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fNIRS Analysis on



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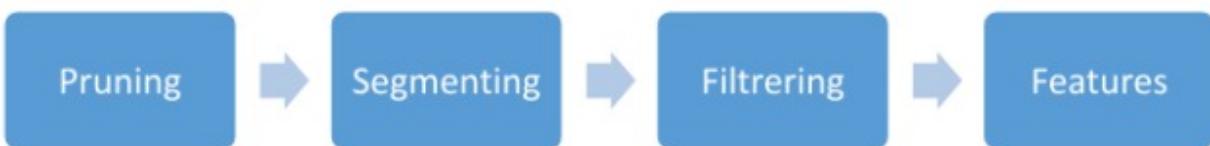
fNIRS Analysis

Patient Name:
Date of Analysis: 26-06-2025
Patient ID:
Date of Birth: 26-06-1995
Gender: Other
Protocol Name:
Diagnosis:



1.3. fNIRS Data Analysis:

All data were filtered with a 4th order Butterworth band pass filter with cut-off frequencies of [0.01 0.09] Hz. Then the data were segmented based on task episodes. Flow chart of the data analysis is given below:



Where **Pruning**: stands for initial data quality check for high spikes, drifts, motion artifacts and poor probe contact. After pruning, data were decimated 4 times to a lower sampling frequency of 1.95 Hz. **Segmenting**: stands for cutting the data into segments of