

Tics and Sleep – Unfortunate Bedfellows

ESSTS Athens 2025

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Why do children need sleep?



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Learning from children (Not just little adults...)

- By the age of 2 years the average child has spent 13 months sleeping
- Memory, behaviour and learning
- Growth, metabolism, immune function, injuries
- Obesity and cardiovascular

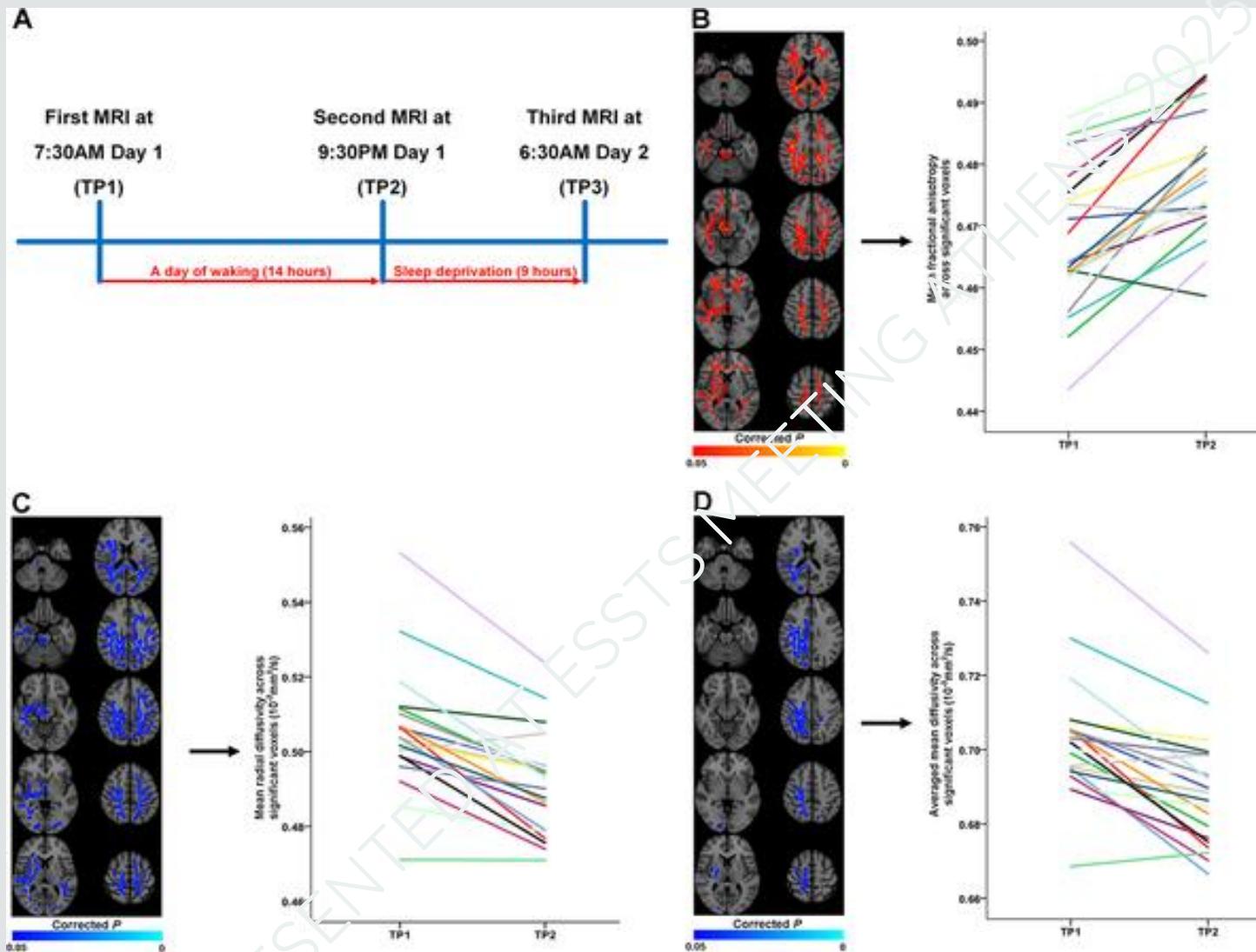


Learning from children (Not just little adults...)

- By the age of 2 years the average child has spent 13 months sleeping
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Brain White Matter Changes after Sleep Deprivation



Elvsåshagen T, Norbom LB, Pedersen PØ, Quraishi SH, Bjørnerud A, et al. (2015) Widespread Changes in White Matter Microstructure after a Day of Waking and Sleep Deprivation. PLoS ONE 10(5): e0127351. doi:10.1371/journal.pone.0127351
<http://journals.plos.org/plosone/article?id=info:doi/10.1371/journal.pone.0127351>

Sleep difficulties in children with Tourette syndrome and chronic tic disorders: a systematic review of characteristics and associated factors

[Get access >](#)

Charlotte Hibberd, Tony Charman, Raj Seraya Bhatoa, Sinem Tekes, Tammy Hedderly, Paul Gringras, Sally Robinson 

Sleep, Volume 43, Issue 6, June 2020, zsz308, <https://doi.org/10.1093/sleep/zsz308>

Published: 20 December 2019 Article history ▾

- 18 Studies
- Estimates of sleep difficulties range 9.7%-80.4%
- Other factors studied included:
 - -Tic severity
 - -Psychopathology
 - -Neurodevelopmental disorder
 - -Medication use
- Co-morbid anxiety biggest risk factor

Research Paper

Risk of Sleep Disorders among Patients with Tourette Syndrome: A Population-Based Cohort Study in Taiwan

Ning-Jen Chung^{1*}, Yung-Puung Lai^{2,3*}, Yih Yang⁴, Shuo-Yan Gau^{1,5}, Shiang-Wen Huang¹, Tung-Han Tsai⁶, Kuang-Hua Huang^{6†}, Chien-Ying Lee^{2,3†}

- 13,646 patients
- Increased risk of sleep disorders (higher >18 vs <7)
- Comorbid ADHD increased risk
- Comorbid anxiety increased risk

Asking more questions

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- TS and Sleep phenotypes
 - No tics experienced at night
 - Tics affect falling asleep
 - Tics affect falling back to sleep
 - Tics wake from sleep
 - Tics feature in dreams
 - Tics occur during dreams

A Tic and Sleep Questionnaire

Tics and Sleep Questionnaire

1. Do your tics stop you being able to fall asleep at night?

 0  1  2  3  4

2. If you wake in the night, do your tics stop you from getting back to sleep?

 0  1  2  3  4

3. Have your tics ever woken you up from sleep?

 0  1  2  3  4

4. Do you ever dream about your tics?

 0  1  2  3  4

5. When your tics are really bad during the day, do you dream about them more at night?

 0  1  2  3  4

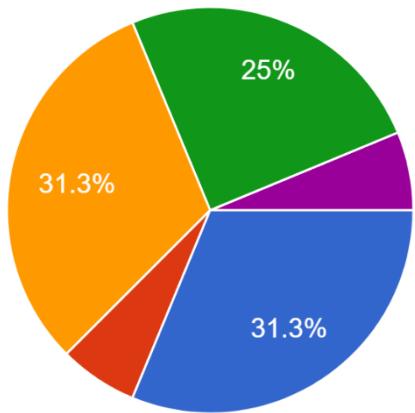
6. Have you ever thought—or has someone told you—that you tic during your dreams?

