
POSTER WALKING TOUR
10th CIBM-CHUV-MR Retreat
Château de Varennes, France
27-30 August 2024

PLAYLIST

CIBM-CHUV-MR Retreat 2024

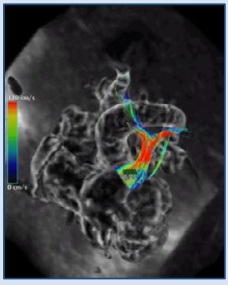
GO WITH THE FLOW

Akporeha Efena

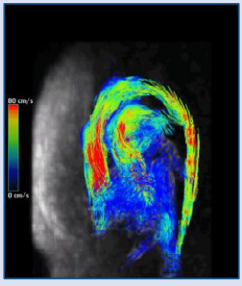
*"Sometimes, one chooses to **go with the flow**, and at other times, one does not." — A very wise man!*

Just as we sometimes choose to go with the flow and sometimes resist, so does the **free-running phase-contrast whole-heart MRI**. This advanced system navigates the turbulent waters of **non-laminar flow** and **acceleration**, potentially stirred up by the storm of **high-grade stenosis**. But beware! These rough waters can cause **signal dephasing**. When coupled with **extended echo times**, this can rock the boat of accuracy in our **blood flow measurements**.

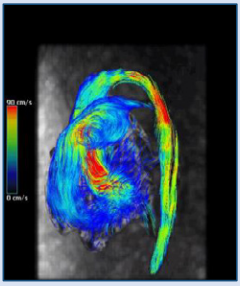
C.H.D Patient 1



C.H.D Patient 2

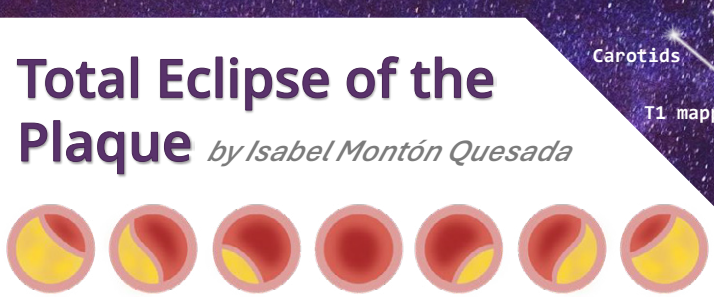


C.H.D Patient 3



Total Eclipse of the Plaque

by Isabel Montón Quesada

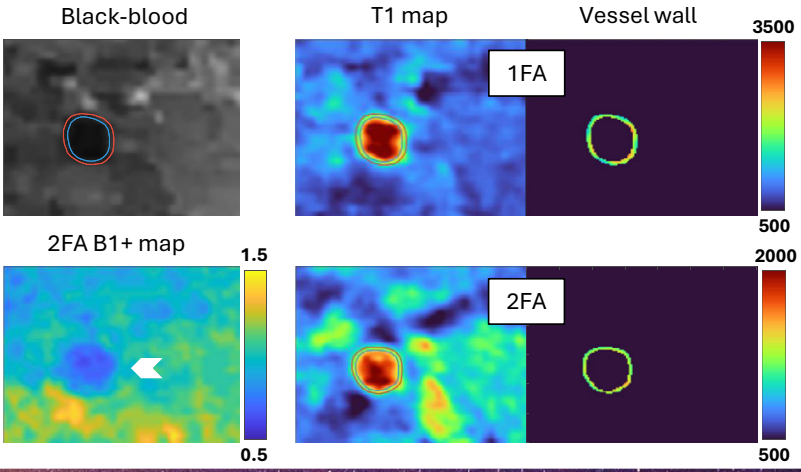


"Every now and then I fall apart..." this Bonnie Tyler's verse from *Total Eclipse of the Heart* could be the theme song for atherosclerotic plaques in the carotid artery. When the **plaque** becomes **vulnerable**, it falls apart too, **increasing** the **risk** of **stroke** and further **microvascular damage** and **dysfunction**. To identify the specific pathological **characteristics** that might be **involved** in this process, **T1 mapping** of the **carotid** has been used to quantitatively **assess** the **vessel wall** and the **plaque components**.