motor imagery. **Filtering**: is performed on segmented data with a 4th order butterworth band pass filter at cutoff frequencies of [0.01 0.09] Hz. **Features**: were calculated from the segmented data for the duration of the task (20 seconds). MAX, LAG, MEAN, AUC, RANGE, and POWER values were computed for each of the rest and task episodes with the below formulas:

$MAX(A) = C_A$	$LAG(A) = TP[MAX(A)]$
$MEAN(A) = \frac{1}{T} \sum_T C_A$	$AUC(A) = \int_{T_S} C_A(t) dt$
$RANGE(A) = \max(C_A) - \min(C_A)$	$POWER(A) = \frac{1}{T} \sum_T C_A^2$

In these equations, C stands for the chromophore (i.e. HBO, HB, OXY, HBT), A for the activity, T for TASK duration (20 seconds).

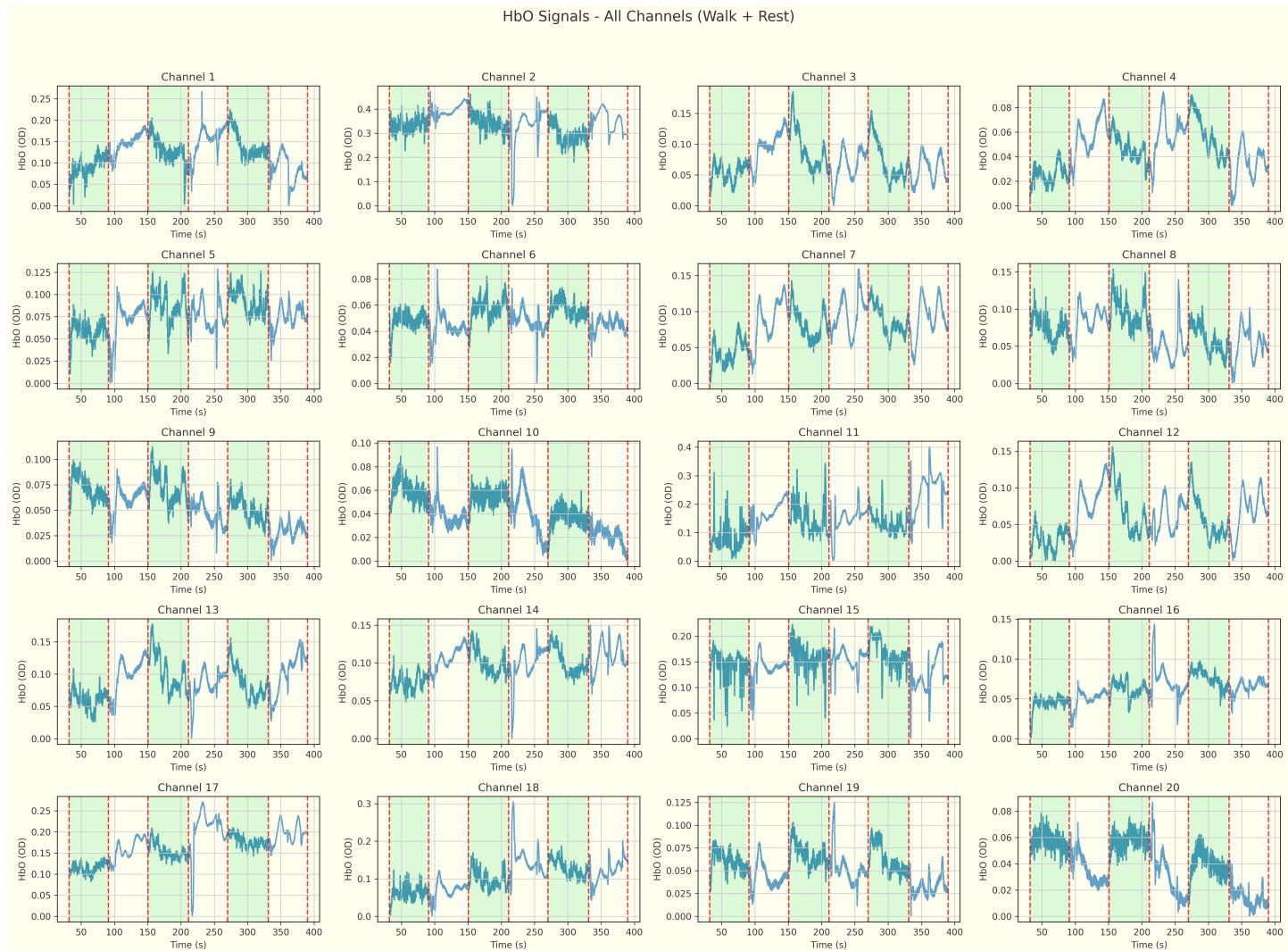
These neurovascular coupling (NVC) parameters were then converted to Z-scores by the following equation:

$$Z_A^C = \frac{P_A^C - \mu_A^C}{\sigma_A^C}$$

Where P_A^C is the parameter (i.e. MAX, LAG, MEAN, AUC, RANGE, POWER) of the Chromophore (i.e. HB, HBO, OXY or HBT), μ_A^C is the mean of the P_A^C for a specific Chromophore over all channels and episodes for the set A , and σ_A^C is the standard deviation of the same set.



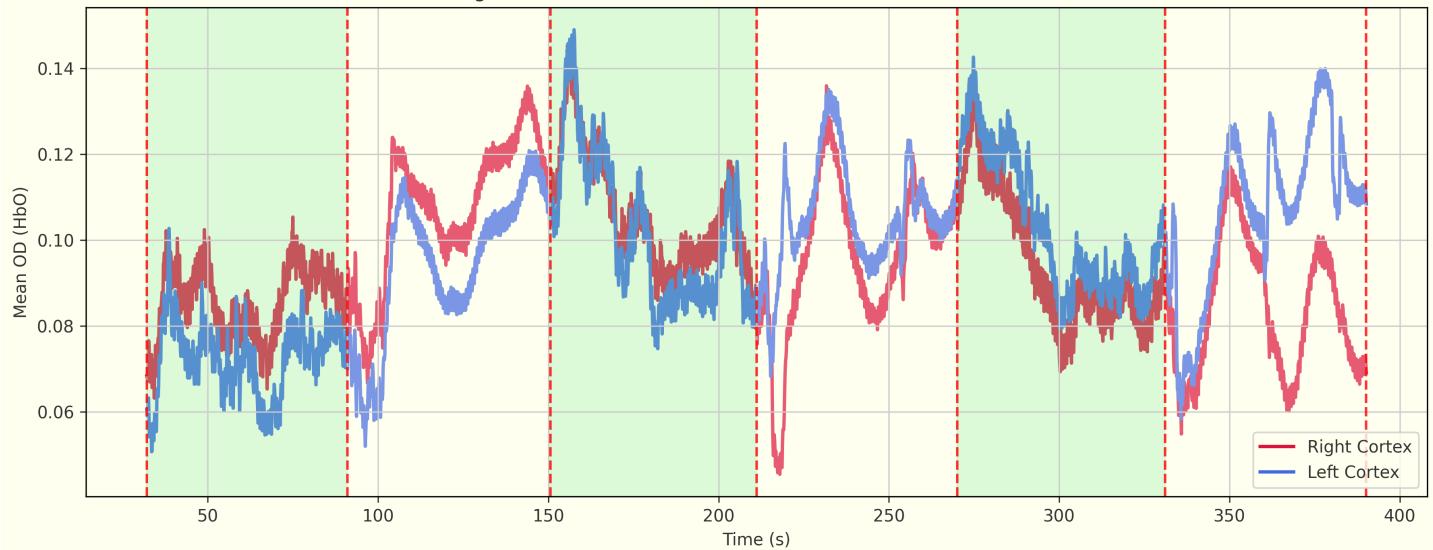
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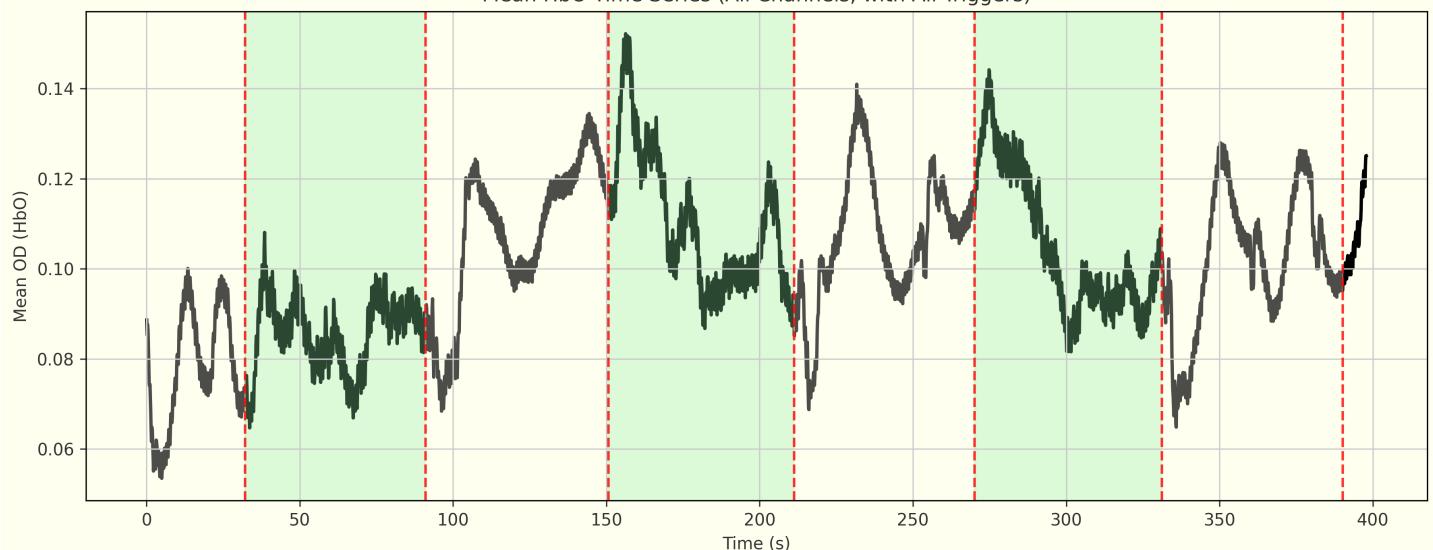


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Right and Left Cortex Mean HbO Time Series — Walk + Rest

