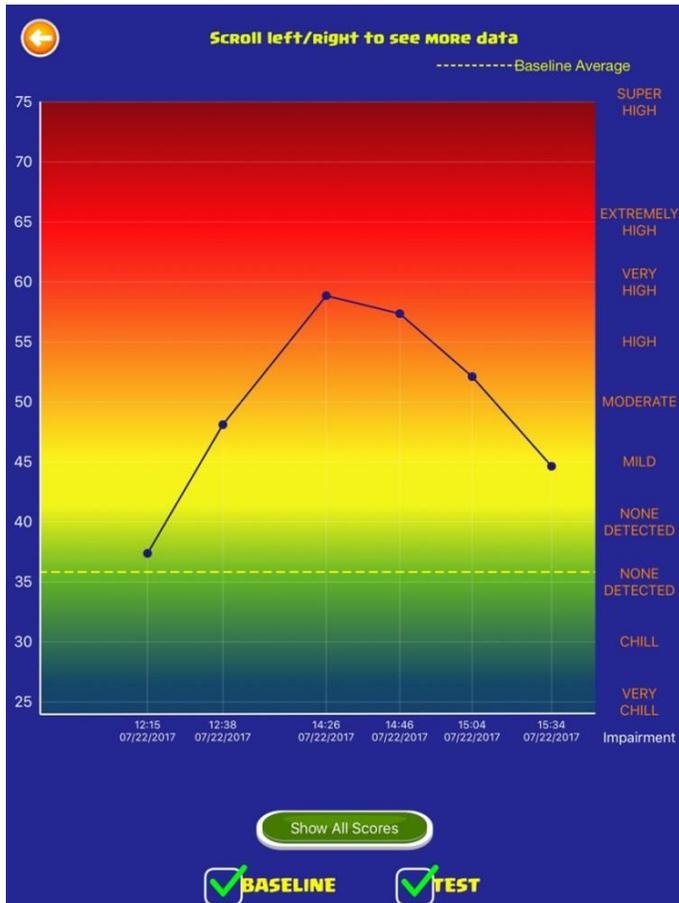


DRUID® app is the gold standard for impairment apps in the world, developed from a close examination of the driving impairment literature, and measuring skills essential to driving and operating heavy machinery that research shows are impaired by cannabis and alcohol. DRUID tracks reaction time, decision making, hand-eye coordination, balance and time estimation, and is designed with multiple “divided attention tasks,” crucial for driving. The app then transforms hundreds of measurements into a single, reliable impairment score, ranging from 0-100 (most scores 30-70); baseline scores are typically in the range of 30-42.

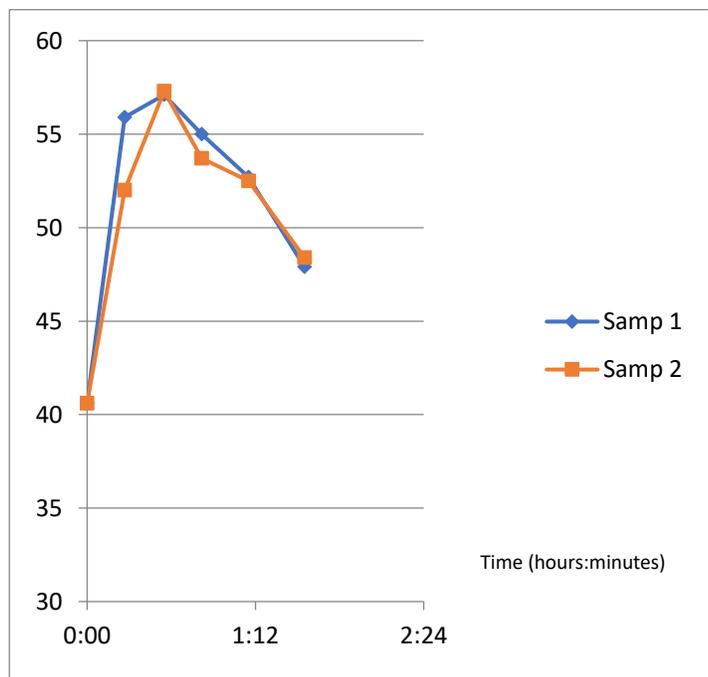
DRUID can track impairment scores over time.