However, **T1** estimations can be **biased** by **B1+ inhomogeneities** and **affected** by **motion** present in the carotid (i.e.: respiration, swallowing, and carotid pulsation).

AIM

To implement a **free-running T1 mapping** of the **carotid** vessel wall with **B1+ correction** combined with a **respiratory-resolved** reconstruction.

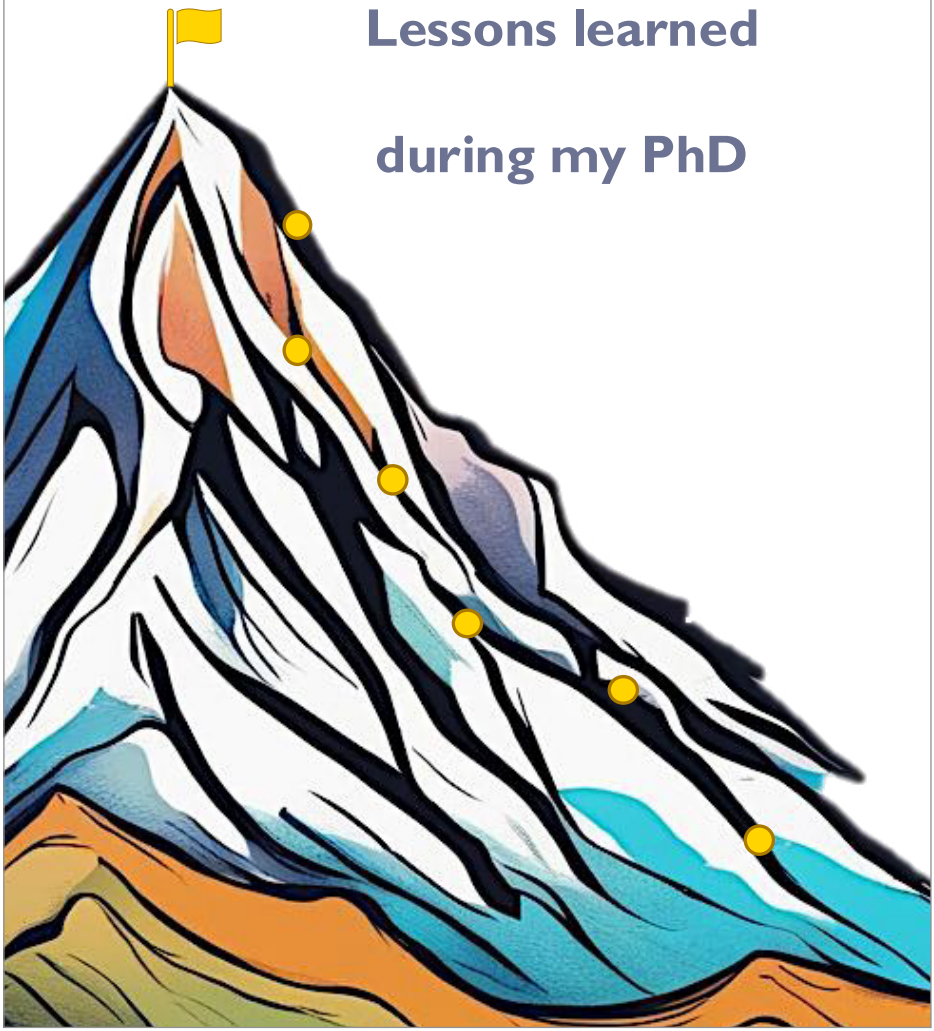



Sweet Recon'O Mine
AI
(kinda) accurate
Cardiac MRI
You're gunna love it?
Nice!
Free-running
Not slow
Cool.
Wow
We're SLASHing reconstruction times!
(Guns n') Roses are Red
Violets are blue
Compressed sensing is great,
But this Recon'O Mine's alright too
Deep Learning

