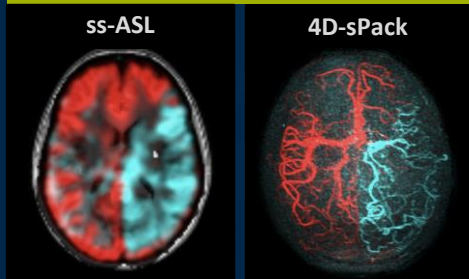


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# Clinical application of ASL-based non-invasive perfusion territory mapping and time-resolved angiography in cerebrovascular diseases

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Session: **MRI in Stroke**  
**Oxygen, Metabolism & Tissue Function**

Time: **Thursday, 20 May 2021**  
**18:00 – 20:00 (UTC)**

Room: **Room: Concurrent 6**



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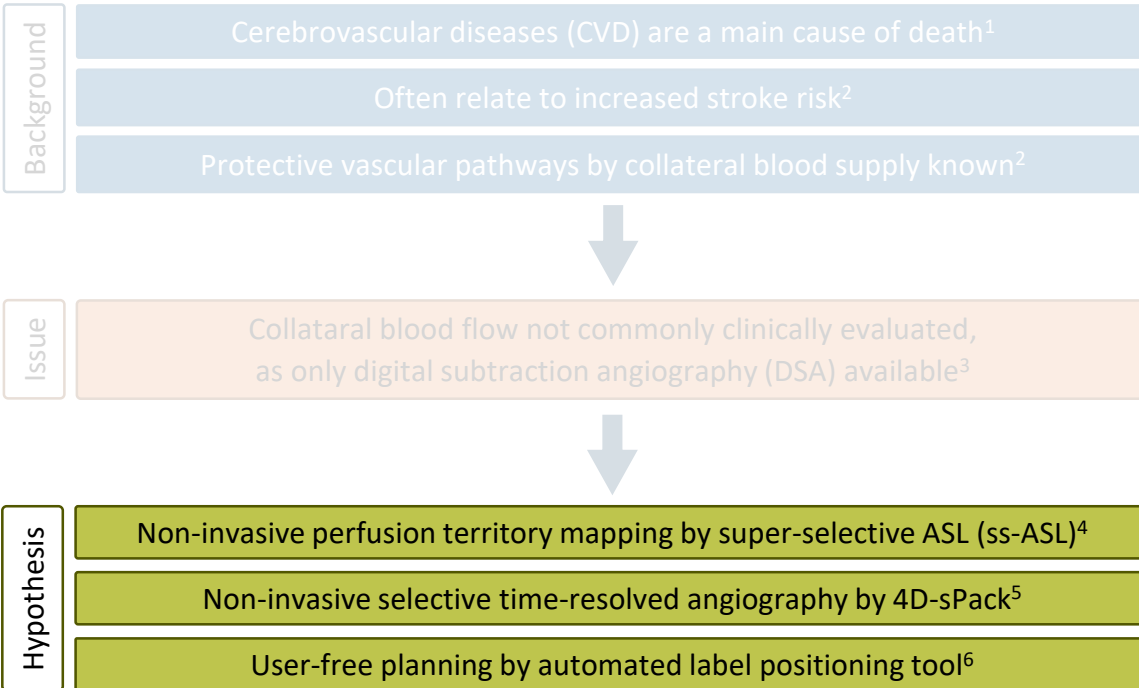
# Declaration of Financial Interests or Relationships

Speaker Name: Stephan Kaczmarz

I have no financial interests or relationships to disclose with regard to the subject matter of this presentation.



# Motivation



### Digital subtraction angiography (DSA)

The diagram illustrates the route of a catheter for DSA. It shows the aorta, common carotid artery, external carotid artery, and internal carotid artery. The tip of the catheter is positioned in the cerebral arteries. Labels include: Aorta, Tip of catheter, Site of entry of catheter, Route of Catheter, Internal carotid artery, External carotid artery, Tip of catheter, Common carotid artery, and Vertebral artery.

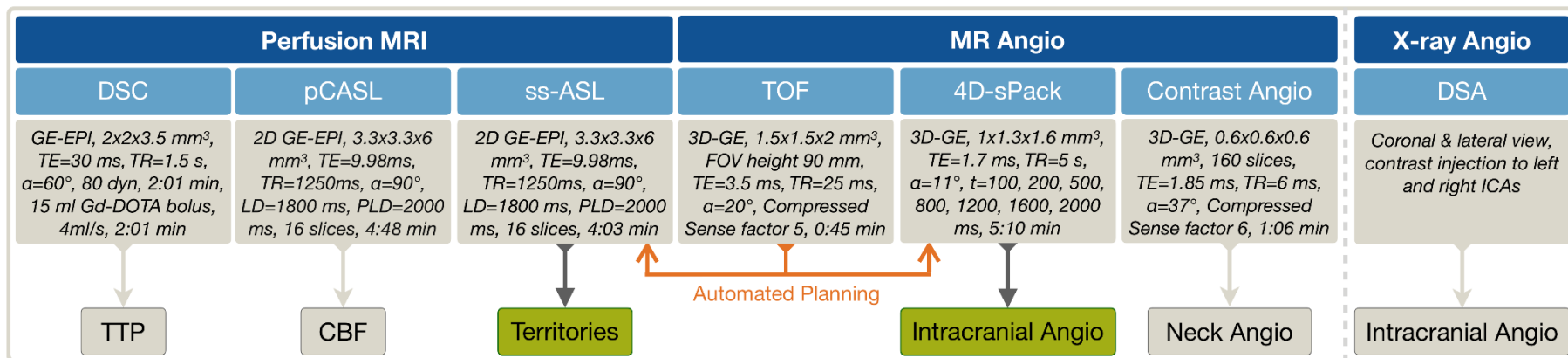
- Requires hospitalization
- High radiation doses
- Complication risks