 0  1  2  3  4

Tics and Sleep

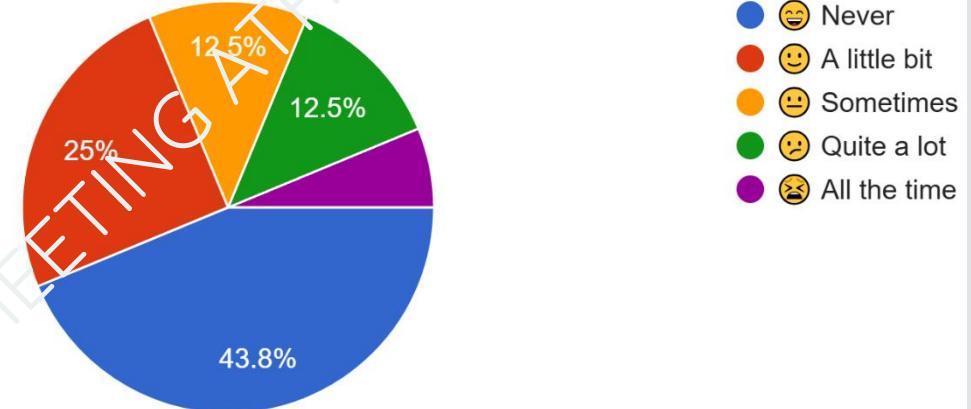
Do your tics stop you from falling asleep at night?

16 responses



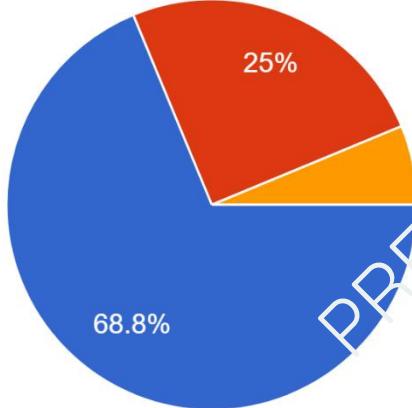
If you wake up in the night, do your tics stop you from getting back to sleep?

16 responses



Do your tics wake you up from sleep?

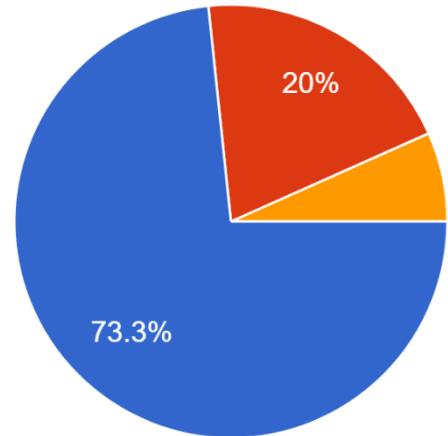
16 responses



Tics and Dreams

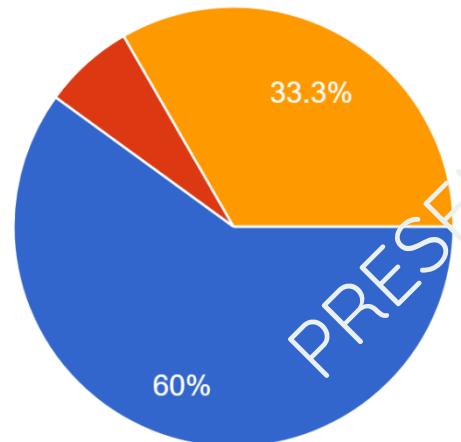
Do you ever dream about your tics?

15 responses



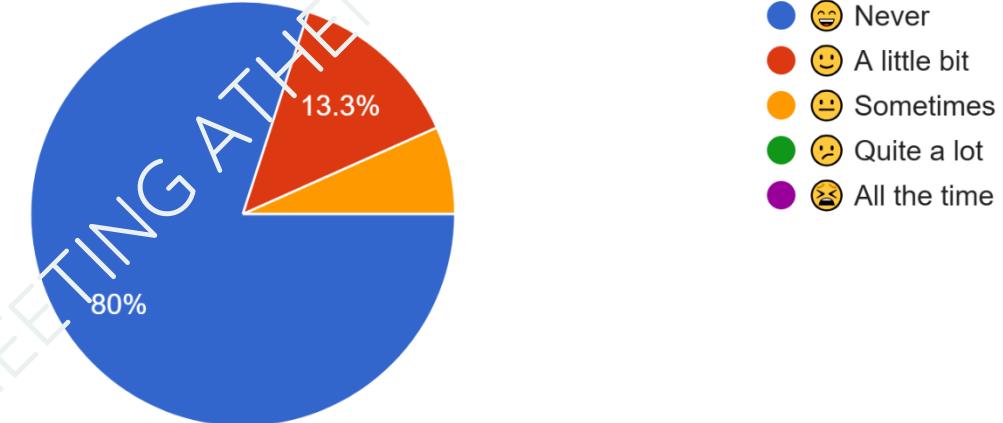
Do you think that you actually tic during your dreams?

15 responses



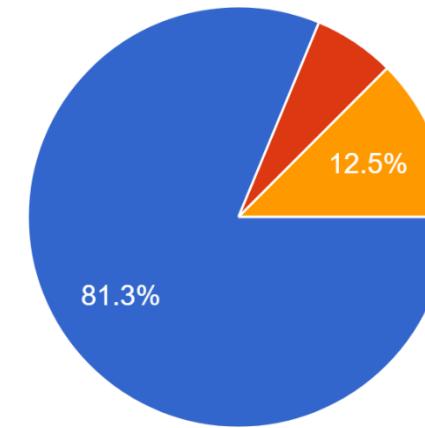
When your tics are really bad during the day, do you dream about them more at night?

15 responses



Has someone told you that you tic during your dreams?

