# RE: new data

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 9:22 AM

To: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

Cenck thinks you sent me new data. I don't have them. Can you send? We are on the PI call.

Patrick D. Lyden, MD, FAAN, FAHA, FANA Professor of Physiology and Neuroscience Professor of Neurology Zilkha Neurogenetic Institute USC Keck School of Medicine of USC O: (323) 442-3917 ZNI 245 MC 2821

Los Angeles, CA 90089-2821 plyden@usc.edu

1501 San Pablo Street

From: Ryan Cabeen | ryan.cabeen@loni.usc.edu

Tuesday, Jul 13, 9:26 AM

To: Patrick Lyden | plyden@usc.edu

Sorry, we discussed sending an update Thursday, but there was a power outage at SHN over the weekend, so things were delayed a bit from that. I'll send it along hopefully this afternoon, or tomorrow at the latest.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 9:22 AM

Cenck thinks you sent me new data. I don't have them. Can you send? We are on the PI call.

Patrick D. Lyden, MD, FAAN, FAHA, FANA Professor of Physiology and Neuroscience Professor of Neurology Zilkha Neurogenetic Institute USC Keck School of Medicine of USC O: (323) 442-3917 ZNI 245 MC 2821 1501 San Pablo Street Los Angeles, CA 90089-2821

plyden@usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 10:50 AM

To: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

Ok great.

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

To: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 12:26 PM

Sorry, we discussed sending an update Thursday, but there was a power outage at SHN over the weekend, so things were delayed a bit from that. I'll send it along hopefully this afternoon, or tomorrow at the latest.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 9:22 AM

Cenck thinks you sent me new data. I don't have them. Can you send? We are on the PI call.

Patrick D. Lyden, MD, FAAN, FAHA, FANA Professor of Physiology and Neuroscience

Professor of Neurology

Zilkha Neurogenetic Institute

USC Keck School of Medicine of USC

O: (323) 442-3917

ZNI 245 MC 2821

1501 San Pablo Street

Los Angeles, CA 90089-2821

plyden@usc.edu

From: Ryan Cabeen | ryan.cabeen@loni.usc.edu

Tuesday, Jul 13, 11:17 PM

To: Patrick Lyden | plyden@usc.edu

Following up, attached please find an updated data table, as well as associated tissue volume plots. The changes to the pipeline include:

- \* A more restrictive region where lesion is allowed to be detected. This removes what we concluded to be a systematic artifact in basal part of the brain.
- \* A more permissive lesion threshold which provides more sensitivity to small lesions (also increasing lesion size overall)

FYI, these changes came out of a few meetings with Cenk, were we looked at lesion maps and the results of a "parameter sweep", in which I exhaustively computed the lesion volumes obtained from of a sequence of threshold values in all of the stage one data. Happy to go over those pieces in detail if you'd like.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> <u>www.ini.usc.edu</u>

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 10:50 AM

Ok great.

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

To: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 12:26 PM

Sorry, we discussed sending an update Thursday, but there was a power outage at SHN over the weekend, so things were delayed a bit from that. I'll send it along hopefully this afternoon, or tomorrow at the latest.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: cabeen.io www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 9:22 AM

Cenck thinks you sent me new data. I don't have them. Can you send? We are on the PI call.

Patrick D. Lyden, MD, FAAN, FAHA, FANA

Professor of Physiology and Neuroscience

Professor of Neurology

Zilkha Neurogenetic Institute

USC Keck School of Medicine of USC

O: (323) 442-3917

ZNI 245 MC 2821

1501 San Pablo Street

Los Angeles, CA 90089-2821

plyden@usc.edu

From: Patrick Lyden | plyden@usc.edu

Sunday, Jul 18, 4:28 AM

To: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

Thank you. Couple of questions:

What are the new variables "regions\_volume\_lesion\_(striatum, cortex, thalamus, hippocampus)"?

Have you sent this to Marcio or cenk?

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu

Wednesday, Jul 14, 2:18 AM

Following up, attached please find an updated data table, as well as associated tissue volume plots. The

changes to the pipeline include:

- \* A more restrictive region where lesion is allowed to be detected. This removes what we concluded to be a systematic artifact in basal part of the brain.
- \* A more permissive lesion threshold which provides more sensitivity to small lesions (also increasing lesion size overall)

FYI, these changes came out of a few meetings with Cenk, were we looked at lesion maps and the results of a "parameter sweep", in which I exhaustively computed the lesion volumes obtained from of a sequence of threshold values in all of the stage one data. Happy to go over those pieces in detail if you'd like.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: cabeen.io www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 10:50 AM

Ok great.

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 12:26 PM

Sorry, we discussed sending an update Thursday, but there was a power outage at SHN over the weekend, so things were delayed a bit from that. I'll send it along hopefully this afternoon, or tomorrow at the latest.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 9:22 AM

Cenck thinks you sent me new data. I don't have them. Can you send? We are on the PI call.

Patrick D. Lyden, MD, FAAN, FAHA, FANA

Professor of Physiology and Neuroscience

Professor of Neurology

Zilkha Neurogenetic Institute

USC Keck School of Medicine of USC

O: (323) 442-3917

ZNI 245 MC 2821

1501 San Pablo Street

Los Angeles, CA 90089-2821

plyden@usc.edu

From: Ryan Cabeen | ryan.cabeen@loni.usc.edu

Tuesday, Jul 20, 6:32 PM

To: Patrick Lyden | plyden@usc.edu

Those variables are the volume of lesion overlapping with each of the listed regions, that is, what we added to compare cortical vs subcortical lesion extent.

I haven't shared with Cenk or Marcio yet, wanted to go through you first. I can send it along to them if you like. Also, I made a couple more refinements which are reflected in the attached data table.

Also, heard there was some flooding in western Mass, hope you are comfortably dry!

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: cabeen.io

#### www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu Sunday, Jul 18, 4:28 AM

Thank you. Couple of questions:

What are the new variables "regions\_volume\_lesion\_(striatum, cortex, thalamus, hippocampus)"?

Have you sent this to Marcio or cenk?

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Wednesday, Jul 14, 2:18 AM

Following up, attached please find an updated data table, as well as associated tissue volume plots. The changes to the pipeline include:

- \* A more restrictive region where lesion is allowed to be detected. This removes what we concluded to be a systematic artifact in basal part of the brain.
- \* A more permissive lesion threshold which provides more sensitivity to small lesions (also increasing lesion size overall)

FYI, these changes came out of a few meetings with Cenk, were we looked at lesion maps and the results of a "parameter sweep", in which I exhaustively computed the lesion volumes obtained from of a sequence of threshold values in all of the stage one data. Happy to go over those pieces in detail if you'd like.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> <u>www.ini.usc.edu</u>

From: Patrick Lyden | plyden@usc.edu Tuesday, Jul 13, 10:50 AM

Ok great.