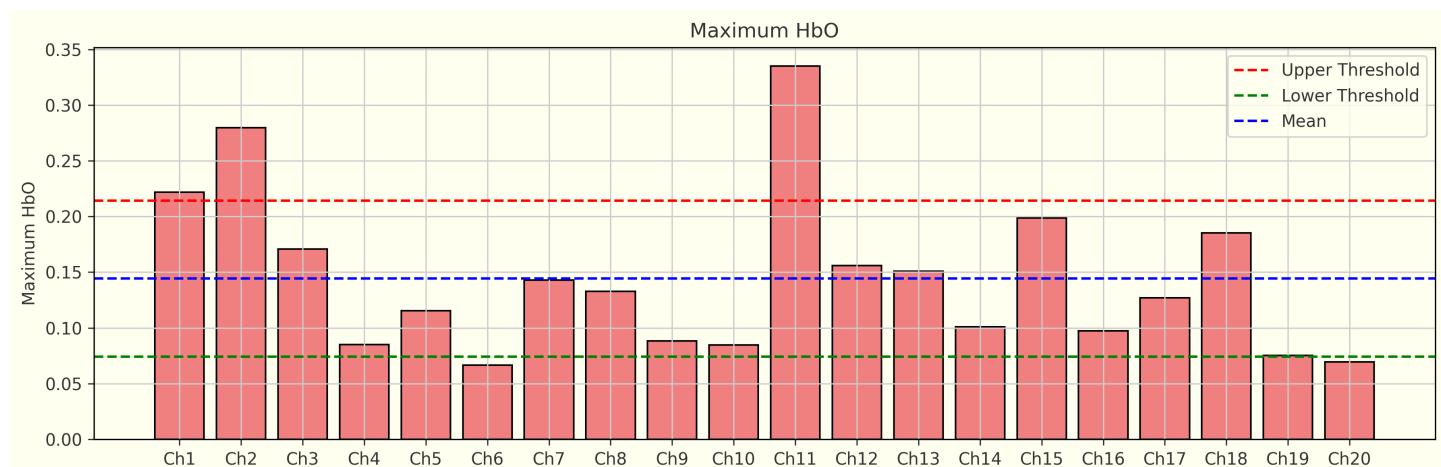
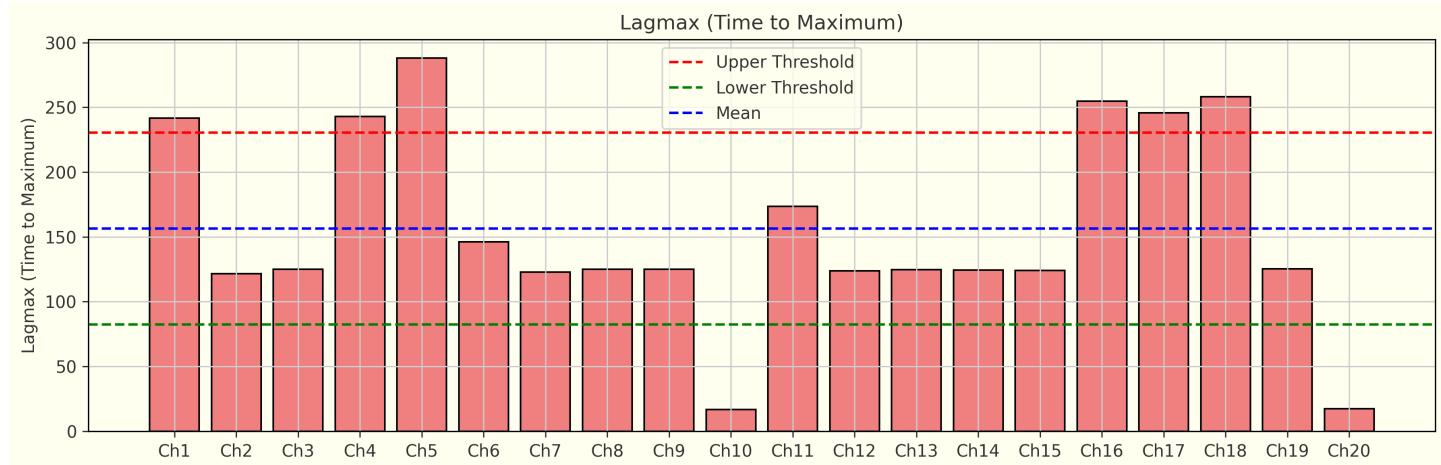


Mean HbO Time Series (All Channels, with All Triggers)