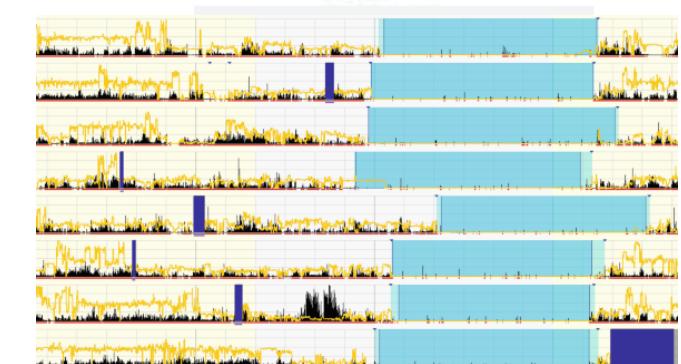
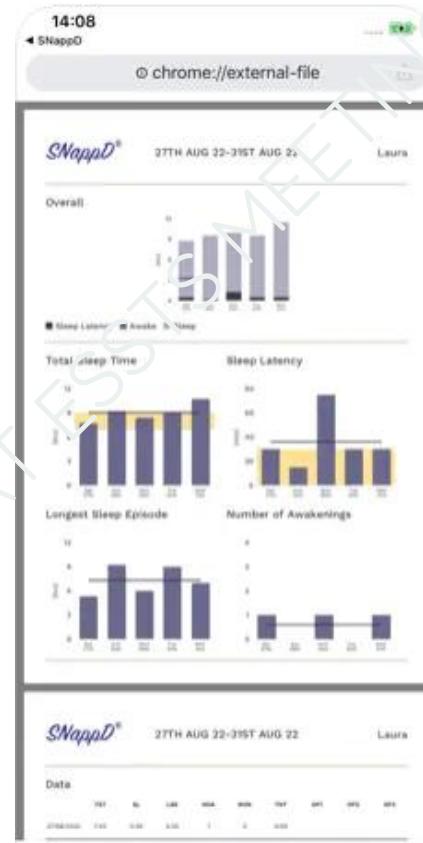
16 responses



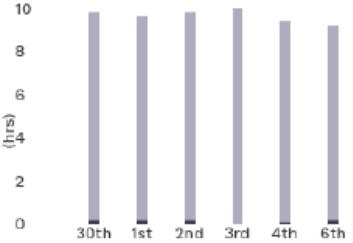
Sleep Diagnostics

1

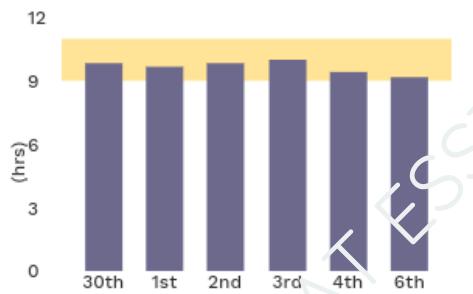
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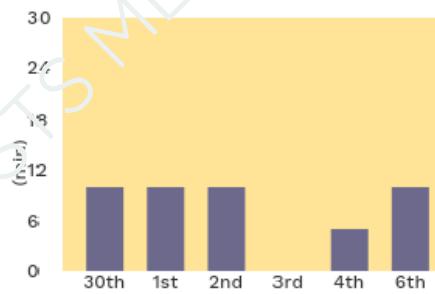
Overall