Ludovica Romanin, PhD student

Running up that hill

Lessons learned during my PhD

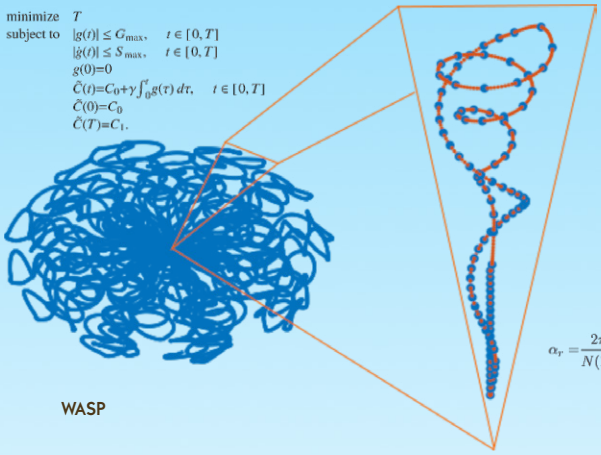



This is not
the best Poster in the World...
A
1) Every Breath You Take
2) Thunderstruck
3) Foxy Lady
...this is just a
TRIBUTE

CONE TOGETHER

Martin Nicoletti

$$
\begin{aligned}
&\text{minimize} && T \\
&\text{subject to} && |g(t)| \le G_{\max}, \quad t \in [0,T] \\
&&& |\tilde{g}(t)| \le S_{\max}, \quad t \in [0,T] \\
&&& g(0)=0 \\
&&& \tilde{C}(t)=C_0+\gamma\textstyle\int_0^t g(\tau)\,d\tau, \quad t \in [0,T] \\
&&& \tilde{C}(0)=C_0 \\
&&& \tilde{C}(T)=C_1.
\end{aligned}
$$



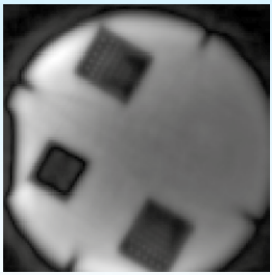
WASP

$$
\begin{aligned}
k_x(n) &= \alpha_r \frac{2\pi l}{N}(n-n_0)\cos\left(\frac{2\pi l}{N}n\right)H(n>n_0) \\
k_y(n) &= \alpha_r \frac{2\pi l}{N}(n-n_0)\sin\left(\frac{2\pi l}{N}n\right)H(n>n_0) \\
k_z(n) &= \beta\left(\sqrt{n-n_0}+\frac{n_0-1}{FOV}\right)H(n>n_0) \\
&\quad + \frac{n}{FOV}H(n\le n_0)
\end{aligned}
$$

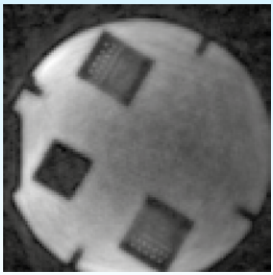
$$
\beta = \frac{1}{\sqrt{n-n_0}}\left[\sqrt{\left(\frac{2\pi l(n-n_0)}{N}\right)^2 + k_{max}^2} - \frac{n_0}{FOV}\right]
$$