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Tuesday, Jul 13, 12:26 PM

Sorry, we discussed sending an update Thursday, but there was a power outage at SHN over the weekend, so things were delayed a bit from that. I'll send it along hopefully this afternoon, or tomorrow at

the latest.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a>

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 9:22 AM

Cenck thinks you sent me new data. I don't have them. Can you send? We are on the PI call.

Patrick D. Lyden, MD, FAAN, FAHA, FANA

Professor of Physiology and Neuroscience

Professor of Neurology

Zilkha Neurogenetic Institute

USC Keck School of Medicine of USC

O: (323) 442-3917

ZNI 245 MC 2821

1501 San Pablo Street

Los Angeles, CA 90089-2821

plyden@usc.edu

From: Patrick Lyden | plyden@usc.edu

Wednesday, Jul 21, 2:21 PM

To: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

We lost our sump pump, water heater and internet, which isn't even in the basement! All good now and we're back in LA. Thanks for asking

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

Tuesday, Jul 20, 6:33 PM

Those variables are the volume of lesion overlapping with each of the listed regions, that is, what we added to compare cortical vs subcortical lesion extent.

I haven't shared with Cenk or Marcio yet, wanted to go through you first. I can send it along to them if you

like. Also, I made a couple more refinements which are reflected in the attached data table.

Also, heard there was some flooding in western Mass, hope you are comfortably dry!

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: <u>rcabeen@loni.usc.edu</u>

Web: <u>cabeen.io</u> <u>www.ini.usc.edu</u>

<SPAN-Stage1-DataTable-2021-07-20.csv>

From: Patrick Lyden | plyden@usc.edu

Sunday, Jul 18, 4:28 AM

Thank you. Couple of questions:

What are the new variables "regions\_volume\_lesion\_(striatum, cortex, thalamus, hippocampus)"?

Have you sent this to Marcio or cenk?

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Wednesday, Jul 14, 2:18 AM

Following up, attached please find an updated data table, as well as associated tissue volume plots. The changes to the pipeline include:

- \* A more restrictive region where lesion is allowed to be detected. This removes what we concluded to be a systematic artifact in basal part of the brain.
- \* A more permissive lesion threshold which provides more sensitivity to small lesions (also increasing lesion size overall)

FYI, these changes came out of a few meetings with Cenk, were we looked at lesion maps and the results of a "parameter sweep", in which I exhaustively computed the lesion volumes obtained from of a sequence of threshold values in all of the stage one data. Happy to go over those pieces in detail if you'd like.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> <u>www.ini.usc.edu</u>

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 10:50 AM

Ok great.

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Tuesday, Jul 13, 12:26 PM

Sorry, we discussed sending an update Thursday, but there was a power outage at SHN over the weekend, so things were delayed a bit from that. I'll send it along hopefully this afternoon, or tomorrow at the latest.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: <u>rcabeen@loni.usc.edu</u>

Web: http://cabeen.io

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 9:22 AM

Cenck thinks you sent me new data. I don't have them. Can you send? We are on the PI call.

Patrick D. Lyden, MD, FAAN, FAHA, FANA

Professor of Physiology and Neuroscience

Professor of Neurology

Zilkha Neurogenetic Institute

USC Keck School of Medicine of USC



From: Patrick Lyden | plyden@usc.edu

Wednesday, Jul 21, 4:22 PM

To: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

# Very interesting.

Do you still have the corner test data? The question would be, can you explain more variance in the corner test "alternative" index by using the hippocampus and thalamus, along with cortex and striatum. Also, I would be most interested in a map, such as the 3d map you made showing lesion densities in striatum vs cortex. But if you could swing it, a multivariable model incorporating all the lesion variables, plus site and sex, would be what we are waiting for from Marcio.

We can chat by phone about all of this as well.

Do please send to Marcio, although he is not back from vacation yet. Do not share with Cenk just yet please.

## Many thanks

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

To: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 20, 6:32 PM

Those variables are the volume of lesion overlapping with each of the listed regions, that is, what we added to compare cortical vs subcortical lesion extent.

I haven't shared with Cenk or Marcio yet, wanted to go through you first. I can send it along to them if you like. Also, I made a couple more refinements which are reflected in the attached data table.

Also, heard there was some flooding in western Mass, hope you are comfortably dry!

Ryan P. Cabeen, PhD
Chan Zuckerberg Imaging Scientist
Assistant Professor of Research Neurology
Laboratory of Neuro Imaging
USC Stevens Neuroimaging and Informatics Institute
Keck School of Medicine of USC
University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: cabeen.io www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Sunday, Jul 18, 4:28 AM

Thank you. Couple of questions:

What are the new variables "regions volume lesion (striatum, cortex, thalamus, hippocampus)"?

Have you sent this to Marcio or cenk?

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu

Wednesday, Jul 14, 2:18 AM

Following up, attached please find an updated data table, as well as associated tissue volume plots. The changes to the pipeline include:

- \* A more restrictive region where lesion is allowed to be detected. This removes what we concluded to be a systematic artifact in basal part of the brain.
- \* A more permissive lesion threshold which provides more sensitivity to small lesions (also increasing lesion size overall)

FYI, these changes came out of a few meetings with Cenk, were we looked at lesion maps and the results of a "parameter sweep", in which I exhaustively computed the lesion volumes obtained from of a sequence of threshold values in all of the stage one data. Happy to go over those pieces in detail if you'd like.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: http://cabeen.io

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 10:50 AM

Ok great.

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Tuesday, Jul 13, 12:26 PM

Sorry, we discussed sending an update Thursday, but there was a power outage at SHN over the

weekend, so things were delayed a bit from that. I'll send it along hopefully this afternoon, or tomorrow at the latest.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 9:22 AM

Cenck thinks you sent me new data. I don't have them. Can you send? We are on the PI call.

Patrick D. Lyden, MD, FAAN, FAHA, FANA

Professor of Physiology and Neuroscience

Professor of Neurology

Zilkha Neurogenetic Institute

USC Keck School of Medicine of USC

O: (323) 442-3917

ZNI 245 MC 2821

1501 San Pablo Street

Los Angeles, CA 90089-2821

plyden@usc.edu

From: Ryan Cabeen | ryan.cabeen@loni.usc.edu

Thursday, Jul 22, 5:29 PM

To: Patrick Lyden | plyden@usc.edu

Sounds like a good plan! I do have the corner test data for that analysis, so I'll work on making those 3D maps that account for other variables as well. Perhaps we can briefly discuss the results once I've made a first pass, and then subsequently share with Marcio for his guidance as you see fit?