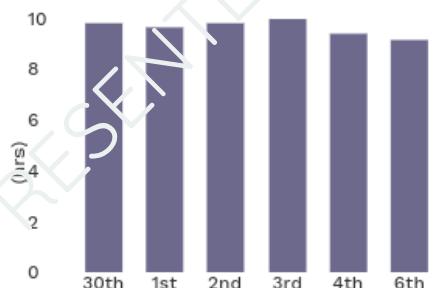
Total Sleep Time



Sleep Latency



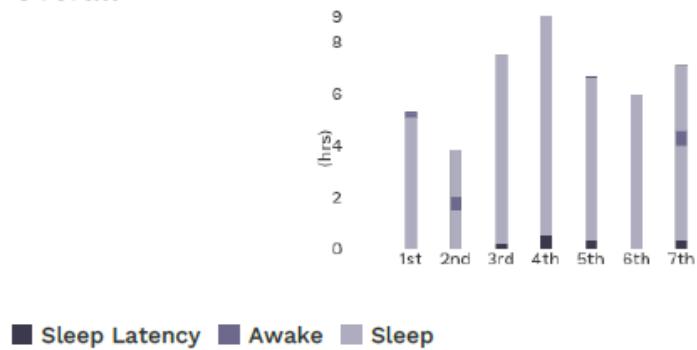
Longest Sleep Episode



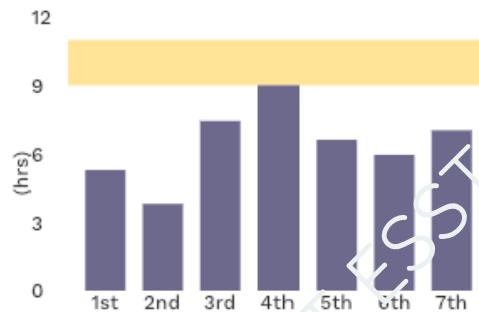
Number of Awakenings



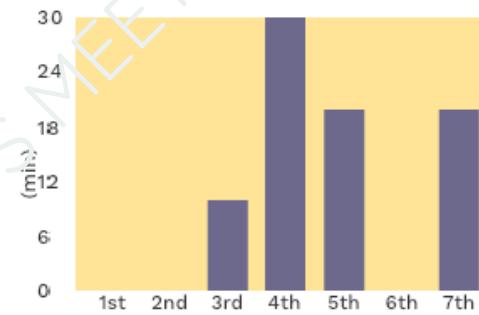
Overall



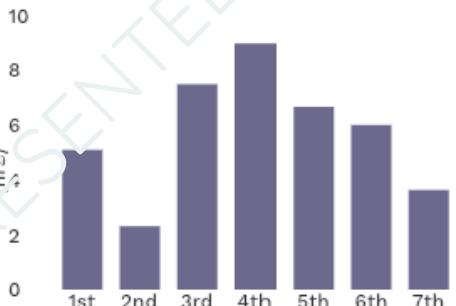
Total Sleep Time



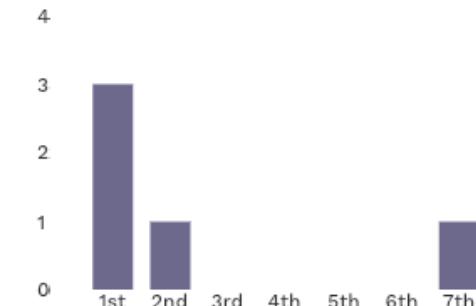
Sleep Latency



Longest Sleep Episode

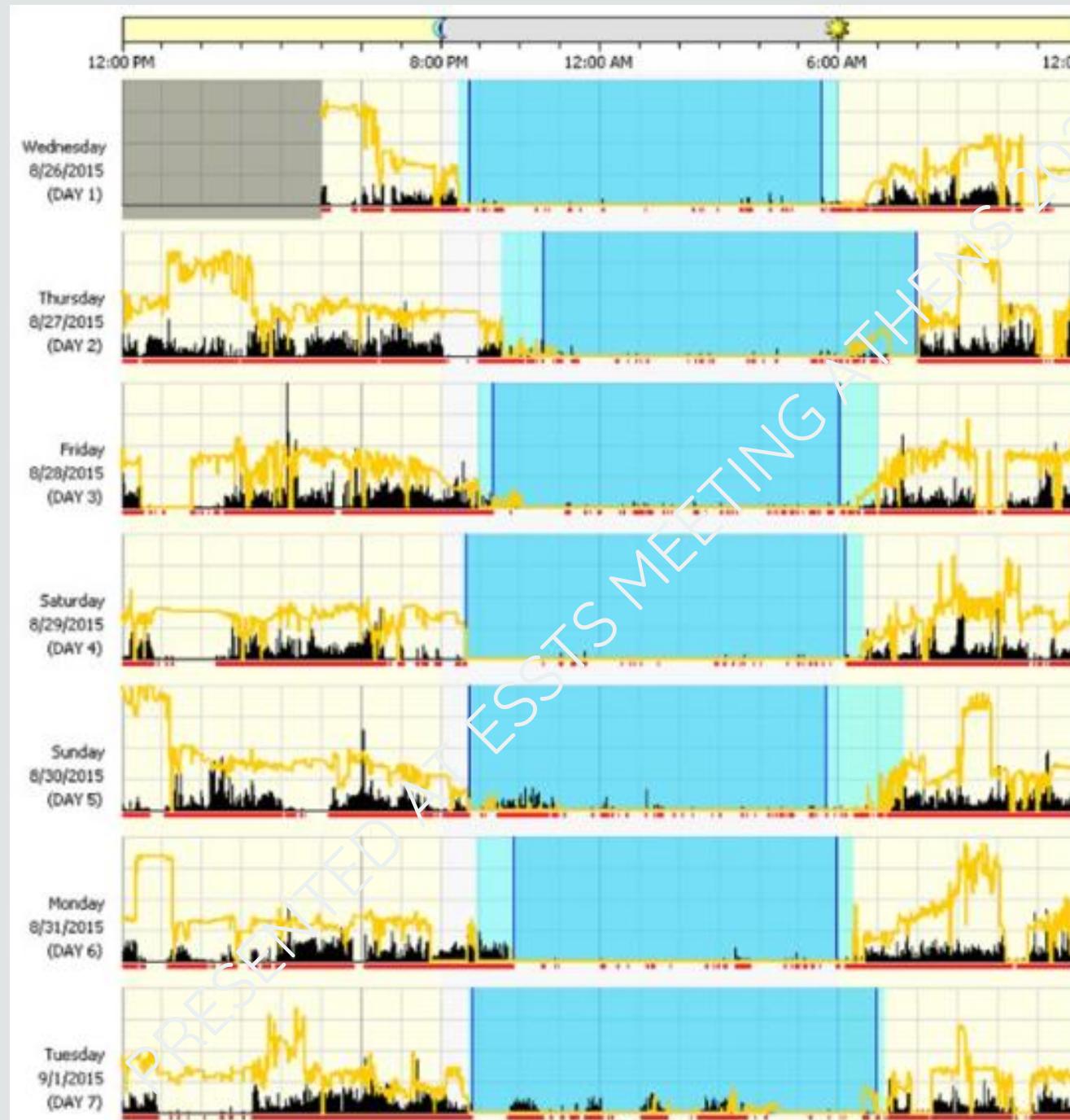


Number of Awakenings



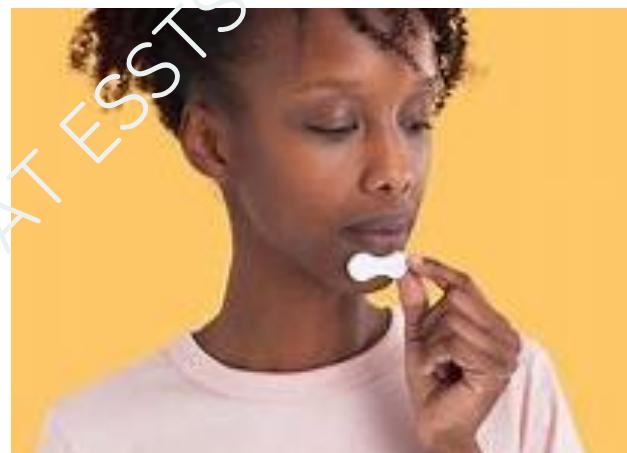
Data

	TST	SL	LSE	NOA	NON	TNT	Night	Morning	Now
13/10/2024	6:50	2:35	2:00	4	0	0:00			
14/10/2024	9:20	2:15	4:40	3	0	0:00			
15/10/2024	5:55	4:40	2:40	5	0	0:00			
16/10/2024	7:55	2:40	3:00	3	0	0:00			
17/10/2024	7:00	2:45	2:30	3	0	0:00			
18/10/2024	7:30	2:25	4:10	6	0	0:00			
19/10/2024	7:45	4:10	4:20	3	0	0:00			
Average record for given time	7:28	3:04	3:20	3.9	0.0	0:00			



Sleep Diagnostics 2

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Sleep Disorders that are unlikely to be associated with TS

Circadian Rhythm Sleep Wake Disorders

Obstructive Sleep Apnoea

Hypersomnia including narcolepsy

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Sleep Disorders that are likely to be associated with TS

Insomnia (7% more than general population)

More movements in sleep

Parasomnias (sleepwalking three times more common)

Restless Leg Syndrome

Possibly REM behaviour disorder

Rivière JB, Xiong L, Levchenko A, et al. Association of intronic variants of the BTBD9 gene with Tourette syndrome. Arch Neurol. 2009;66:1267–1272.

F.J. Jiménez-Jiménez, H. Alonso-Navarro, E. García-Martín, J.A.G. Agúndez Sleep disorders in Tourette syndrome Sleep Med. Rev., 53 (2020)

Isomura K, Sidorchuk A, Sevilla-Cermeño L, et al. Insomnia in Tourette syndrome and chronic tic disorder. Mov Disord. 2022;37:392–400.