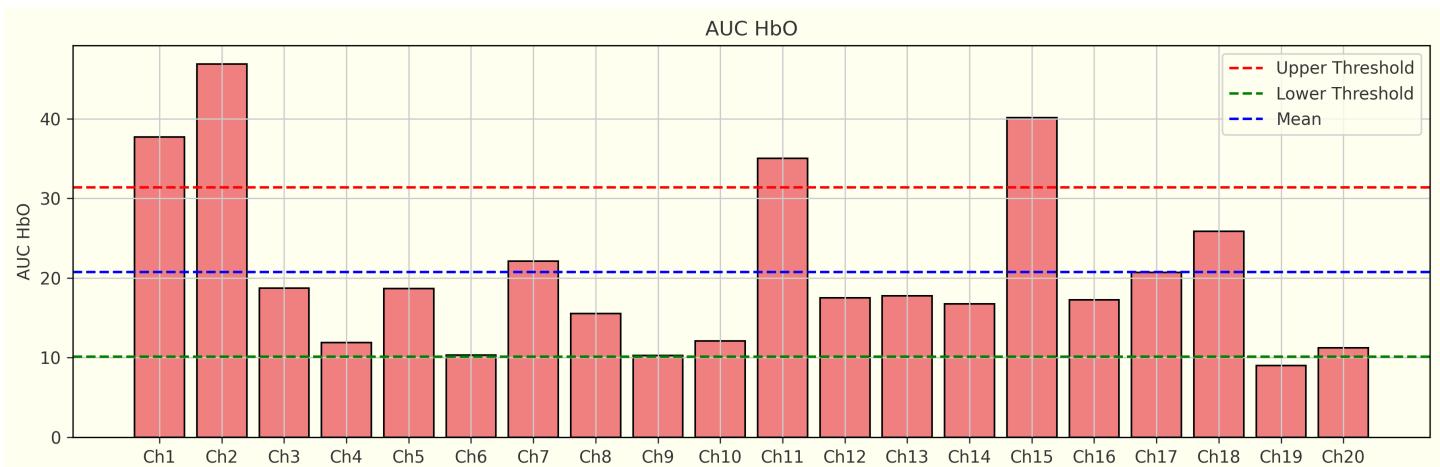
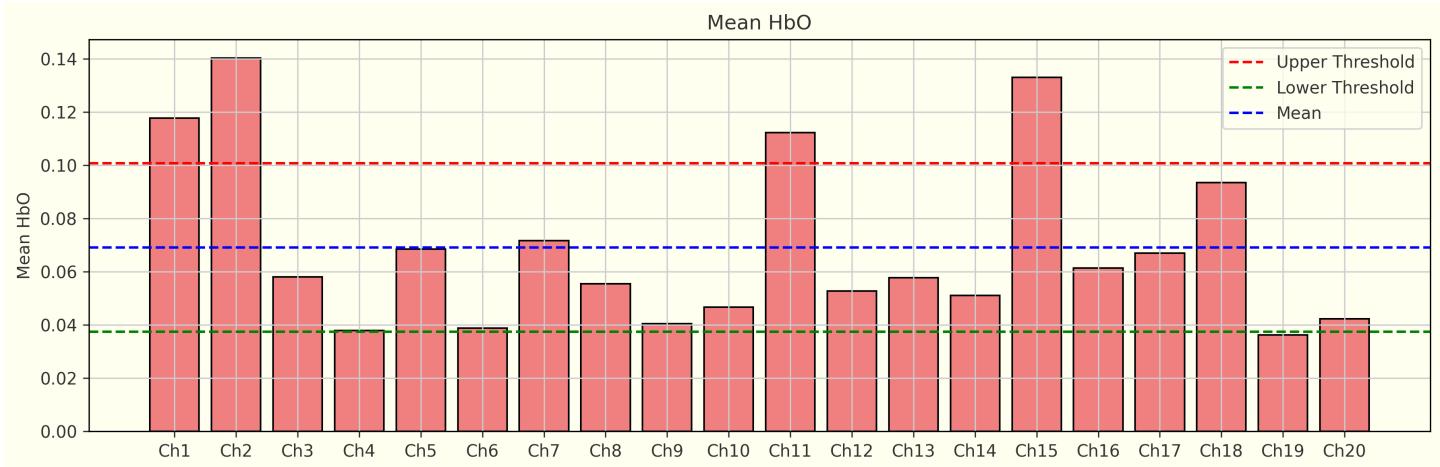


