What can we image?

MRI / MRA
IA-DSA
BSSFP
Double IR
Cardiac Function

Imaging of Vessel Wall
• (x) Inversion Recovery
  – single, double, triple, quadruple

Imaging of Vessel Lumen

MR Tools
For Imaging the Vasculature
Microvascular Dysfunction

- Late enhancement

Disease Typically Affecting Larger Upper Extremity Arteries

1st dynamic 2nd dynamic
37 y/o male construction worker
• Pain in left hand

Hypothenar Hammer Syndrome
• Finger ischemia due to embolic occlusion of digital arteries coming from ulnar artery
  – caused by repetitively striking objects with heel of hand
  – typically seen in carpenters, mechanics, mountain bikers, staplers

Vasculitis
• Inflammation of vessel wall
  – infectious and non-infectious etiology
  – any type, size
  – any organ
  • wide variety of signs and symptoms
• Accurate identification important
  – substantial differences in prognosis

高安右人博士!
Vessel Wall Imaging

Medium and Small Artery Vasculitis

Incidental discovery of Kawasaki

72 y/o male presenting with CP

11 y/o with claudication

ilioic aneurysm
right common femoral pseudoaneurysm
right popliteal artery occlusion
left popliteal artery aneurysm

Courtesy of Prof. Martin Prince, MD, PhD, Cornell University, NY, NY
44 y/o female with SLE presenting with CP

Other Diseases
75 y/o Female
Upper extremity claudication
S/P radiation Tx for Breast cancer 20 yrs ago

65 y/o female
Intermittent claudication
S/P radiation Tx for sarcoma >20 yrs ago

Radiation Induced Fibrosis
- History is key to diagnosis
  - Previous radiotherapy at location of narrowing
    - Up to decades ago
  - FMD is key differential
- May present with full spectrum of PAOD
  - Intermittent Claudication
  - Chronic Critical Ischemia
  - Embolization

38 y/o Female
Bilateral Intermittent claudication

Fibromuscular Dysplasia
- Non-atherosclerotic, non-inflammatory arteriopathy of medium sized arteries
  - Typically affects women of childbearing age
  - 60-75% renal involvement
    - Important cause of renovascular hypertension
    - 25-30% cerebrovascular involvement
    - Up to 10% peripheral arterial involvement
- Typical "string of beads" sign at angiography

Congenital Aortic Hypoplasia

- Rare disorder presenting in childhood
- Developmental narrowing of abdominal aorta
  - Renovascular hypertension
  - Intermittent claudication

Fontaine II – Intermittent Claudication

MRA Images obtained with flexed hips

- High resolution, no venous enhancement

Lower Extremity MRA

- 1.1 x 1.1 x 0.75 mm
  - 150 slices
  - 60 secs
  - SENSE & CENTRA
- 1.2 x 1.4 x 1.0 mm
  - 70 slices
  - 14 secs
  - SENSE x2
- 1.3 x 1.4 x 1.4 mm
  - 70 slices
  - 14 secs
  - SENSE x2

Courtesy of Dr. Goof Schep, MD, Veldhoven, The Netherlands
Iliac Artery Syndrome in Cyclists

- Recently described entity
- External iliac artery endofibrosis due to repetitive trauma and bending
- Young endurance cyclists
  - Frequency of up to 1:5 athletes
- No classic risk factors for atherosclerosis

42 y/o male smoker
Intermittent Claudication Right Leg

Smooth Segmental Stenosis in Right Popliteal Artery
**Cystic Adventitial Disease**

- Rare cause of intermittent claudication\(^1,2\)
- Sometimes mass
- Caused by mucoid cysts in peripheral arterial wall
  - Most often popliteal artery
  - Segmental smooth luminal narrowing
- Diagnosed confirmed with additional T1w and T2w imaging

\(^1\) Peterson, AJR 2003;180:621-5  \(^2\) Wright, RadioGraphics 2004; 24: 467-479

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**Summary and Conclusions**

- MRI techniques are well suited to detect and characterize vasculopathies in large and medium arteries
- MRI can also image consequences of small vessel injury
- Well suited for follow-up
- History incongruent with typical atherosclerotic patient should prompt consideration of uncommon arteriopathies
- Uncommon causes predominate in upper extremity
- Consider (large) differential diagnosis