SCREEN SHOT: If a cannabis smoker (or alcohol drinker) uses DRUID repeatedly after consuming, the app provides a graphic display of how the person’s impairment changes over time. After using cannabis (and just as you would expect as the body processes the THC over time), the graph increases to a peak and then declines as the body processes the relevant chemical. DRUID also tracks impairment from prescription drugs, exhaustion, and other sources.



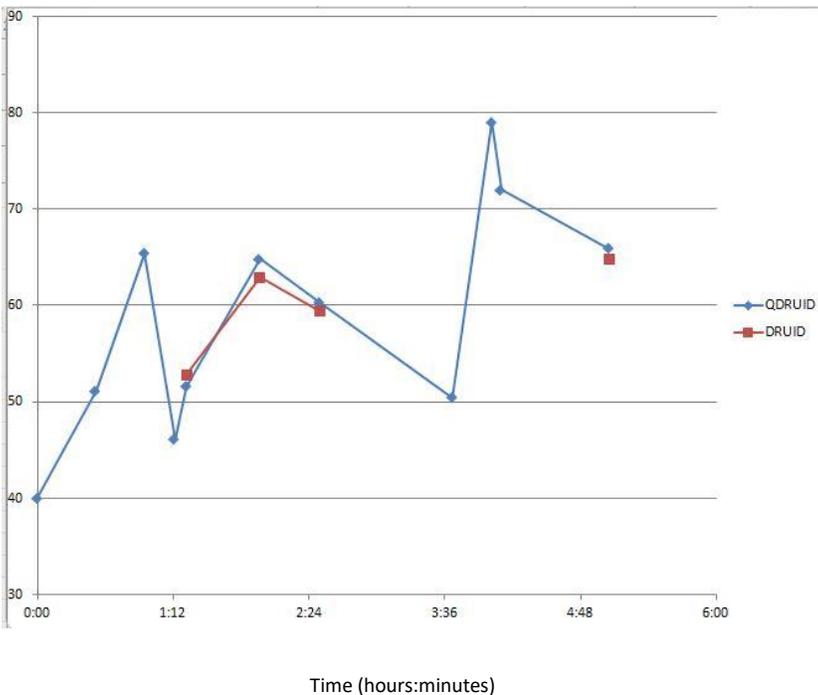
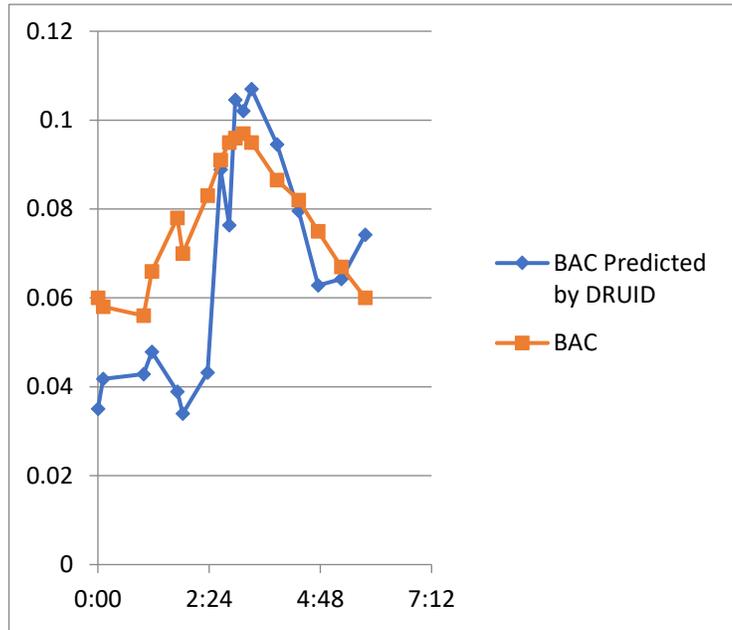
The reliability of DRUID is high.

This is a graph of DRUID impairment scores over time (hours:minutes). The same person vaped two samples of marijuana from the same batch at high heat, on two separate days and did the 5-minute DRUID:



DRUID is a general measure of impairment

The DRUID total impairment score is highly correlated with Blood Alcohol Concentration for individuals who do not have a high tolerance for alcohol. The correlation for the graph to the right is $r = .78$ overall; $r = .87$ for the BAC/DRUID correlation calculated during the post-intoxication period. These data could be used to give users an estimate of their BAC equivalent to their level of impairment, after more data are collected.