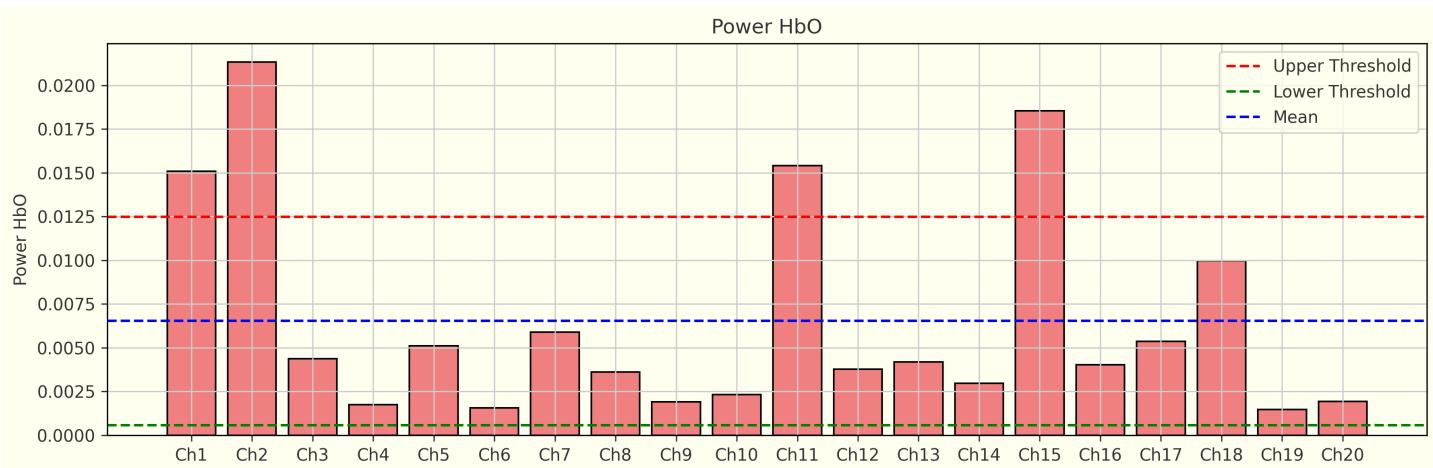
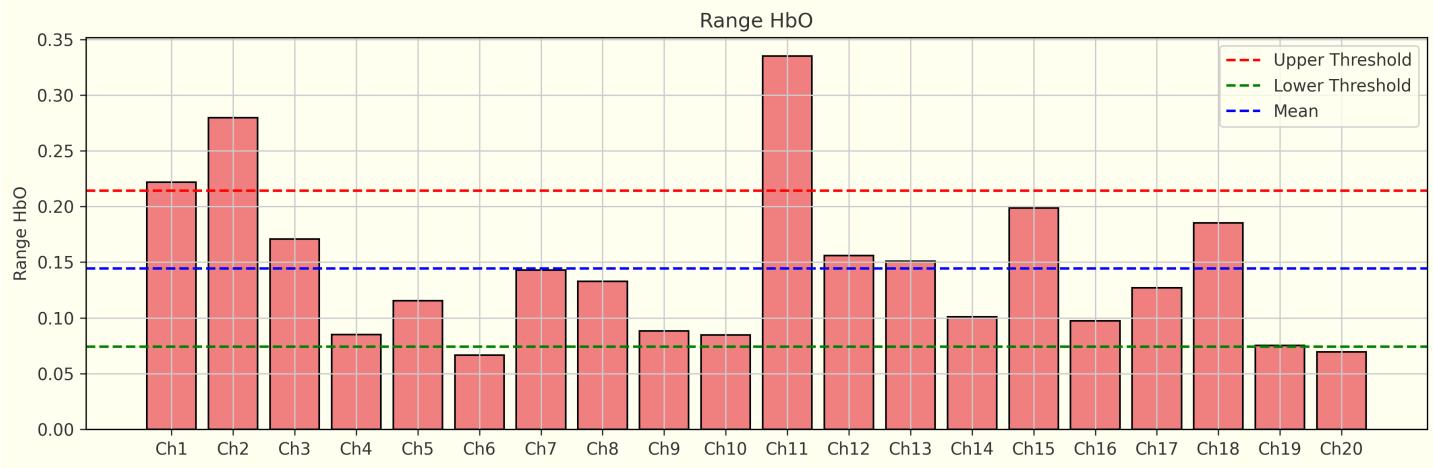
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