Glad to hear that the flooding complications were manageable and folks are safe, welcome back

Ryan P. Cabeen, PhD Chan Zuckerberg Imaging Scientist Assistant Professor of Research Neurology
Laboratory of Neuro Imaging
USC Stevens Neuroimaging and Informatics Institute
Keck School of Medicine of USC
University of Southern California
2025 Zonal Ave.

Los Angeles, CA 90033 Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> <u>www.ini.usc.edu</u>

From: Patrick Lyden | plyden@usc.edu

Wednesday, Jul 21, 4:22 PM

Very interesting.

Do you still have the corner test data? The question would be, can you explain more variance in the corner test "alternative" index by using the hippocampus and thalamus, along with cortex and striatum. Also, I would be most interested in a map, such as the 3d map you made showing lesion densities in striatum vs cortex. But if you could swing it, a multivariable model incorporating all the lesion variables, plus site and sex, would be what we are waiting for from Marcio.

We can chat by phone about all of this as well.

Do please send to Marcio, although he is not back from vacation yet. Do not share with Cenk just yet please.

#### Many thanks

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

To: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 20, 6:32 PM

Those variables are the volume of lesion overlapping with each of the listed regions, that is, what we added to compare cortical vs subcortical lesion extent.

I haven't shared with Cenk or Marcio yet, wanted to go through you first. I can send it along to them if you like. Also, I made a couple more refinements which are reflected in the attached data table.

Also, heard there was some flooding in western Mass, hope you are comfortably dry!

Ryan P. Cabeen, PhD
Chan Zuckerberg Imaging Scientist
Assistant Professor of Research Neurology
Laboratory of Neuro Imaging
USC Stevens Neuroimaging and Informatics Institute
Keck School of Medicine of USC
University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> <u>www.ini.usc.edu</u>

From: Patrick Lyden | plyden@usc.edu

Sunday, Jul 18, 4:28 AM

Thank you. Couple of questions:

What are the new variables "regions\_volume\_lesion\_(striatum, cortex, thalamus, hippocampus)"?

Have you sent this to Marcio or cenk?

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Wednesday, Jul 14, 2:18 AM

Following up, attached please find an updated data table, as well as associated tissue volume plots. The changes to the pipeline include:

- \* A more restrictive region where lesion is allowed to be detected. This removes what we concluded to be a systematic artifact in basal part of the brain.
- \* A more permissive lesion threshold which provides more sensitivity to small lesions (also increasing lesion size overall)

FYI, these changes came out of a few meetings with Cenk, were we looked at lesion maps and the results of a "parameter sweep", in which I exhaustively computed the lesion volumes obtained from of a sequence of threshold values in all of the stage one data. Happy to go over those pieces in detail if you'd like.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: http://cabeen.io

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 10:50 AM

Ok great.

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Tuesday, Jul 13, 12:26 PM

Sorry, we discussed sending an update Thursday, but there was a power outage at SHN over the weekend, so things were delayed a bit from that. I'll send it along hopefully this afternoon, or tomorrow at the latest.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a>
<a href="http://cabeen.io">www.ini.usc.edu</a>

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 9:22 AM

Cenck thinks you sent me new data. I don't have them. Can you send? We are on the PI call.

Patrick D. Lyden, MD, FAAN, FAHA, FANA

Professor of Physiology and Neuroscience

Professor of Neurology

Zilkha Neurogenetic Institute

USC Keck School of Medicine of USC

O: (323) 442-3917

ZNI 245 MC 2821

1501 San Pablo Street

Los Angeles, CA 90089-2821

plyden@usc.edu

From: Patrick Lyden | plyden@usc.edu

Friday, Jul 23, 7:47 AM

To: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

Yes please, and Marcio is out of the country anyway. I am free tomorrow (Saturday), but then I will be taking a short Vacation sun to Wednesday. What would work for you on Saturday or Friday, 7/30

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

To: Patrick Lyden | plyden@usc.edu

Thursday, Jul 22, 5:29 PM

Sounds like a good plan! I do have the corner test data for that analysis, so I'll work on making those 3D maps that account for other variables as well. Perhaps we can briefly discuss the results once I've made a first pass, and then subsequently share with Marcio for his guidance as you see fit?

Glad to hear that the flooding complications were manageable and folks are safe, welcome back

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: <u>rcabeen@loni.usc.edu</u>

Web: <u>cabeen.io</u> <u>www.ini.usc.edu</u>

From: Patrick Lyden | plyden@usc.edu

Wednesday, Jul 21, 4:22 PM

Very interesting.

Do you still have the corner test data? The question would be, can you explain more variance in the corner test "alternative" index by using the hippocampus and thalamus, along with cortex and striatum. Also, I would be most interested in a map, such as the 3d map you made showing lesion densities in striatum vs cortex. But if you could swing it, a multivariable model incorporating all the lesion variables, plus site and sex, would be what we are waiting for from Marcio.

We can chat by phone about all of this as well.

Do please send to Marcio, although he is not back from vacation yet. Do not share with Cenk just yet please.

Many thanks

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

To: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 20, 6:32 PM

Those variables are the volume of lesion overlapping with each of the listed regions, that is, what we added to compare cortical vs subcortical lesion extent.

I haven't shared with Cenk or Marcio yet, wanted to go through you first. I can send it along to them if you like. Also, I made a couple more refinements which are reflected in the attached data table.

Also, heard there was some flooding in western Mass, hope you are comfortably dry!

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Sunday, Jul 18, 4:28 AM

Thank you. Couple of questions:

What are the new variables "regions\_volume\_lesion\_(striatum, cortex, thalamus, hippocampus)"?

Have you sent this to Marcio or cenk?

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Wednesday, Jul 14, 2:18 AM

Following up, attached please find an updated data table, as well as associated tissue volume plots. The changes to the pipeline include:

- \* A more restrictive region where lesion is allowed to be detected. This removes what we concluded to be a systematic artifact in basal part of the brain.
- \* A more permissive lesion threshold which provides more sensitivity to small lesions (also increasing lesion size overall)

FYI, these changes came out of a few meetings with Cenk, were we looked at lesion maps and the results of a "parameter sweep", in which I exhaustively computed the lesion volumes obtained from of a sequence of threshold values in all of the stage one data. Happy to go over those pieces in detail if you'd like.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 10:50 AM

Ok great.