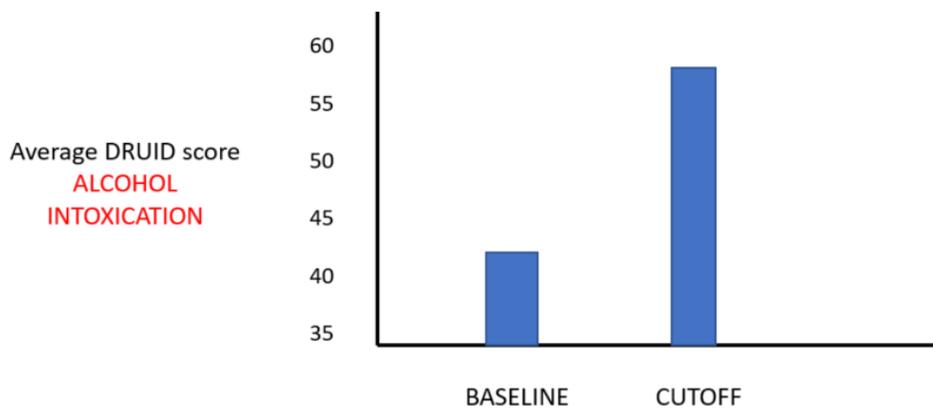


DRUID scores are consistent across platforms

I have developed a method for calibrating different versions of DRUID to produce the same scores. Scores from the 2-minute and 5-minute versions are shown here. The iPhone, iPad-mini, full iPad and Android versions are similarly calibrated.

The original 5-minute (in red; DRUID = 5-minute DRUID) was modified to create an equivalent 2-minute version (in blue is QDRUID = 2-minute DRUID)

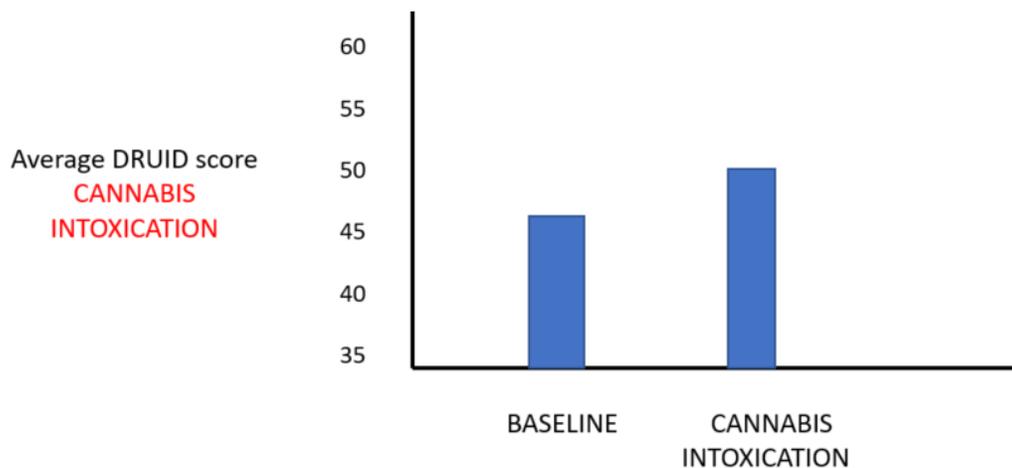
The two versions were used one after another in quick succession. The correspondence is very high, indicating high accuracy and reliability.



Data collected at the Regional Municipal Police Academy in Randolph, MA, July 2017

Massachusetts is one of 15 states that teaches police cadets how to use the Standard Field Sobriety Test to detect impaired driving using volunteers who come to the Academy and consume enough alcohol to get their blood alcohol up to .08. They do a breathalyzer to confirm that they have no alcohol in their system before drinking. These 20 volunteers also used the DRUID app both before drinking and after they had to stop drinking. The graph above shows their DRUID scores when they were sober (BASELINE), compared to when their BAC \geq .08 and they had to stop drinking (CUTOFF). The difference between the means was highly statistically significant ($t_{(19)} = 8.2, p < .001$; eta-squared = .78). These results demonstrate that DRUID is accurate in detecting impairment from alcohol.