$$
\alpha_r = \frac{2\pi l k_{max}}{N(1+\sqrt{5})}(N-n_0)
$$

bSTAR



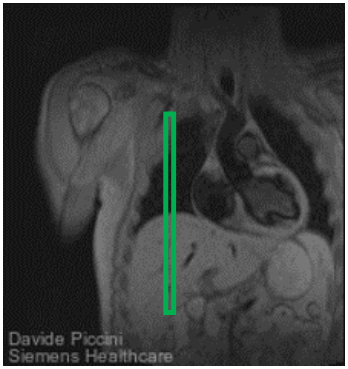
Cone

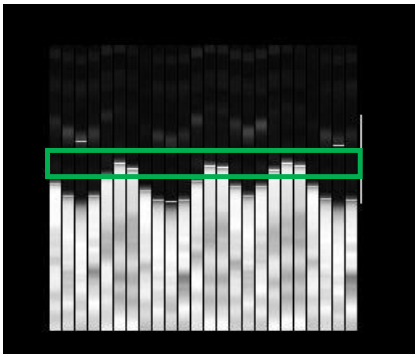


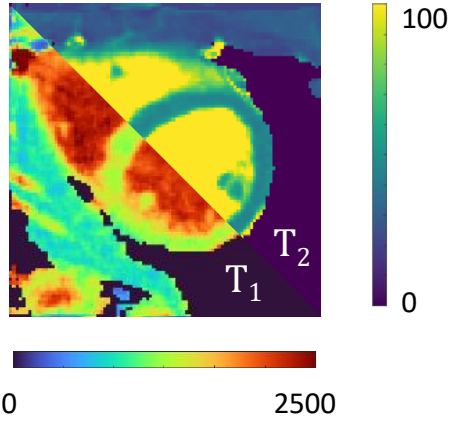
bSSFP with Pulseq

Every breath you take, I'll be mapping you

- **Free-breathing** joint T_1-T_2 mapping of the heart
- Lung-liver navigator to limit through-plane motion





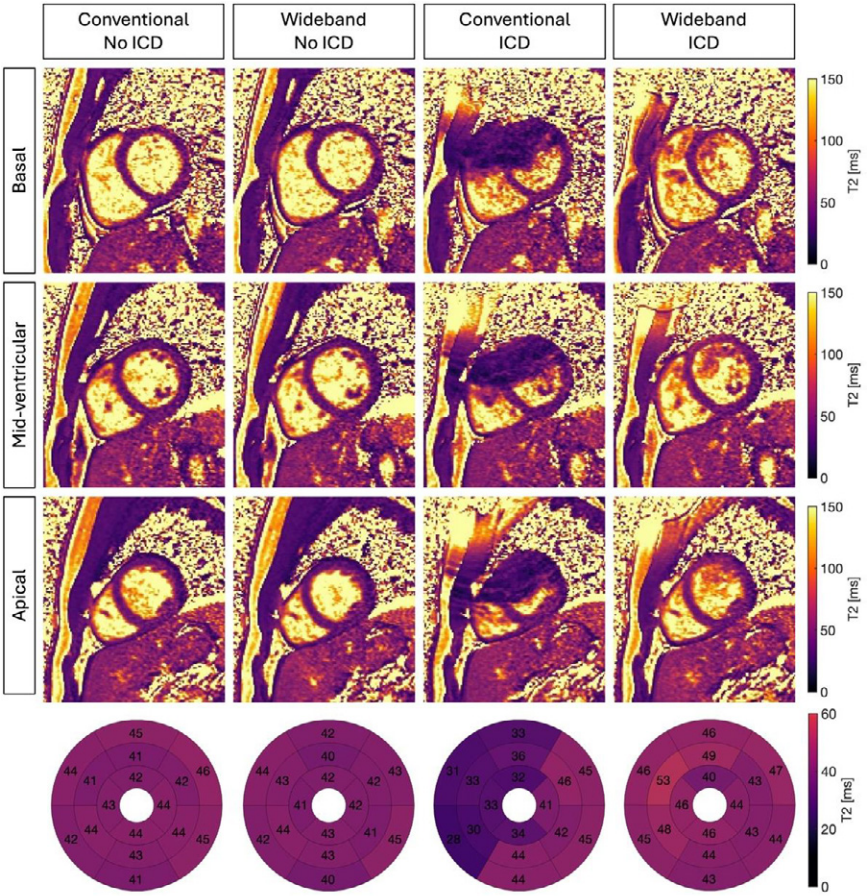


“Crystal clear”

Wideband myocardial T2 mapping in patients with implantable cardiac devices: Preliminary evaluation in healthy volunteers at 1.5T

Pauline Gut[1,2], D. Kim[3,4], H. Cochet[1,5], F. Sacher[1,6], P. Jaïs[1,6], M. Stuber[1,2,7], A. Bustin[1,2,5]

[1]IHU LIRYC, Université de Bordeaux, France; [2]CHUV, Lausanne, Switzerland; [3]Department of Biomedical Engineering, Northwestern University, USA; [4]Department of Radiology, Northwestern University, USA; [5]Department of Cardiovascular Imaging, CHU de Bordeaux, France; [6]Department of Cardiac Pacing and Electrophysiology, CHU de Bordeaux, Pessac, France; [7]CIBM, Lausanne, Switzerland



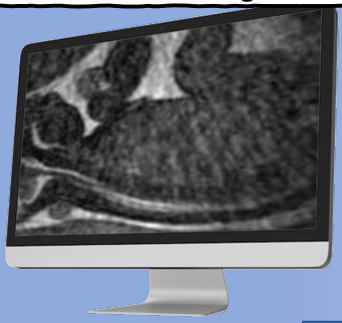
What's The Difference?

