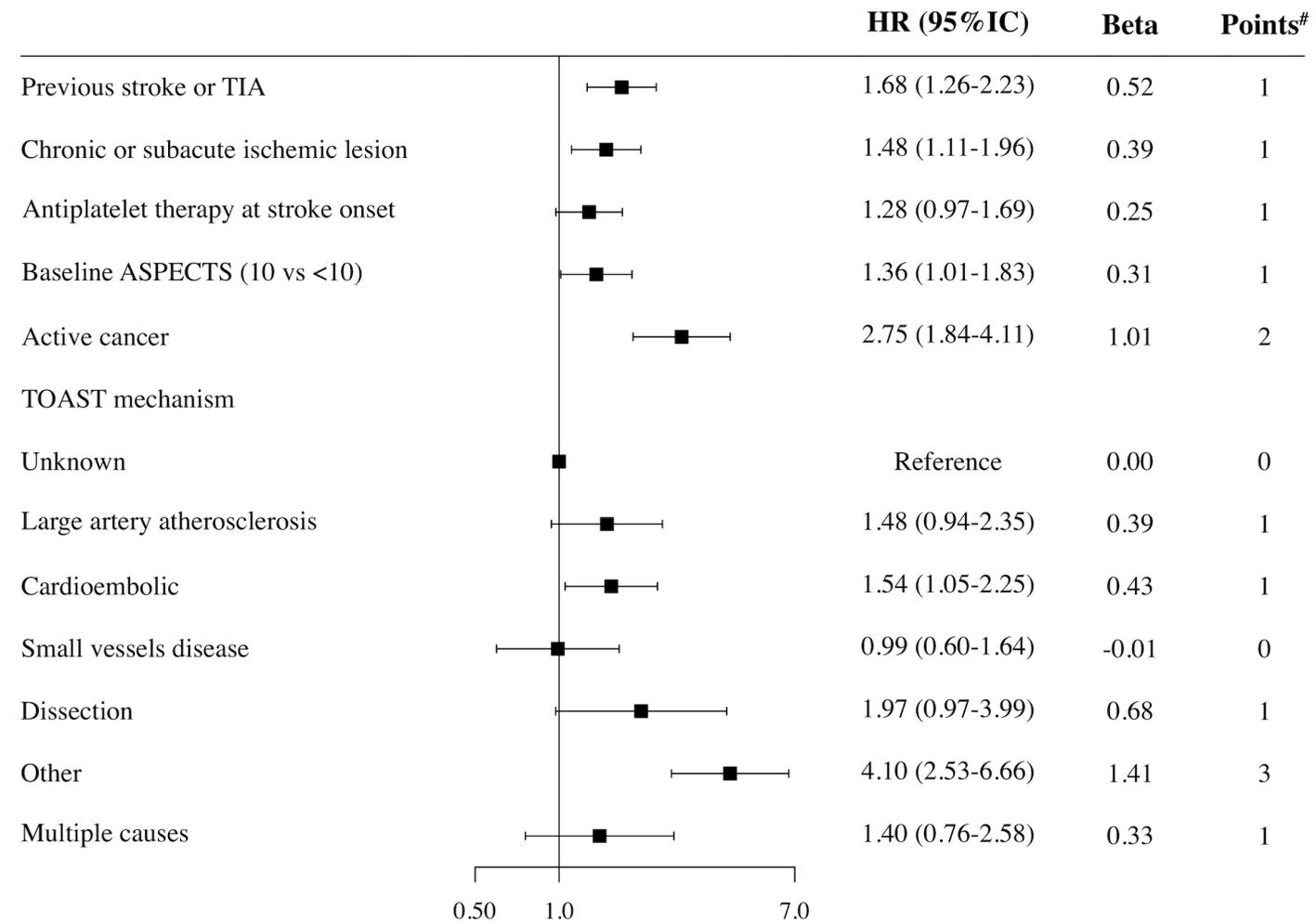
- Using multimodal CT vs. plain CT and MRI vs. CT provide more information and **may be associated to better outcomes**
- For endovascular treatment candidates in the early time window (<6h), advanced neuroimaging parameters :
 - **do not identify patients who will or won't benefit from the treatment**
 → are not necessary to select patients for treatment
 - **large core volume and no mismatch are associated to worse outcome**