DRUID is highly effect in detecting impairment without false positives:



Data from the DRUID database

The DRUID app allows users to save their DRUID scores in the DRUID database. Users need to use DRUID in an unimpaired state before using it in "TEST" mode. In the above graph are the means for 90 individuals who reported they were impaired by "marijuana". As with alcohol, the difference between the means was highly statistically significant ($t_{(89)} = 7.4, p < .001$; eta-squared = .38). These results demonstrate that DRUID is also effective in detecting impairment from cannabis.



WSU Tongue Swab Assay for THC



DRUID[®] Impairment Evaluation App
(currently used in research at Yale, Brown, Johns Hopkins, UC Boulder, WSU)

WSU Device

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DRUIDapp, Inc

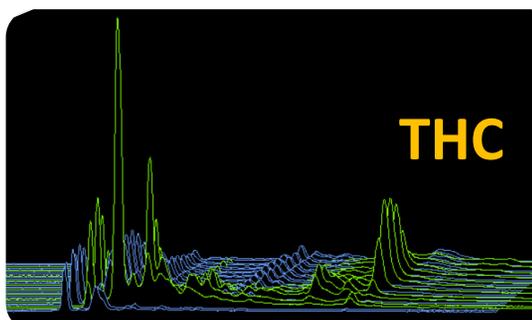
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617-785-0353
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[SBIR grant proposal to NIDA under review; DRUID[®] app in App Store and Google Play]

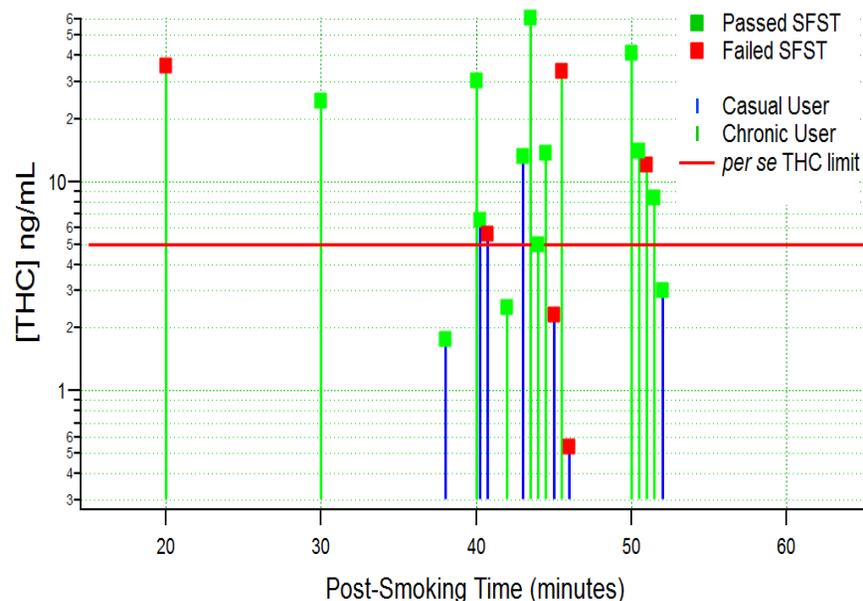
PROMISING DIRECTIONS IN RESEARCH: THE FUTURE OF TESTING FOR CANNABIS-IMPAIRED DRIVING

WSU/DRUIDapp Partnership

WSU device uses
Ion Mobility Spectrometry to analyze tongue swabs and identify the chemical signature of THC



WSU device detects cannabis usage missed by ARIDE-trained officers



DRUID[®] uses **cognitive neuroscience** to identify impairment from cannabis or other sources in 2 minutes

DRUID is a general measure of impairment, with scores ranging from 0-100. The graph shows participants' DRUID scores when they were sober (BASELINE), compared to when their $BAC \geq .08$ and they had to stop drinking (CUTOFF). The difference between the means was highly statistically significant ($t_{(19)} = 8.2, p < .001; \eta^2 = .78$).

Average DRUID score
ALCOHOL
INTOXICATION

Data collected at the
 Regional Municipal Police
 Academy in Randolph,
 MA, July 2017