From: **Ryan Cabeen** | To: **Patrick Lyden** | Tuesday, Jul 13, 12:26

Ryan.Cabeen@loni.usc.edu plyden@usc.edu

Sorry, we discussed sending an update Thursday, but there was a power outage at SHN over the weekend, so things were delayed a bit from that. I'll send it along hopefully this afternoon, or

Ryan P. Cabeen, PhD

tomorrow at the latest.

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 9:22 AM

Cenck thinks you sent me new data. I don't have them. Can you send? We are on the PI call.

Patrick D. Lyden, MD, FAAN, FAHA, FANA

Professor of Physiology and Neuroscience

Professor of Neurology

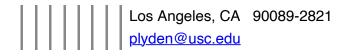
Zilkha Neurogenetic Institute

USC Keck School of Medicine of USC

O: (323) 442-3917

ZNI 245 MC 2821

1501 San Pablo Street



From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

Friday, Jul 23, 1:14 PM

To: Patrick Lyden | plyden@usc.edu

I'm taking a weekend trip up to eastern Sierra myself, but Friday 7/30 would work well. Does either 11am or after 2pm happen to work for you?

Also, Cenk asked to meet to review TTC annotations from 9am-11am that day, and I can send a zoom link if you'd like to join for that as well.

Ryan P. Cabeen, PhD
Chan Zuckerberg Imaging Scientist
Assistant Professor of Research Neurology
Laboratory of Neuro Imaging
USC Stevens Neuroimaging and Informatics Institute
Keck School of Medicine of USC
University of Southern California
2025 Zonal Ave.

Los Angeles, CA 90033 Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Friday, Jul 23, 7:47 AM

Yes please, and Marcio is out of the country anyway. I am free tomorrow (Saturday), but then I will be taking a short Vacation sun to Wednesday. What would work for you on Saturday or Friday, 7/30

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

To: Patrick Lyden | plyden@usc.edu

Thursday, Jul 22, 5:29 PM

Sounds like a good plan! I do have the corner test data for that analysis, so I'll work on making those 3D maps that account for other variables as well. Perhaps we can briefly discuss the results once I've made a first pass, and then subsequently share with Marcio for his guidance as you see fit?

Glad to hear that the flooding complications were manageable and folks are safe, welcome back

Ryan P. Cabeen, PhD
Chan Zuckerberg Imaging Scientist
Assistant Professor of Research Neurology
Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Wednesday, Jul 21, 4:22 PM

Very interesting.

Do you still have the corner test data? The question would be, can you explain more variance in the corner test "alternative" index by using the hippocampus and thalamus, along with cortex and striatum. Also, I would be most interested in a map, such as the 3d map you made showing lesion densities in striatum vs cortex. But if you could swing it, a multivariable model incorporating all the lesion variables, plus site and sex, would be what we are waiting for from Marcio.

We can chat by phone about all of this as well.

Do please send to Marcio, although he is not back from vacation yet. Do not share with Cenk just yet please.

Many thanks

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Tuesday, Jul 20, 6:32 PM

Those variables are the volume of lesion overlapping with each of the listed regions, that is, what we added to compare cortical vs subcortical lesion extent.

I haven't shared with Cenk or Marcio yet, wanted to go through you first. I can send it along to them if you like. Also, I made a couple more refinements which are reflected in the attached data table.

Also, heard there was some flooding in western Mass, hope you are comfortably dry!

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Sunday, Jul 18, 4:28 AM

Thank you. Couple of questions:

What are the new variables "regions\_volume\_lesion\_(striatum, cortex, thalamus, hippocampus)"?

Have you sent this to Marcio or cenk?

From: **Ryan Cabeen** | To: **Patrick Lyden** | Wednesday, Jul 14, 2:18

Ryan.Cabeen@loni.usc.edu plyden@usc.edu AM

Following up, attached please find an updated data table, as well as associated tissue volume plots. The changes to the pipeline include:

- \* A more restrictive region where lesion is allowed to be detected. This removes what we concluded to be a systematic artifact in basal part of the brain.
- \* A more permissive lesion threshold which provides more sensitivity to small lesions (also increasing lesion size overall)

FYI, these changes came out of a few meetings with Cenk, were we looked at lesion maps and the results of a "parameter sweep", in which I exhaustively computed the lesion volumes obtained from of a sequence of threshold values in all of the stage one data. Happy to go over those pieces in detail if you'd like.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: http://cabeen.io

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 10:50 AM

Ok great.

From: **Ryan Cabeen** | To: **Patrick Lyden** | Tuesday, Jul 13, 12:26

Ryan.Cabeen@loni.usc.edu plyden@usc.edu

Sorry, we discussed sending an update Thursday, but there was a power outage at SHN over the weekend, so things were delayed a bit from that. I'll send it along hopefully this afternoon, or tomorrow at the latest.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu Tuesday, Jul 13, 9:22 AM

Cenck thinks you sent me new data. I don't have them. Can you send? We are on the PI call.

Patrick D. Lyden, MD, FAAN, FAHA, FANA

Professor of Physiology and Neuroscience

Professor of Neurology

Zilkha Neurogenetic Institute

USC Keck School of Medicine of USC

O: (323) 442-3917

ZNI 245 MC 2821

1501 San Pablo Street

Los Angeles, CA 90089-2821

plyden@usc.edu

From: Patrick Lyden | plyden@usc.edu Friday, Jul 23, 1:55 PM

To: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

2pm next Wednesday, 7/30

Perfect. Will you send a zoom invite?

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

To: Patrick Lyden | plyden@usc.edu

Friday, Jul 23, 1:15 PM

I'm taking a weekend trip up to eastern Sierra myself, but Friday 7/30 would work well. Does either 11am or after 2pm happen to work for you?

Also, Cenk asked to meet to review TTC annotations from 9am-11am that day, and I can send a zoom link if you'd like to join for that as well.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Friday, Jul 23, 7:47 AM

Yes please, and Marcio is out of the country anyway. I am free tomorrow (Saturday), but then I will be taking a short Vacation sun to Wednesday. What would work for you on Saturday or Friday, 7/30

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

To: Patrick Lyden | plyden@usc.edu

Thursday, Jul 22, 5:29 PM

Sounds like a good plan! I do have the corner test data for that analysis, so I'll work on making those 3D maps that account for other variables as well. Perhaps we can briefly discuss the results once I've made a first pass, and then subsequently share with Marcio for his guidance as you see fit?

Glad to hear that the flooding complications were manageable and folks are safe, welcome back

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a>
<a href="http://cabeen.io">www.ini.usc.edu</a>

From: Patrick Lyden | plyden@usc.edu

Wednesday, Jul 21, 4:22 PM

Very interesting.