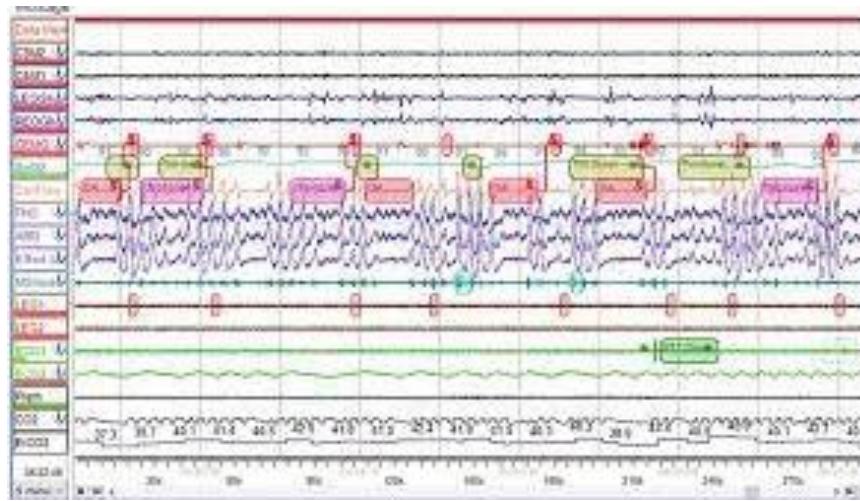
Sleep Diagnostics

3

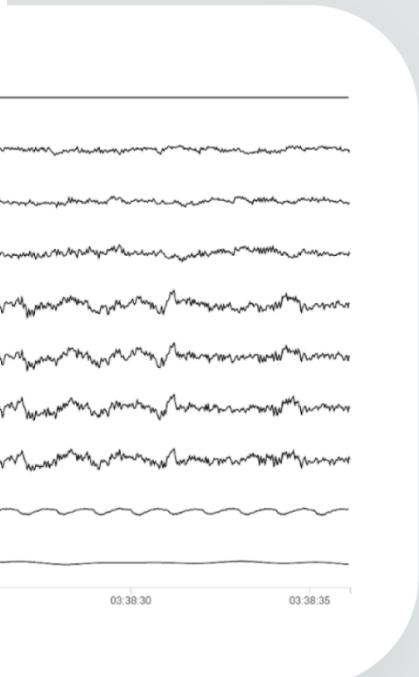
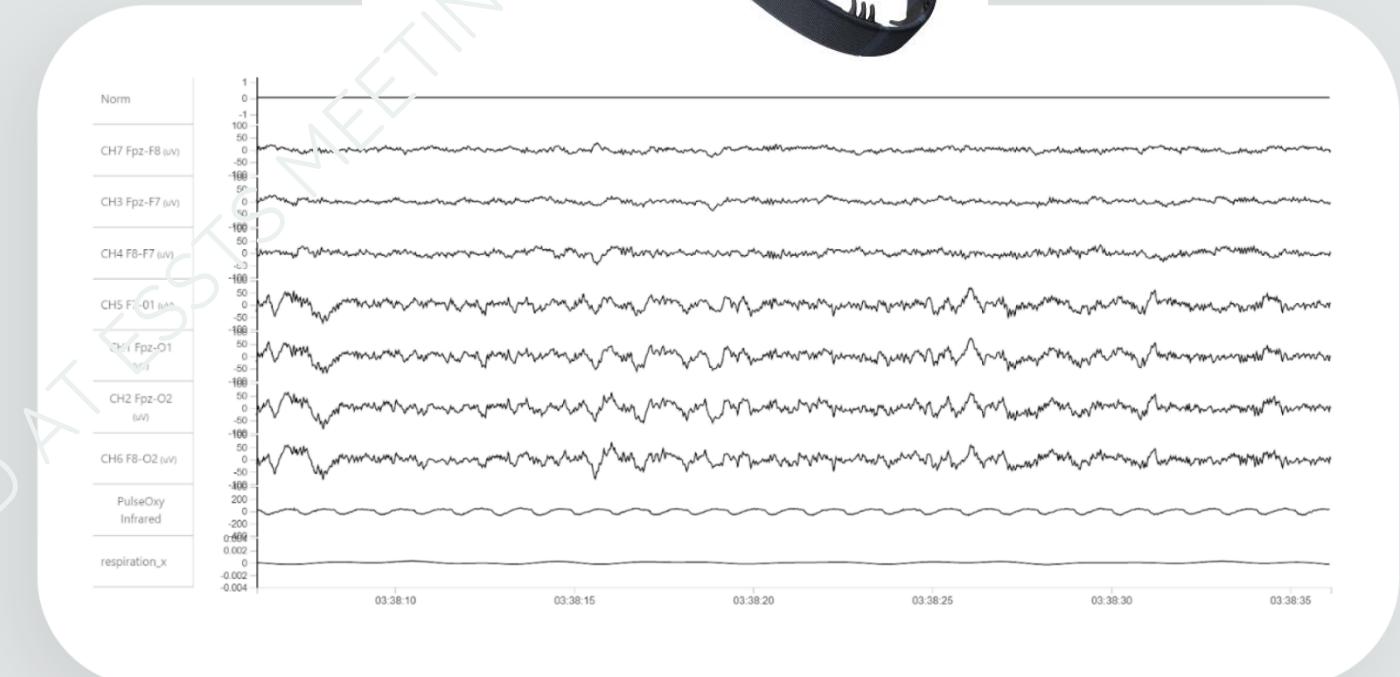
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Ambulatory PSG and AI