1: Donahue et al. JCBFM 2018; 2: Liebeskind, Stroke 2003; 3: Guberina et al. Neuroradiology 2016; 4: Helle et al. MRM 2010; 5: Obara et al. MRM 2020; 6: Helle et al. ISMRM 2018, #302, Paris, France  
 Image from ganosue: <https://ganosue152.wordpress.com/2017/04/12/i-was-prescribed-hydrochlotiazide-for-high-blood-pressure/>

## Material & Methods

### MR imaging protocol



# Material & Methods

## Participants



- 3T Philips Ingenia Elition
- 3T Philips Achieva dStream
- Software release 5.6
- Philips Spinlab Patch

**10 Young Healthy Controls**      24.3 ± 0.9 y      20/20 automated labelings

**10 AVM patients**      39.6 ± 21.6 y      18/20\* automated labelings



**3 Moyamoya patients**      35.0 ± 2.6 y      6/6 automated labelings

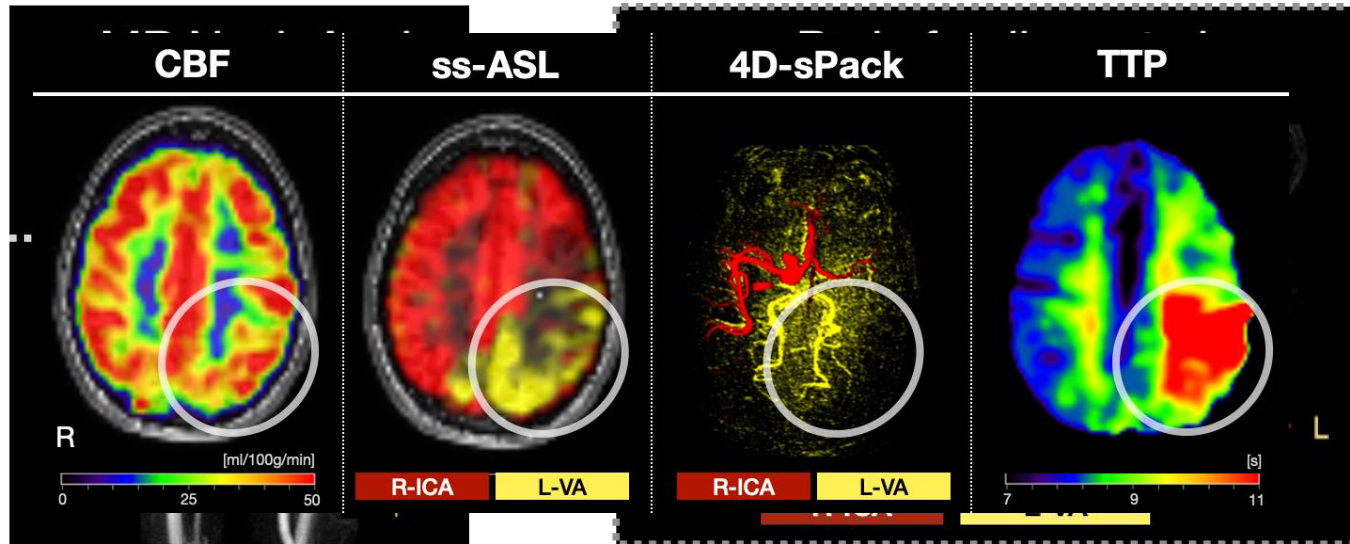


**1 Vessel Dissection**      36 y      2/3\* automated labelings



## Case 1: Vessel Dissection

- Male 36y
- L-M1 occlusion
- L-ICA dissection
- R-VA hypoplastic



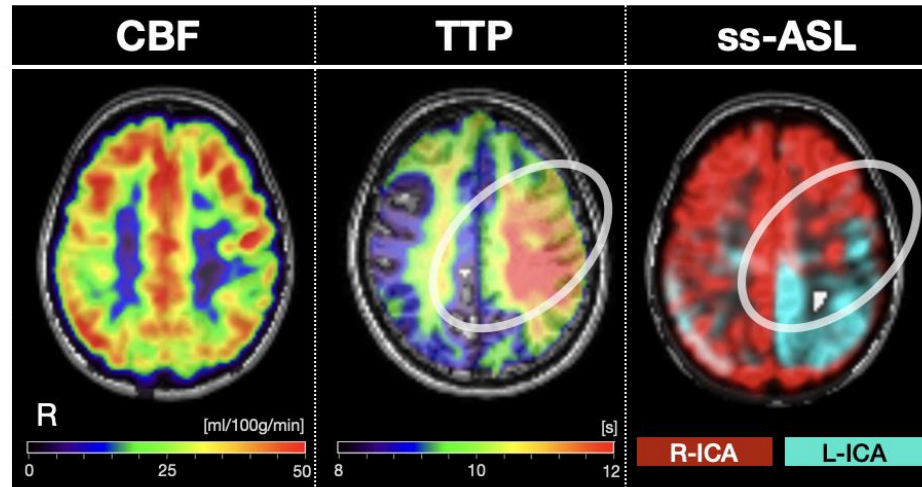
- Difficile cerebral blood supply, but almost unaffected perfusion