Do you still have the corner test data? The question would be, can you explain more variance in the corner test "alternative" index by using the hippocampus and thalamus, along with cortex and striatum. Also, I would be most interested in a map, such as the 3d map you made showing lesion densities in striatum vs cortex. But if you could swing it, a multivariable model incorporating all the lesion variables, plus site and sex, would be what we are waiting for from Marcio.

We can chat by phone about all of this as well.

Do please send to Marcio, although he is not back from vacation yet. Do not share with Cenk just yet please.

Many thanks

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Tuesday, Jul 20, 6:32 PM

Those variables are the volume of lesion overlapping with each of the listed regions, that is, what we added to compare cortical vs subcortical lesion extent.

I haven't shared with Cenk or Marcio yet, wanted to go through you first. I can send it along to them if you like. Also, I made a couple more refinements which are reflected in the attached data table.

Also, heard there was some flooding in western Mass, hope you are comfortably dry!

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: http://cabeen.io

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Sunday, Jul 18, 4:28 AM

Thank you. Couple of questions:

What are the new variables "regions\_volume\_lesion\_(striatum, cortex, thalamus, hippocampus)"?

Have you sent this to Marcio or cenk?

From: Ryan Cabeen | To: Patrick Lyden Wednesday, Jul 14, 2:18

Ryan.Cabeen@loni.usc.edu plyden@usc.edu

Following up, attached please find an updated data table, as well as associated tissue volume plots. The changes to the pipeline include:

- \* A more restrictive region where lesion is allowed to be detected. This removes what we concluded to be a systematic artifact in basal part of the brain.
- \* A more permissive lesion threshold which provides more sensitivity to small lesions (also increasing lesion size overall)

FYI, these changes came out of a few meetings with Cenk, were we looked at lesion maps and the results of a "parameter sweep", in which I exhaustively computed the lesion volumes obtained from of a sequence of threshold values in all of the stage one data. Happy to go over those pieces in detail if you'd like.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: http://cabeen.io

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 10:50 AM

PM

Ok great.

From: Ryan Cabeen | To: Patrick Lyden Tuesday, Jul 13, 12:26

Ryan.Cabeen@loni.usc.edu plyden@usc.edu

Sorry, we discussed sending an update Thursday, but there was a power outage at SHN over the weekend, so things were delayed a bit from that. I'll send it along hopefully this afternoon, or tomorrow at the latest.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: http://cabeen.io

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 9:22 AM

Cenck thinks you sent me new data. I don't have them. Can you send? We are on the PI call.

Patrick D. Lyden, MD, FAAN, FAHA, FANA

Professor of Physiology and Neuroscience

Professor of Neurology

Zilkha Neurogenetic Institute

USC Keck School of Medicine of USC

O: (323) 442-3917

ZNI 245 MC 2821

1501 San Pablo Street

Los Angeles, CA 90089-2821

plyden@usc.edu

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

Friday, Jul 23, 2:08 PM

To: Patrick Lyden | plyden@usc.edu

Great, sent a calendar invite for Friday 7/30 and below is a copy of the zoom. Hope you have a nice vacation

Topic: SPAN MRI review with Ryan

Time: Jul 30, 2021 02:00 PM Pacific Time (US and Canada)

Join Zoom Meeting

usc.zoom.us/j/3214616632

Meeting ID: 321 461 6632

One tap mobile

+16699006833,,3214616632# US (San Jose)

+12532158782,,3214616632# US (Tacoma)

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: cabeen.io www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Friday, Jul 23, 1:55 PM

2pm next Wednesday, 7/30

Perfect. Will you send a zoom invite?

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu

Friday, Jul 23, 1:15 PM

I'm taking a weekend trip up to eastern Sierra myself, but Friday 7/30 would work well. Does either 11am or after 2pm happen to work for you?

Also, Cenk asked to meet to review TTC annotations from 9am-11am that day, and I can send a zoom link if you'd like to join for that as well.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u>

## www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Friday, Jul 23, 7:47 AM

Yes please, and Marcio is out of the country anyway. I am free tomorrow (Saturday), but then I will be taking a short Vacation sun to Wednesday. What would work for you on Saturday or Friday, 7/30

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Thursday, Jul 22, 5:29 PM

Sounds like a good plan! I do have the corner test data for that analysis, so I'll work on making those 3D maps that account for other variables as well. Perhaps we can briefly discuss the results once I've made a first pass, and then subsequently share with Marcio for his guidance as you see fit?

Glad to hear that the flooding complications were manageable and folks are safe, welcome back

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Wednesday, Jul 21, 4:22 PM

Very interesting.

Do you still have the corner test data? The question would be, can you explain more variance in the corner test "alternative" index by using the hippocampus and thalamus, along with cortex and striatum. Also, I would be most interested in a map, such as the 3d map you made showing lesion densities in striatum vs cortex. But if you could swing it, a multivariable model incorporating all the lesion variables, plus site and sex, would be what we are waiting for from Marcio.

We can chat by phone about all of this as well.

Do please send to Marcio, although he is not back from vacation yet. Do not share with Cenk just yet please.

Many thanks

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Tuesday, Jul 20, 6:32 PM

Those variables are the volume of lesion overlapping with each of the listed regions, that is, what we added to compare cortical vs subcortical lesion extent.

I haven't shared with Cenk or Marcio yet, wanted to go through you first. I can send it along to them if you like. Also, I made a couple more refinements which are reflected in the attached data table.

Also, heard there was some flooding in western Mass, hope you are comfortably dry!

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Sunday, Jul 18, 4:28 AM

Thank you. Couple of questions:

What are the new variables "regions\_volume\_lesion\_(striatum, cortex, thalamus, hippocampus)"?

Have you sent this to Marcio or cenk?

From: Ryan Cabeen |

To: Patrick Lyden

Wednesday, Jul 14, 2:18

Ryan.Cabeen@loni.usc.edu

plyden@usc.edu

AM

Following up, attached please find an updated data table, as well as associated tissue volume plots. The changes to the pipeline include:

- \* A more restrictive region where lesion is allowed to be detected. This removes what we concluded to be a systematic artifact in basal part of the brain.
- \* A more permissive lesion threshold which provides more sensitivity to small lesions (also increasing lesion size overall)

FYI, these changes came out of a few meetings with Cenk, were we looked at lesion maps and the results of a "parameter sweep", in which I exhaustively computed the lesion volumes obtained from of a sequence of threshold values in all of the stage one data. Happy to go over those pieces in detail if you'd like.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a>
www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu Tuesday, Jul 13, 10:50 AM

Ok great.