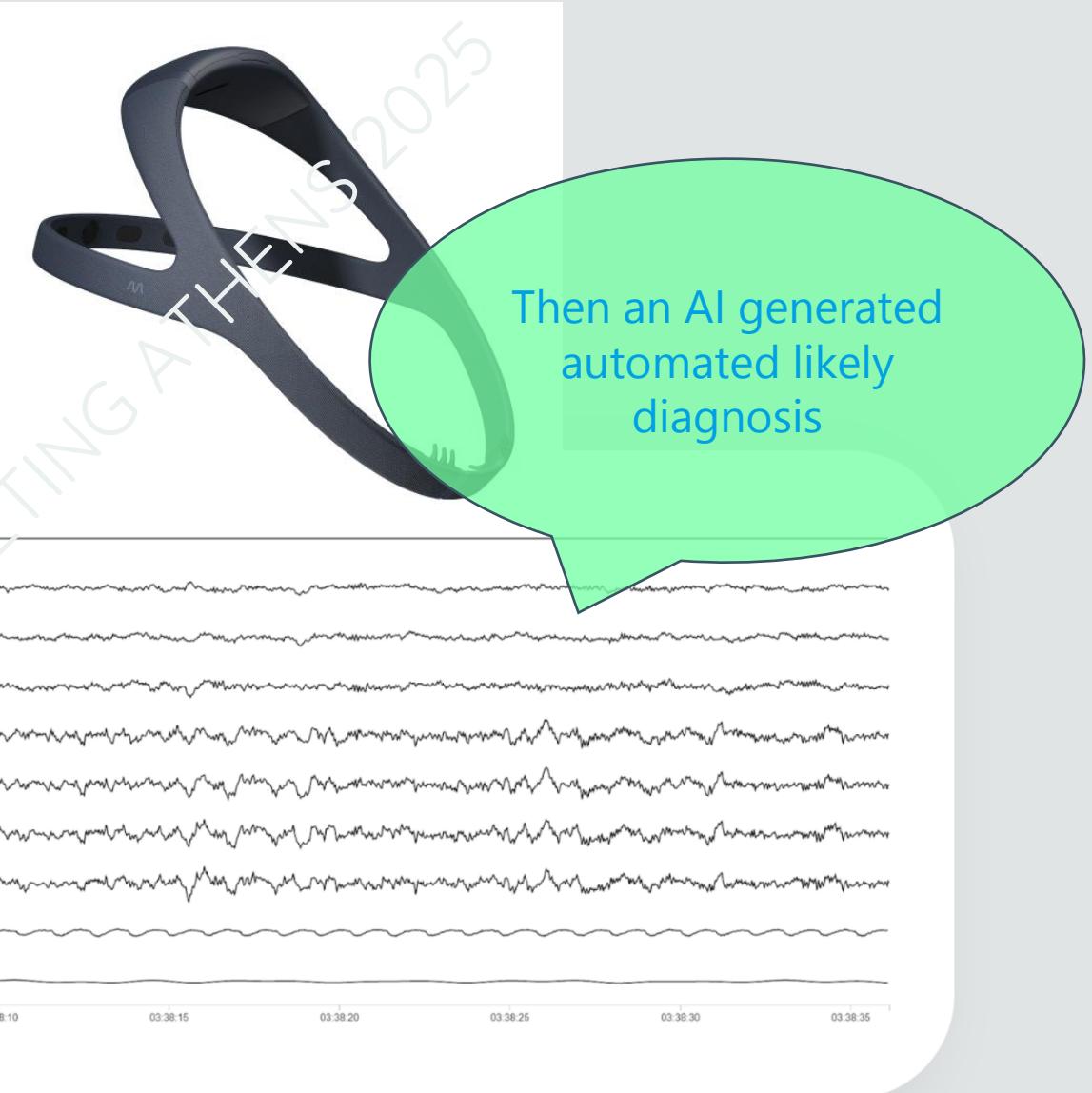
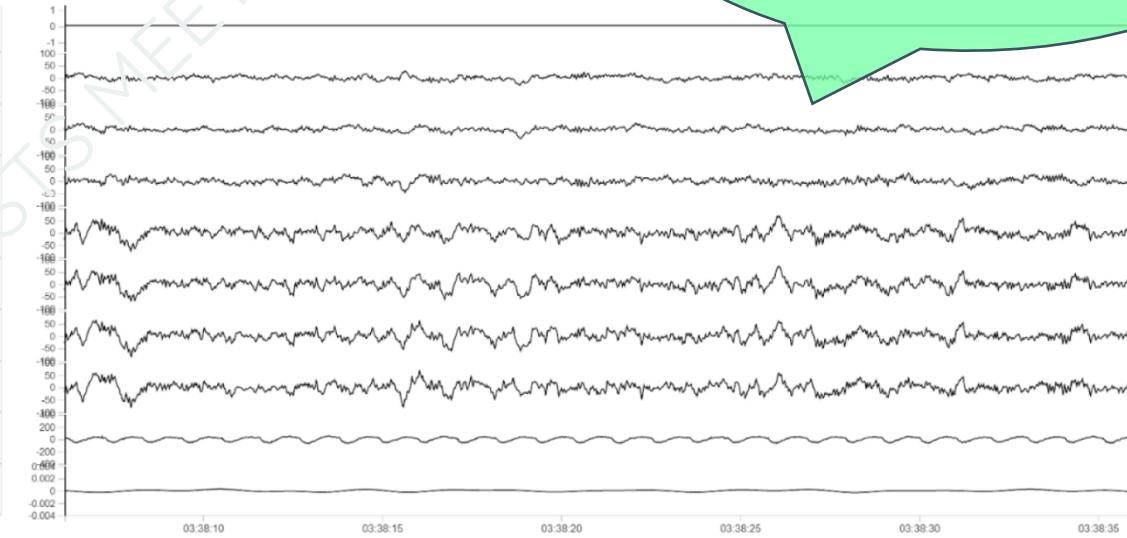


Ambulatory PSG and AI



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Norm
CH7 Fpz-F8 (uV)
CH3 Fpz-F7 (uV)
CH4 F8-F7 (uV)
CH5 Fz-O1 (uV)
CH1 Fpz-O1 (uV)
CH2 Fpz-O2 (uV)
CH6 F8-O2 (uV)
PulseOxy Infrared
respiration_X



Ticcing all through the night!

- 25 patients with TS (mean age 29 years)
- PSG and Video
- All patients had tics in their sleep (higher REM than non REM)
- Higher movement index
- Positive correlation with TS severity
- Clue about volitional nature of tics?

Decreased sleep quality and increased sleep related movements in Tourette's syndrome