- Extensive collateral takeover visualized by ss-ASL and 4D-sPack



## Case 2: Moyamoya Disease

### Perfusion

- Female 26 y
- Moyamoya
- Right hemihypesthesia



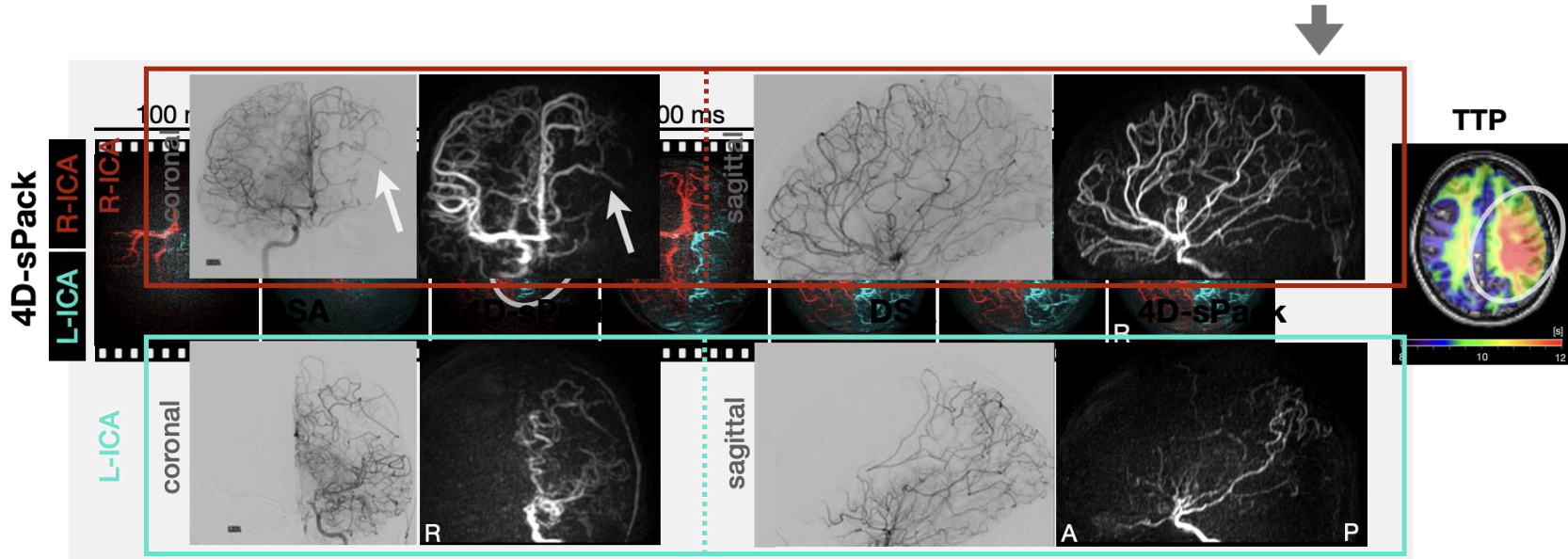
- Collateral blood flow visualized by ss-ASL in agreement with TTP



# Case 2: Moyamoya Disease

## Angiography

- Female 26 y
- Moyamoya
- Right hemihypesthesia



➤ Regionally delayed perfusion by 4D-sPack in agreement with TTP





Summary

**Pial collateral pathways**  
Kaczmarz et al.  
Talk #825

**Collaterals after treatment**

Schmitzer et al.  
Talk #823

**Oxygenation: MRI vs. PET**

Kufer et al.  
Poster #1305

**Venous QSM**  
Berg et al.  
Poster #3973

ss-ASL & 4D-sPack visualize collateral blood supply and are clinically applicable

Automated ICA labeling is reliable and improves clinical applicability

High potential for improved CVD diagnostics

Future evaluation of practical clinical impact required



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Thank you very much  
for your attention!

 @SKaczmarz  
@NMRgroup

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