From: **Ryan Cabeen** | To: **Patrick Lyden** | Tuesday, Jul 13, 12:26

Ryan.Cabeen@loni.usc.edu plyden@usc.edu

Sorry, we discussed sending an update Thursday, but there was a power outage at SHN over the weekend, so things were delayed a bit from that. I'll send it along hopefully this afternoon, or tomorrow at the latest.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a>

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 9:22 AM

Cenck thinks you sent me new data. I don't have them. Can you send? We are on the PI call.

Ш	
Ш	Patrick D. Lyden, MD, FAAN, FAHA, FANA
Ш	Professor of Physiology and Neuroscience
Ш	Professor of Neurology
Ш	Zilkha Neurogenetic Institute
Ш	USC Keck School of Medicine of USC
Ш	O: (323) 442-3917
Ш	ZNI 245 MC 2821
Ш	1501 San Pablo Street
Ш	Los Angeles, CA 90089-2821
	plyden@usc.edu

From: **Ryan Cabeen** I ryan.cabeen@loni.usc.edu Friday, Jul 30, 5:18 PM

To: Patrick Lyden | plyden@usc.edu

Just to follow up with a few updates. I repeated the voxel-wise statistics tests with the expanded region like we discussed, and also, I thought to test each site separately, which might explain things a bit.

The statistical maps showed some sites have distinct cortical effect that are in the opposite direction of the striatum effect, i.e. similar to the blue/red pattern of the earlier movies. However, the sites each have somewhat different cortical effects, while they mostly agree on the striatum effect. So I wonder if that cortical heterogeneity might explain why there were no significant effects when looking at the cohort as a whole.

I'll make a panel of images for each site so you can see the distribution, but I wanted to share that update for you to ponder while that's in the works.

Ryan P. Cabeen, PhD
Chan Zuckerberg Imaging Scientist
Assistant Professor of Research Neurology
Laboratory of Neuro Imaging
USC Stevens Neuroimaging and Informatics Institute
Keck School of Medicine of USC
University of Southern California
2025 Zonal Ave.

Los Angeles, CA 90033 Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> www.ini.usc.edu

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

Friday, Jul 23, 2:08 PM

Great, sent a calendar invite for Friday 7/30 and below is a copy of the zoom. Hope you have a nice vacation

Topic: SPAN MRI review with Ryan

Time: Jul 30, 2021 02:00 PM Pacific Time (US and Canada)

Join Zoom Meeting

usc.zoom.us/j/3214616632

Meeting ID: 321 461 6632

One tap mobile

+16699006833,,3214616632# US (San Jose)

+12532158782,,3214616632# US (Tacoma)

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Friday, Jul 23, 1:55 PM

2pm next Wednesday, 7/30

Perfect. Will you send a zoom invite?

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

To: Patrick Lyden | plyden@usc.edu Friday

Friday, Jul 23, 1:15 PM

I'm taking a weekend trip up to eastern Sierra myself, but Friday 7/30 would work well. Does either 11am or after 2pm happen to work for you?

Also, Cenk asked to meet to review TTC annotations from 9am-11am that day, and I can send a zoom link if you'd like to join for that as well.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> <u>www.ini.usc.edu</u>

From: Patrick Lyden | plyden@usc.edu

Friday, Jul 23, 7:47 AM

Yes please, and Marcio is out of the country anyway. I am free tomorrow (Saturday), but then I will be taking a short Vacation sun to Wednesday. What would work for you on Saturday or Friday, 7/30

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Thursday, Jul 22, 5:29 PM

Sounds like a good plan! I do have the corner test data for that analysis, so I'll work on making those 3D maps that account for other variables as well. Perhaps we can briefly discuss the results once I've made a first pass, and then subsequently share with Marcio for his guidance as you see fit?

Glad to hear that the flooding complications were manageable and folks are safe, welcome back

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: http://cabeen.io

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Wednesday, Jul 21, 4:22 PM

Very interesting.

Do you still have the corner test data? The question would be, can you explain more variance in the corner test "alternative" index by using the hippocampus and thalamus, along with cortex and striatum. Also, I would be most interested in a map, such as the 3d map you made showing lesion densities in striatum vs cortex. But if you could swing it, a multivariable model incorporating all the lesion variables, plus site and sex, would be what we are waiting for from Marcio.

We can chat by phone about all of this as well.

Do please send to Marcio, although he is not back from vacation yet. Do not share with Cenk just yet please.

## Many thanks

From: **Ryan Cabeen** I To: **Patrick Lyden** I Tuesday, Jul 20, 6:32 Ryan.Cabeen@loni.usc.edu plyden@usc.edu PM

Those variables are the volume of lesion overlapping with each of the listed regions, that is, what we added to compare cortical vs subcortical lesion extent.

I haven't shared with Cenk or Marcio yet, wanted to go through you first. I can send it along to them if you like. Also, I made a couple more refinements which are reflected in the attached data table.

Also, heard there was some flooding in western Mass, hope you are comfortably dry!

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a>

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Sunday, Jul 18, 4:28 AM

Thank you. Couple of questions:

What are the new variables "regions\_volume\_lesion\_(striatum, cortex, thalamus, hippocampus)"?

Have you sent this to Marcio or cenk?

From: **Ryan Cabeen** | To: **Patrick Lyden** | Wednesday, Jul 14, 2:18

Ryan.Cabeen@loni.usc.edu plyden@usc.edu AM

Following up, attached please find an updated data table, as well as associated tissue volume plots. The changes to the pipeline include:

- \* A more restrictive region where lesion is allowed to be detected. This removes what we concluded to be a systematic artifact in basal part of the brain.
- \* A more permissive lesion threshold which provides more sensitivity to small lesions (also increasing lesion size overall)

FYI, these changes came out of a few meetings with Cenk, were we looked at lesion maps and the results of a "parameter sweep", in which I exhaustively computed the lesion volumes obtained from of a sequence of threshold values in all of the stage one data. Happy to go over those pieces in detail if you'd like.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: http://cabeen.io

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 10:50 AM

Ok great.

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden plyden@usc.edu

Tuesday, Jul 13, 12:26

Sorry, we discussed sending an update Thursday, but there was a power outage at SHN over the weekend, so things were delayed a bit from that. I'll send it along hopefully this afternoon, or tomorrow at the latest.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033
Tel: (323) 44-BRAIN
Email: rcabeen@loni.usc.edu
Web: http://cabeen.io
www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Cenck thinks you sent me new data. I don't have them. Can you send? We are on the PI call.

