

Detecting Insulin Sensitivity Changes For Individuals With Type 1 Diabetes

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Background: A method to calculate changes in insulin needs was developed in the OpenAPS (Open Source Artificial Pancreas System) community. Individuals have natural fluctuations in insulin needs, but excessive periods of sensitivity or resistance may indicate ongoing physiological trends and therefore impact T1D management.

Methods: Autosens analyzes each CGM data point for 24 hours, comparing observed change to expected impact from insulin. Autosens calculates the deviation for the median of the last 8 and 24 hours of CGM data points and determines the sensitivity ratio (SR) required to neutralize the median deviation. Autosens was run retrospectively to obtain an hourly SR value (first calculated SR every hour) for (N=1)*16 individuals using OpenAPS; with M=5393 data points, and range=922 to 20,473. A SR of >1.0 indicates resistance; <1.0 indicates sensitivity. Histograms were created to visualize SR for each participant. Mean SR \pm SD was calculated and those falling beyond \pm 10% of 1.0 were classified as being resistant and sensitive respectively.

Results: Mean SR for 12 individuals fell within \pm 10% of 1.0. 1 individual tended toward sensitivity [0.79 \pm 16]. 3 individuals tended toward resistance [1.2 \pm 0.28; 1.33 \pm 0.30; 1.41 \pm 0.37].

Conclusion: Such idiographic visualization of SR can be useful for detecting overall patterns of sensitivity/resistance potentially unaccounted for by the user's pump settings.