- Between recon and fetus -

Robin Ferincz, Christopher W. Roy

Department of Radiology, Lausanne University Hospital (CHUV)
and University of Lausanne (UNIL), Switzerland

30th-35th week of gestation



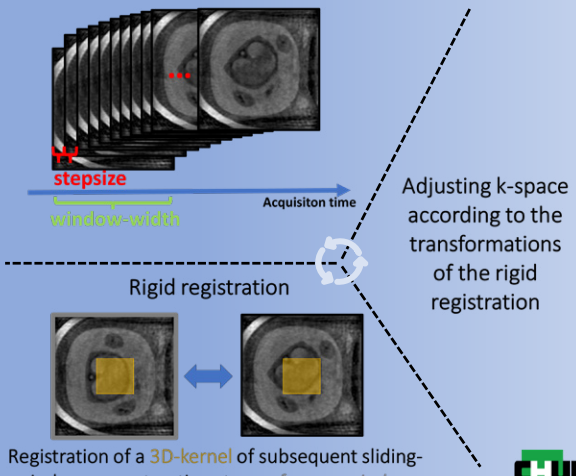
Postpartum

Aim

Correcting MR acquisitions for 3D fetal bulk-motion.

Methods

Sliding window reconstruction



Oops WE did it again: 5D Whole-heart CMR at 0.55T

MRI is accepted as the gold standard for the assessment of the cardiac function, however required expertise and high costs prohibits wide-spread adoption. To democratize CMR, we propose to address these challenges by using a one-click and efficient 5D sequence on a 0.55 T low-field system to drive down the cost and simplify CMR exams.

We implemented and tested a 5D self-gated free-breathing radial phyllotaxis sequence (5D CMR) on a 0.55T Free.Max scanner with limited gradient performances. The images were used to measure the LVEF, RVEF and LAVI and those measurements were compared with a 2D cine clinical reference protocol.

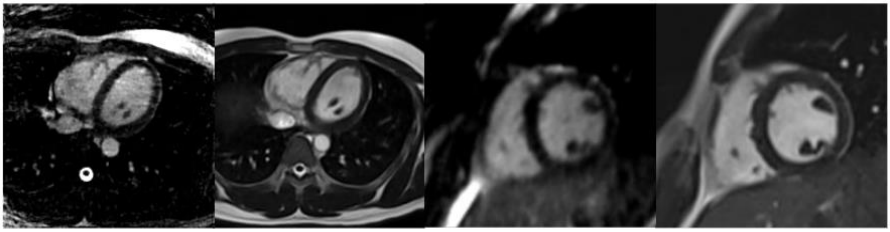


Figure 1: Purposedly unlabeled CMR images to serve as a teaser.

Some of the comments on the 5D CMR images at 0.55T:

“Wow, is this really an image from the Free.Max?”
A full professor

“This image is not great. I’ll give it the grade 2 out of 5.”
A spoiled cardiologist

“How did you get those images? They look good.”
An assistant/spy professor trying to replicate the work.

“Is this a heart?”
My (sarcastic) dad

"Impressive clarity and detail in this CMR image—truly exceptional work!“
ChatGPT when asked to compliment CMR images

BEAT-ing with their own Drum

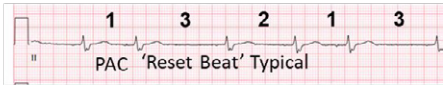
Justin Baraboo

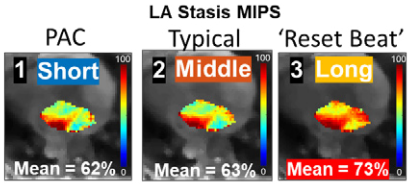
Some  are 

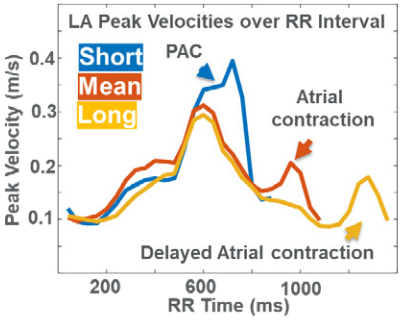
Some  are 

With 5D *Flow*, we can resolve heartbeat variable atrial hemodynamics within any arrhythmia!