Patrick D. Lyden, MD, FAAN, FAHA, FANA
Professor of Physiology and Neuroscience
Professor of Neurology
Zilkha Neurogenetic Institute
USC Keck School of Medicine of USC
O: (323) 442-3917
ZNI 245 MC 2821

1501 San Pablo Street

plyden@usc.edu

Los Angeles, CA 90089-2821

Saturday, Jul 31, 11:43 AM

To: Patrick Lyden | plyden@usc.edu

From: Ryan Cabeen | ryan.cabeen@loni.usc.edu

One more update to share (promise it's the last of the weekend) related to the TTC analysis -- I computed the fractional lesion volumes from the TTC outlines and compared them with MRI-derived fractional lesion volumes. Attached are scatter plots, along with the Pearson correlation. I looked at all cases (N=36 cases) and also a subset with reliable TTC (N=24 cases with at most 5% disagreement between human raters); the correlation coefficients were 0.742 and 0.865, respectively. Should be interesting to do the comparison among individual slices!

### -Ryan

From: Ryan Cabeen | ryan.cabeen@loni.usc.edu

Friday, Jul 30, 5:18 PM

Just to follow up with a few updates. I repeated the voxel-wise statistics tests with the expanded region like we discussed, and also, I thought to test each site separately, which might explain things a bit.

The statistical maps showed some sites have distinct cortical effect that are in the opposite direction of the striatum effect, i.e. similar to the blue/red pattern of the earlier movies. However, the sites each have somewhat different cortical effects, while they mostly agree on the striatum effect. So I wonder if that cortical heterogeneity might explain why there were no significant effects when looking at the cohort as a whole.

I'll make a panel of images for each site so you can see the distribution, but I wanted to share that update for you to ponder while that's in the works.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: <u>rcabeen@loni.usc.edu</u>

Web: <u>cabeen.io</u> <u>www.ini.usc.edu</u>

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

Friday, Jul 23, 2:08 PM

Great, sent a calendar invite for Friday 7/30 and below is a copy of the zoom. Hope you have a nice vacation

Topic: SPAN MRI review with Ryan

Time: Jul 30, 2021 02:00 PM Pacific Time (US and Canada)

Join Zoom Meeting

usc.zoom.us/j/3214616632

Meeting ID: 321 461 6632

One tap mobile

+16699006833,,3214616632# US (San Jose)

+12532158782,,3214616632# US (Tacoma)

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: cabeen.io

### www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu Friday, Jul 23, 1:55 PM

2pm next Wednesday, 7/30

Perfect. Will you send a zoom invite?

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Friday, Jul 23, 1:15 PM

I'm taking a weekend trip up to eastern Sierra myself, but Friday 7/30 would work well. Does either 11am or after 2pm happen to work for you?

Also, Cenk asked to meet to review TTC annotations from 9am-11am that day, and I can send a zoom link if you'd like to join for that as well.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Friday, Jul 23, 7:47 AM

Yes please, and Marcio is out of the country anyway. I am free tomorrow (Saturday), but then I will be taking a short Vacation sun to Wednesday. What would work for you on Saturday or Friday, 7/30

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Thursday, Jul 22, 5:29 PM

Sounds like a good plan! I do have the corner test data for that analysis, so I'll work on making those 3D maps that account for other variables as well. Perhaps we can briefly discuss the results once I've made a first pass, and then subsequently share with Marcio for his guidance as you see fit?

Glad to hear that the flooding complications were manageable and folks are safe, welcome back

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a>

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Wednesday, Jul 21, 4:22 PM

Very interesting.

Do you still have the corner test data? The question would be, can you explain more variance in the corner test "alternative" index by using the hippocampus and thalamus, along with cortex and striatum. Also, I would be most interested in a map, such as the 3d map you made showing lesion densities in striatum vs cortex. But if you could swing it, a multivariable model incorporating all the lesion variables, plus site and sex, would be what we are waiting for from Marcio.

We can chat by phone about all of this as well.

Do please send to Marcio, although he is not back from vacation yet. Do not share with Cenk just yet please.

Many thanks

From: Ryan Cabeen |

To: Patrick Lyden

Tuesday, Jul 20, 6:32

Ryan.Cabeen@loni.usc.edu

plyden@usc.edu

PM

Those variables are the volume of lesion overlapping with each of the listed regions, that is, what we added to compare cortical vs subcortical lesion extent.

I haven't shared with Cenk or Marcio yet, wanted to go through you first. I can send it along to them if you like. Also, I made a couple more refinements which are reflected in the attached data table.

Also, heard there was some flooding in western Mass, hope you are comfortably dry!

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Sunday, Jul 18, 4:28 AM

Thank you. Couple of questions:

What are the new variables "regions\_volume\_lesion\_(striatum, cortex, thalamus, hippocampus)" ?

Have you sent this to Marcio or cenk?

From: Ryan Cabeen |

To: Patrick Lyden |

Wednesday, Jul 14, 2:18

Ryan.Cabeen@loni.usc.edu

plyden@usc.edu

1030day, 001 14, 2.10

Following up, attached please find an updated data table, as well as associated tissue volume plots. The changes to the pipeline include:

- \* A more restrictive region where lesion is allowed to be detected. This removes what we concluded to be a systematic artifact in basal part of the brain.
- \* A more permissive lesion threshold which provides more sensitivity to small lesions (also increasing lesion size overall)

FYI, these changes came out of a few meetings with Cenk, were we looked at lesion maps and the results of a "parameter sweep", in which I exhaustively computed the lesion volumes obtained from of a sequence of threshold values in all of the stage one data. Happy to go over those pieces in detail if you'd like.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: http://cabeen.io

# www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu Tuesday, Jul 13, 10:50 AM

Ok great.

From: Ryan Cabeen | To: Patrick Lyden | Tuesday, Jul 13, 12:26

Ryan.Cabeen@loni.usc.edu plyden@usc.edu

sc.edu PM

Sorry, we discussed sending an update Thursday, but there was a power outage at SHN over the weekend, so things were delayed a bit from that. I'll send it along hopefully this afternoon, or tomorrow at the latest.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: http://cabeen.io

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu Tuesday, Jul 13, 9:22 AM

Cenck thinks you sent me new data. I don't have them. Can you send? We are on the PI call.

Patrick D. Lyden, MD, FAAN, FAHA, FANA

Professor of Physiology and Neuroscience

Professor of Neurology

Zilkha Neurogenetic Institute

USC Keck School of Medicine of USC

O: (323) 442-3917

ZNI 245 MC 2821

1501 San Pablo Street

Los Angeles, CA 90089-2821

plyden@usc.edu

From: Patrick Lyden | plyden@usc.edu

Sunday, Aug 1, 10:35 AM

To: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

To: Patrick Lyden | plyden@usc.edu

Saturday, Jul 31, 11:43 AM

One more update to share (promise it's the last of the weekend) related to the TTC analysis -- I computed the fractional lesion volumes from the TTC outlines and compared them with MRI-derived fractional lesion volumes. Attached are scatter plots, along with the Pearson correlation. I looked at all cases (N=36 cases) and also a subset with reliable TTC (N=24 cases with at most 5% disagreement between human raters); the correlation coefficients were 0.742 and 0.865, respectively. Should be interesting to do the comparison among individual slices!