Stroke recurrences



Predicting stroke recurrences: after any stroke

- ASTRAL stroke recurrence score
- Derivation cohort: n= 3'246



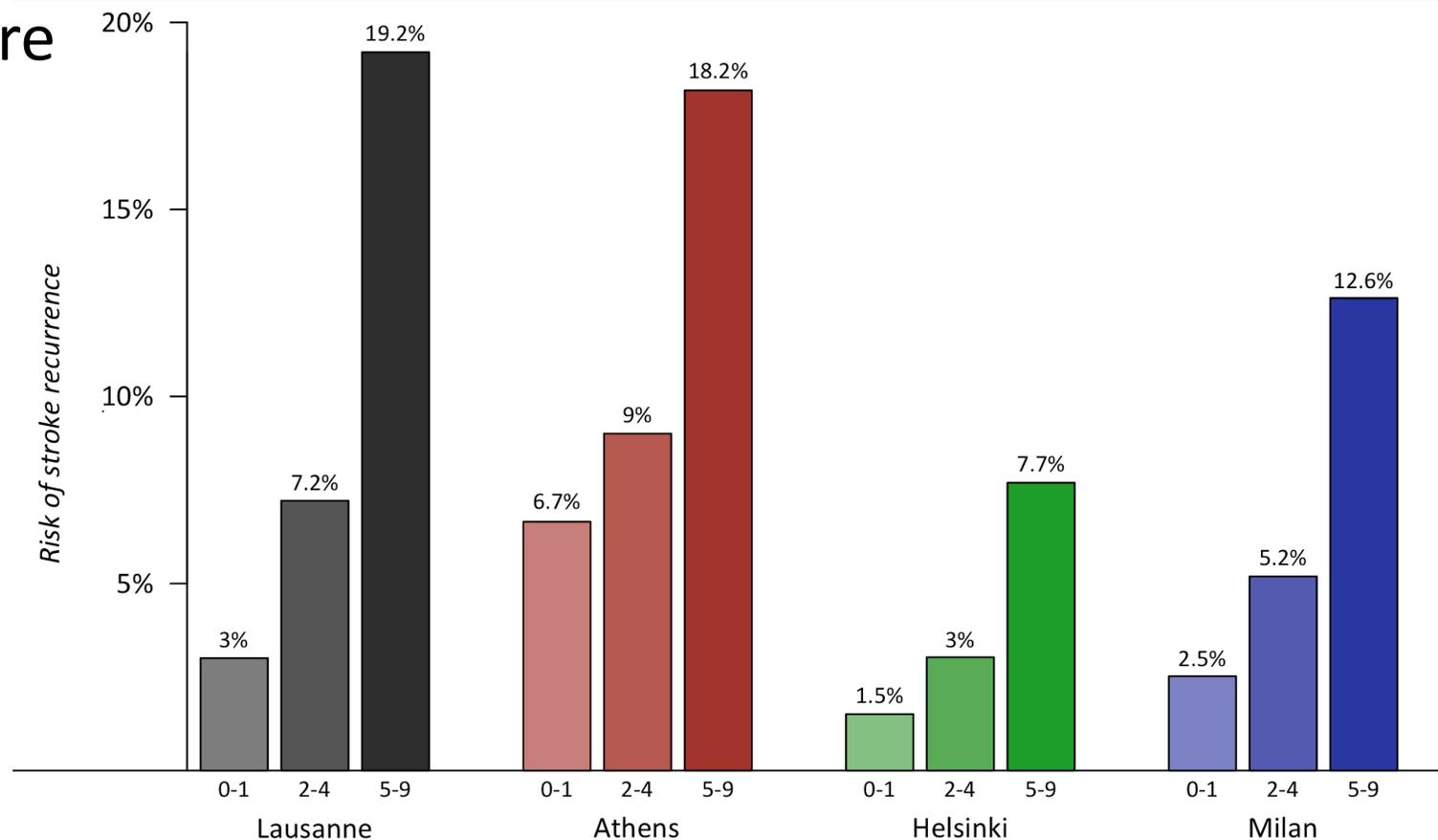
ASTRA Recurrence Score after any stroke

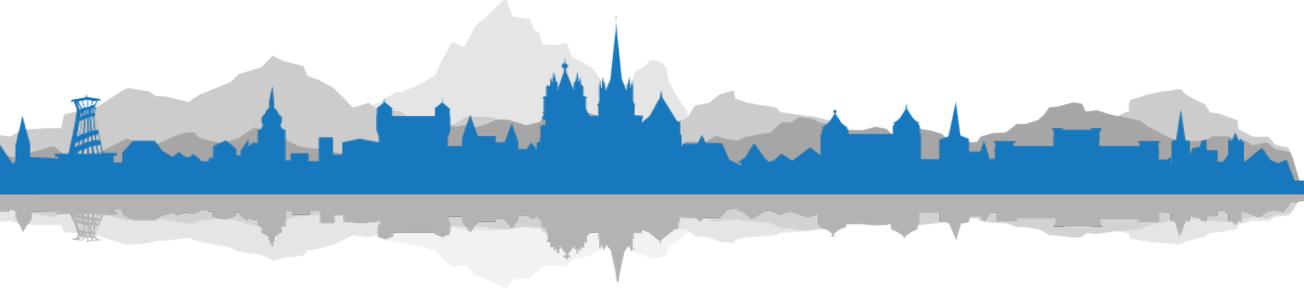
History of cerebrovascular events	1
Chronic infarcts on imaging	1
Antiplatelet pre-treatment	1
Stroke mechanism	
Other determined cause / rare	3
Cardiac/atherosclerotic/multiple causes/dissection	1
Small vessel disease	0
Active cancer	2
No early ischemic changes on acute CT	1

* Ischemic/haemorrhagic/retinal recurrences

Predicting stroke recurrences: after any stroke

- ASTRAL stroke recurrence score
- Derivation cohort: AUC= 0.67
- External validation:
 - Athens (n=2495): AUC= 0.56
 - Helsinki (n=714): AUC=0.70
 - Milano (n=1279): AUC=0.63





Stroke recurrences

- Difficult task
- Short term stroke risk after TIA
 - Good risk stratification
 - Important practical implication
- Long term risk of stroke recurrences



Conclusion

Stroke registries provided important information:

- to effectively **stratify the probability of disability** after a stroke
- on the influence of **acute neuroimaging** exams on patients' outcomes
- to **stratify the risk of stroke recurrences** after TIA and stroke

28 septembre 2023

Thank you for your attention

Questions?

davide.strambo@chuv.ch