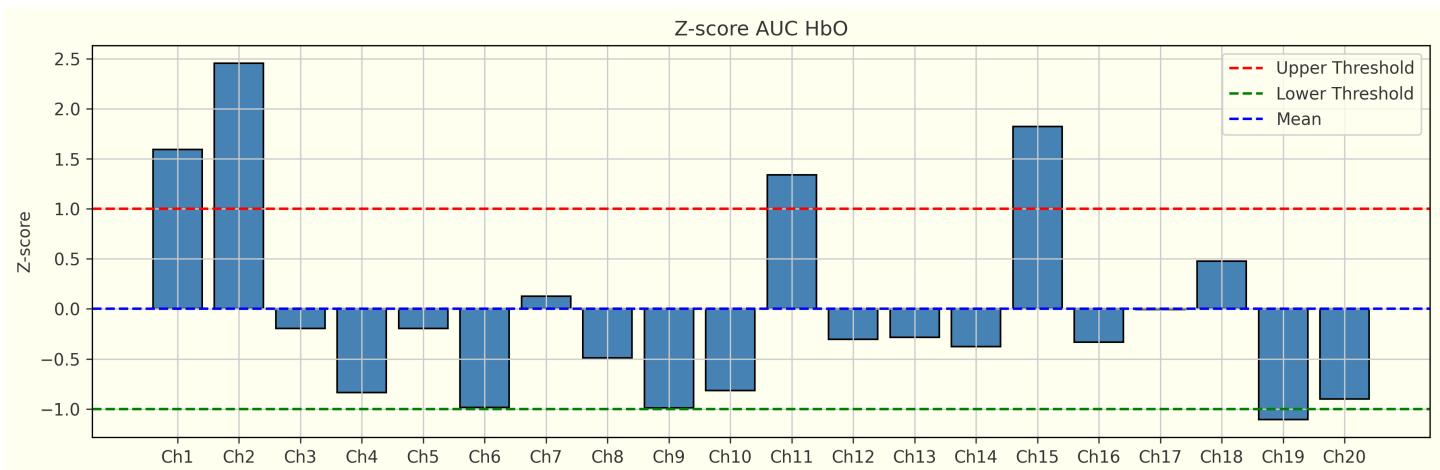
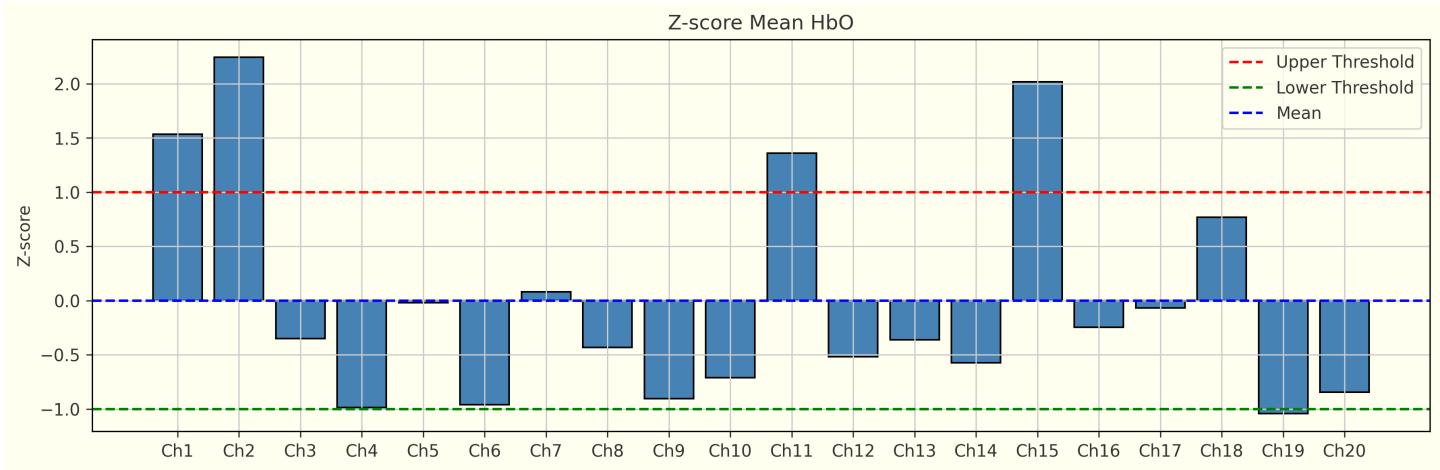
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