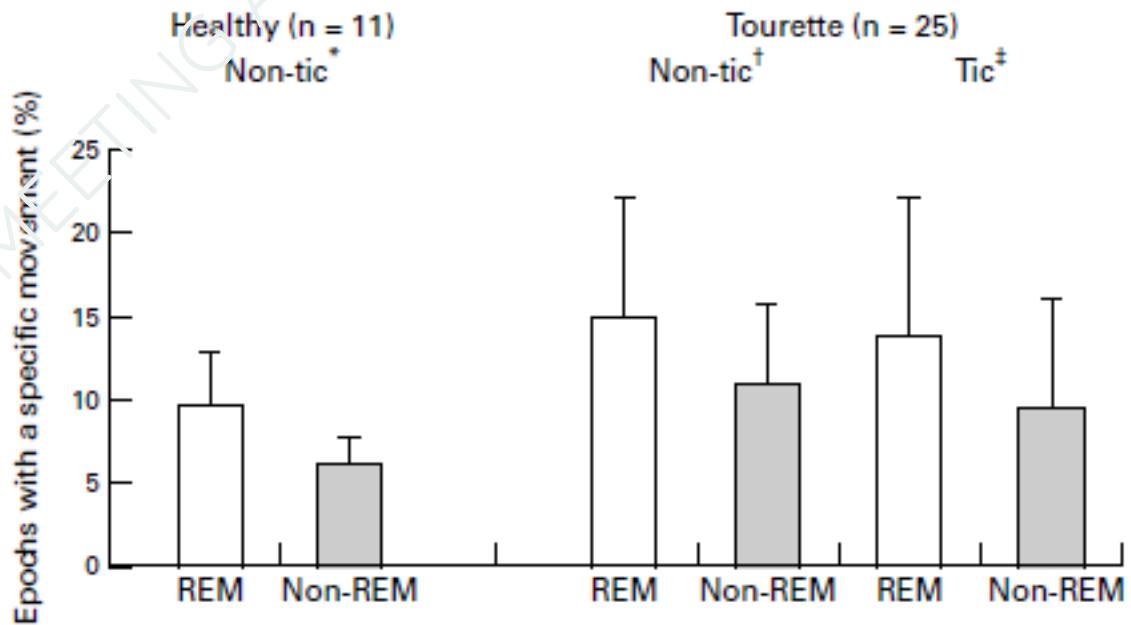
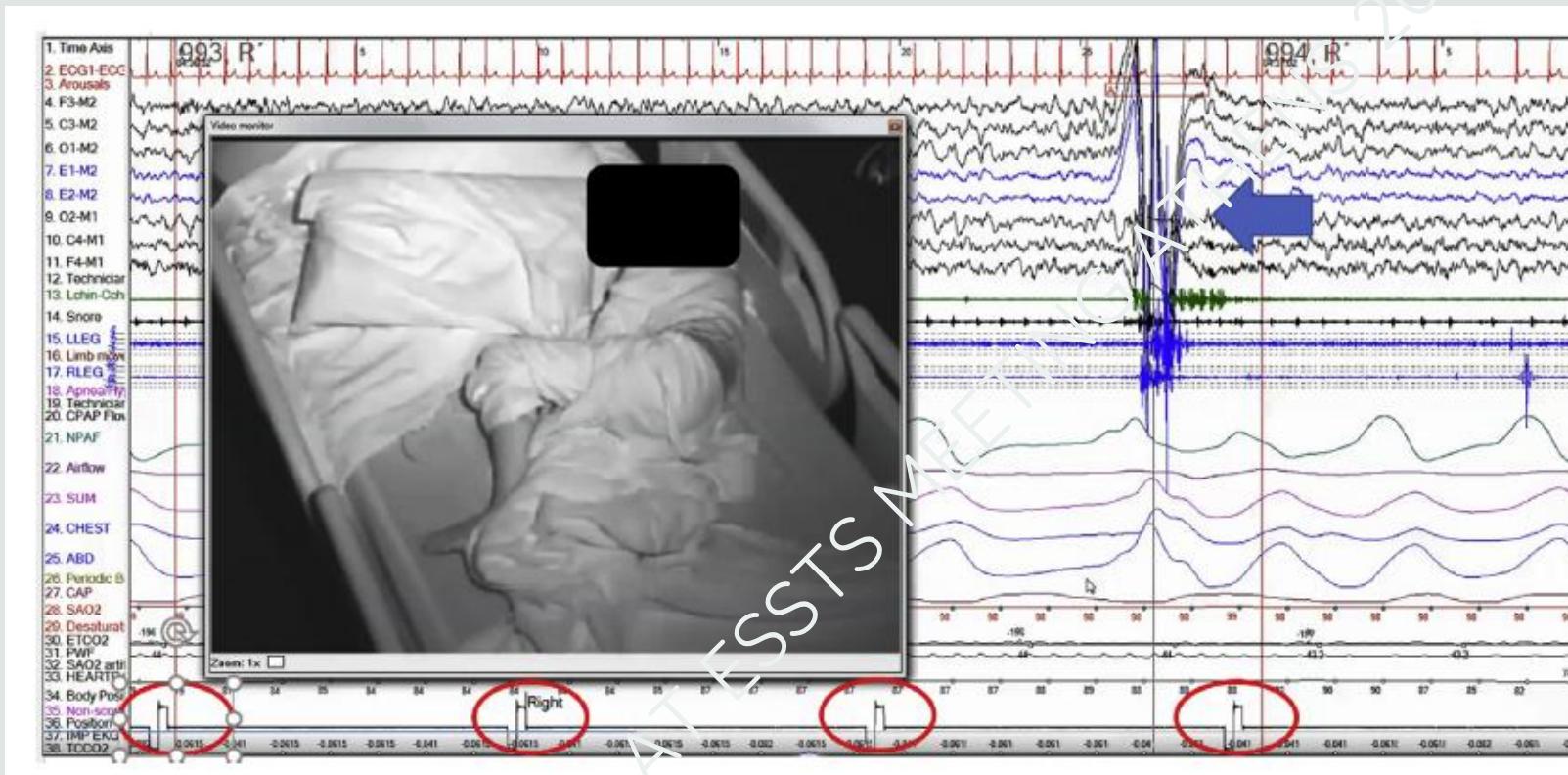


Figure 2 Frequency of tic and non-tic epochs in patients with Tourette's syndrome (n=25) and healthy controls (n=11) in percentage of epochs of REM or non-REM sleep.

*Significant sleep stage effect (10 (3) v 6 (2); $p < 0.01$); †Significant sleep stage effect (15 (7) v 11 (5); $p < 0.02$); ‡Significant sleep stage effect (14 (8) v 9 (6); $p < 0.02$).

Polysomnography



DelRosso LM, Blaty JL. Tourette Disorder and Sleep. *Biomedical Journal* 45 2022 240-249 Keenan L et al
Overlapping sleep disturbances in persistent tic disorders and attention-deficit hyperactivity disorder: A
systematic review and meta-analysis of polysomnographic findings. *Neuroscience & Biobehavioral
Reviews*, Volume 126, 2021,
194-212,