Atrial Trigeminy Case







SPOT-MAPPING smells like T2 spirit

V. de Villedon de Naide et al.

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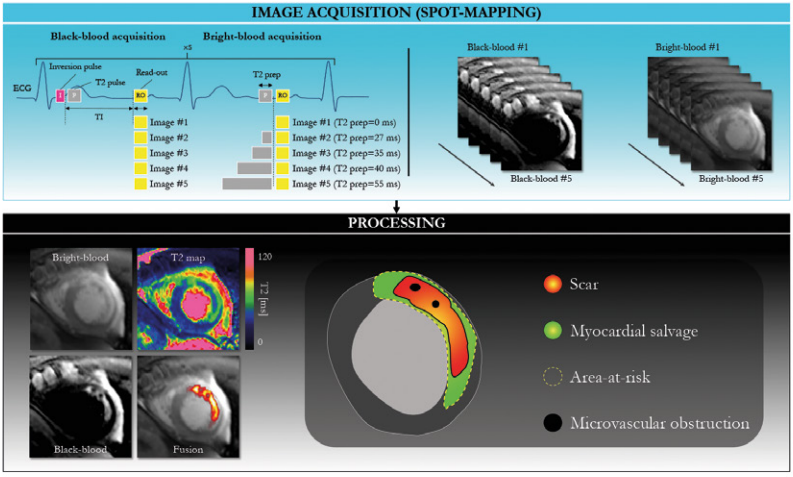

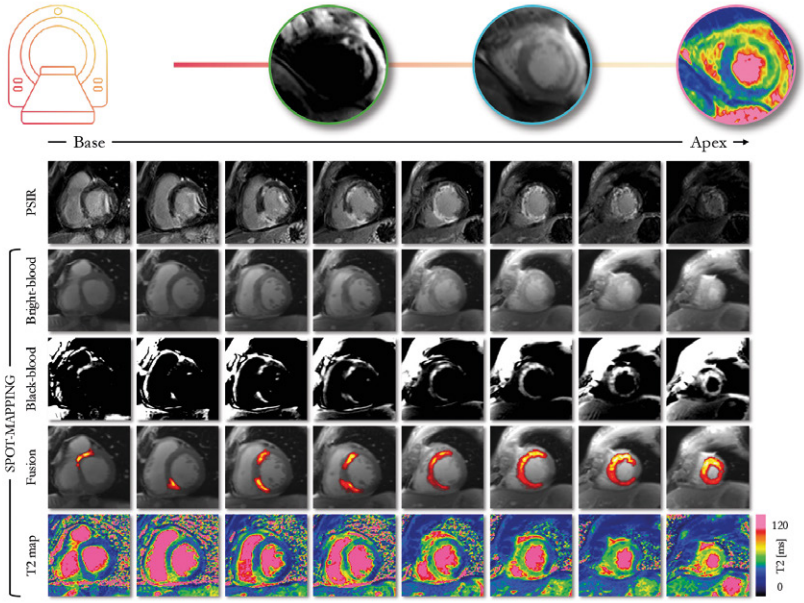

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Aug. 27th – Aug. 30th, 2024 | Château de Varennes, France

GOALS

- Promote unity in our MR research family in a relaxed atmosphere and free of daily commitments.
- Provide a platform for communication among MR sub-specialties to generate new ideas and stimulate new collaborations.
- Critical review of on-going research projects and future directions.
- Tribute to scientific excellence and achievements.
- Dialog and knowledge exchange among basic scientists, clinicians and industry.
- Foster local, national, and international relations.

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