## -Ryan

From: Ryan Cabeen | ryan.cabeen@loni.usc.edu

Friday, Jul 30, 5:18 PM

Just to follow up with a few updates. I repeated the voxel-wise statistics tests with the expanded region like we discussed, and also, I thought to test each site separately, which might explain things a bit.

The statistical maps showed some sites have distinct cortical effect that are in the opposite direction of the striatum effect, i.e. similar to the blue/red pattern of the earlier movies. However, the sites each have somewhat different cortical effects, while they mostly agree on the striatum effect. So I wonder if that cortical heterogeneity might explain why there were no significant effects when looking at the cohort as a whole.

I'll make a panel of images for each site so you can see the distribution, but I wanted to share that update for you to ponder while that's in the works.

Ryan P. Cabeen, PhD
Chan Zuckerberg Imaging Scientist
Assistant Professor of Research Neurology
Laboratory of Neuro Imaging
USC Stevens Neuroimaging and Informatics Institute
Keck School of Medicine of USC
University of Southern California
2025 Zonal Ave.

Los Angeles, CA 90033

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> <u>www.ini.usc.edu</u>

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu

Friday, Jul 23, 2:08 PM

Great, sent a calendar invite for Friday 7/30 and below is a copy of the zoom. Hope you have a nice vacation

Topic: SPAN MRI review with Ryan

Time: Jul 30, 2021 02:00 PM Pacific Time (US and Canada)

Join Zoom Meeting

https://usc.zoom.us/j/3214616632

Meeting ID: 321 461 6632

One tap mobile

+16699006833,,3214616632# US (San Jose)

+12532158782,,3214616632# US (Tacoma)

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <u>cabeen.io</u> www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Friday, Jul 23, 1:55 PM

2pm next Wednesday, 7/30

Perfect. Will you send a zoom invite?

From: Ryan Cabeen | Ryan.Cabeen@loni.usc.edu To: Patrick Lyden | plyden@usc.edu Friday, Jul 23, 1:15 PM

I'm taking a weekend trip up to eastern Sierra myself, but Friday 7/30 would work well. Does either 11am or after 2pm happen to work for you?

Also, Cenk asked to meet to review TTC annotations from 9am-11am that day, and I can send a zoom link if you'd like to join for that as well.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC University of Southern California 2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: <a href="http://cabeen.io">http://cabeen.io</a>
<a href="www.ini.usc.edu">www.ini.usc.edu</a>

From: Patrick Lyden | plyden@usc.edu

Friday, Jul 23, 7:47 AM

Yes please, and Marcio is out of the country anyway. I am free tomorrow (Saturday), but then I will be taking a short Vacation sun to Wednesday. What would work for you on Saturday or Friday, 7/30

From: **Ryan Cabeen** | To: **Patrick Lyden** | Thursday, Jul 22, 5:29 Ryan.Cabeen@loni.usc.edu plyden@usc.edu PM

Sounds like a good plan! I do have the corner test data for that analysis, so I'll work on making those 3D maps that account for other variables as well. Perhaps we can briefly discuss the results once I've made a first pass, and then subsequently share with Marcio for his guidance as you see fit?

Glad to hear that the flooding complications were manageable and folks are safe, welcome back

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: http://cabeen.io

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Wednesday, Jul 21, 4:22 PM

Very interesting.

Do you still have the corner test data? The question would be, can you explain more variance in the corner test "alternative" index by using the hippocampus and thalamus, along with cortex and striatum. Also, I would be most interested in a map, such as the 3d map you made showing lesion densities in striatum vs cortex. But if you could swing it, a multivariable model incorporating all the lesion variables, plus site and sex, would be what we are waiting for from Marcio.

We can chat by phone about all of this as well.

Do please send to Marcio, although he is not back from vacation yet. Do not share with Cenk just yet please.

### Many thanks

From: Ryan Cabeen | To: Patrick Lyden Tuesday, Jul 20, 6:32 Ryan.Cabeen@loni.usc.edu plyden@usc.edu

Those variables are the volume of lesion overlapping with each of the listed regions, that is, what we added to compare cortical vs subcortical lesion extent.

I haven't shared with Cenk or Marcio yet, wanted to go through you first. I can send it along to them if you like. Also, I made a couple more refinements which are reflected in the attached data table.

Also, heard there was some flooding in western Mass, hope you are comfortably dry!

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: http://cabeen.io www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Sunday, Jul 18, 4:28 AM

AM

Thank you. Couple of questions:

What are the new variables "regions\_volume\_lesion\_(striatum, cortex, thalamus, hippocampus)" ?

Have you sent this to Marcio or cenk?

From: Ryan Cabeen | To: Patrick Lyden Wednesday, Jul 14, 2:18 Ryan.Cabeen@loni.usc.edu plyden@usc.edu

Following up, attached please find an updated data table, as well as associated tissue volume plots. The changes to the pipeline include:

- \* A more restrictive region where lesion is allowed to be detected. This removes what we concluded to be a systematic artifact in basal part of the brain.
- \* A more permissive lesion threshold which provides more sensitivity to small lesions (also increasing lesion size overall)

FYI, these changes came out of a few meetings with Cenk, were we looked at lesion maps and the results of a "parameter sweep", in which I exhaustively computed the lesion volumes obtained from of a sequence of threshold values in all of the stage one data. Happy to go over those pieces in detail if you'd like.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

University of Southern California

2025 Zonal Ave.

Los Angeles, CA 90033

Tel: (323) 44-BRAIN

Email: rcabeen@loni.usc.edu

Web: http://cabeen.io

www.ini.usc.edu

From: Patrick Lyden | plyden@usc.edu

Tuesday, Jul 13, 10:50 AM

Ok great.

From: Ryan Cabeen |

To: Patrick Lyden

Tuesday, Jul 13, 12:26

Ryan.Cabeen@loni.usc.edu

plyden@usc.edu

DI

Sorry, we discussed sending an update Thursday, but there was a power outage at SHN over the weekend, so things were delayed a bit from that. I'll send it along hopefully this afternoon, or tomorrow at the latest.

Ryan P. Cabeen, PhD

Chan Zuckerberg Imaging Scientist

Assistant Professor of Research Neurology

Laboratory of Neuro Imaging

USC Stevens Neuroimaging and Informatics Institute

Keck School of Medicine of USC