Restless legs syndromes - quotes from clinic

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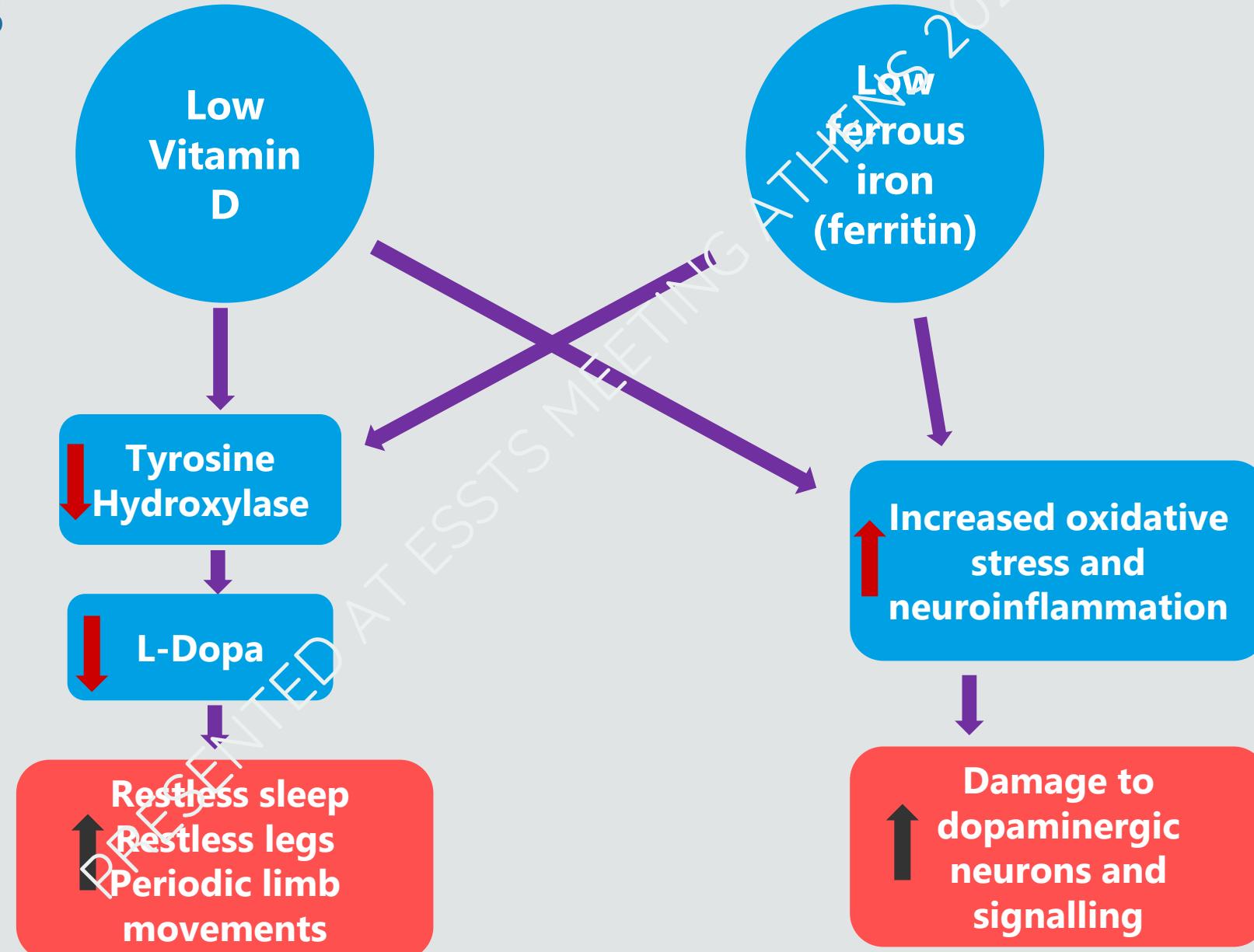
'Creepy-crawly feelings in my legs'

'Bugs crawling on my legs'

'Like fizzy stuff going up my veins'

'Its worse if I have to keep still'

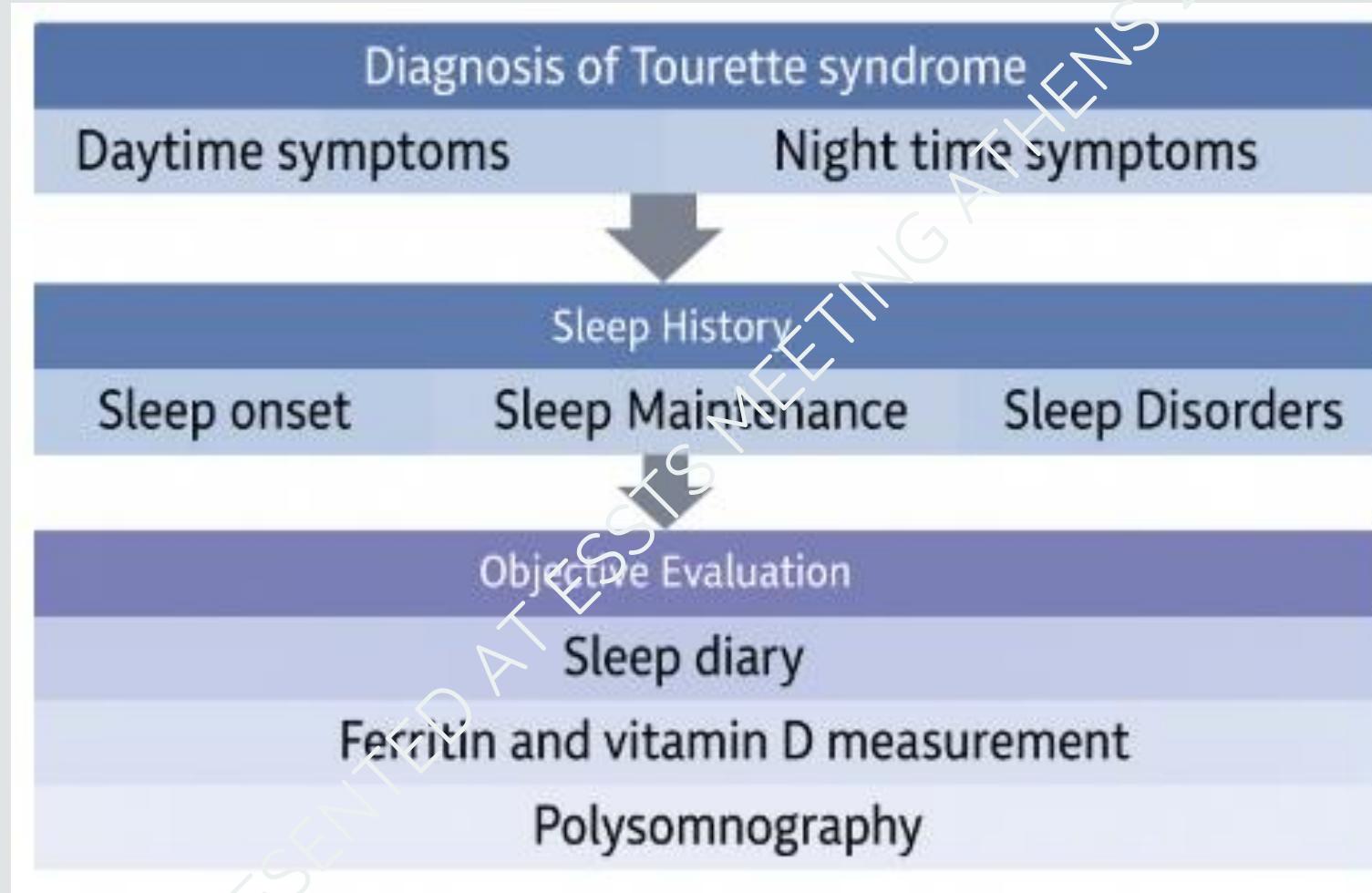
Role of Iron and Vitamin D in sleep movement disorders



TS Sleep Summary

- Insomnia and sleep disruptions are increased in TS
- Overnight arousals secondary to the underlying TD can cause other symptoms including daytime somnolence
- The tics themselves can contribute to insomnia, night wakings or dream disturbances

Suggested Sleep and TS Algorithm



Next steps

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- Use our sleep questionnaire
- Research systematic measurement of ferritin and Vitamin D and treatment effect on sleep
- Consider adding full EEG to PSG
- Consider ambulatory AI PSG

Thanks!

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