

## LDTD-MS/MS in 1.8 seconds with RSD of 2.4%: Paracetamol in Human Plasma Crash

Pierre Picard and Patrice Tremblay

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### Overview

- High-throughput determination of paracetamol in human plasma crash is performed by LDTD-MS/MS;
- Calibration range from 0.6 to 5000 ng/mL with  $r^2 = 0.9944$ ;
- 1008 samples in 1.26 hours;
- Sample-to-sample run time of 4.5 seconds;
- Desorption peak width of 1.8 seconds;
- RSD of 2.4 % for 1008 replicates.

### Instrumentation

- Phytronix Technologies LDTD ion source (model T-960);
- Thermo Fisher Scientific TSQ<sup>®</sup> Quantum<sup>™</sup> Ultra AM mass spectrometer.

### LDTD ionization process

The LDTD ion source uses an infrared laser diode to desorb sample that have been dried onto a well of a LazWell<sup>™</sup> (96-well plate). The desorbed gas phase molecules are carried into a corona discharge region to undergo APCI, then they are transferred directly into the mass spectrometer for detection.

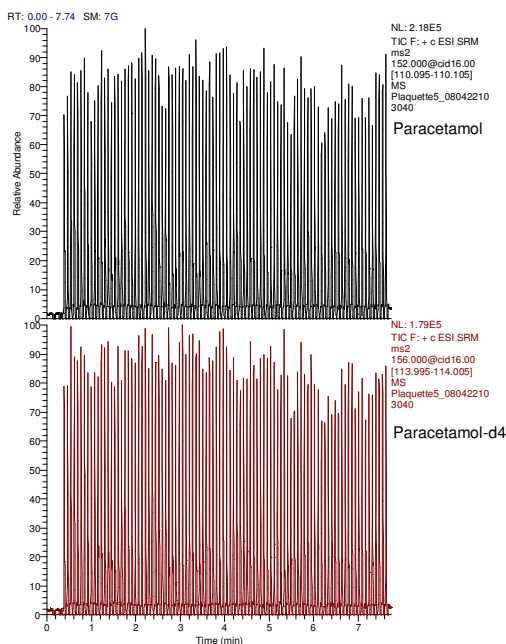
### Samples Preparation

Stripped human plasma was spiked with paracetamol and paracetamol-d4 (ISTD). Plasma proteins were precipitated with the addition of acetonitrile (1:4 v/v). A volume of 2.0  $\mu$ L of the supernatant was manually transferred into a well of a LazWell<sup>™</sup> and was allowed to dry at room temperature.

### Results and Discussion

LDTD-MS/MS allows high-throughput analysis of paracetamol in human plasma as shown in **Figure 1** where 96 replicates are analyzed in 7.2 minutes.

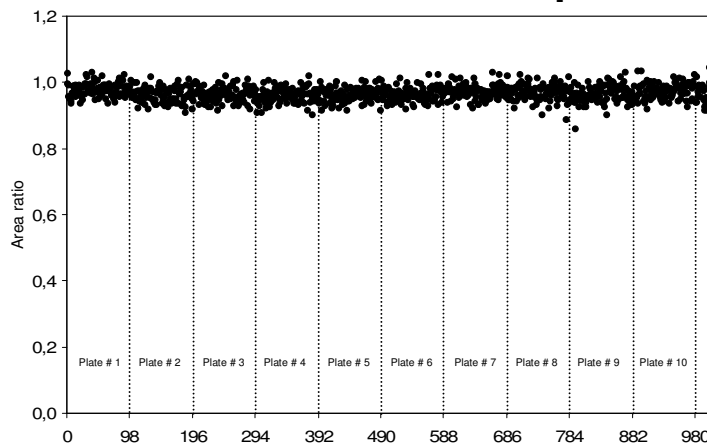
**Figure 1** Area count of 96 replicates of paracetamol (40 ng/mL) in human plasma crash determined in LDTD-MS/MS.



### Analysis Repeatability

Using only the raw area count of 1008 replicates, the RSD for paracetamol (40 ng/mL) and paracetamol-d4 (40 ng/mL) signal are 9.9 %. With the ISTD correction, the **RSD is lowered to 2.4 %** showing the stability of the LDTD-APCI process (**Figure 2**).

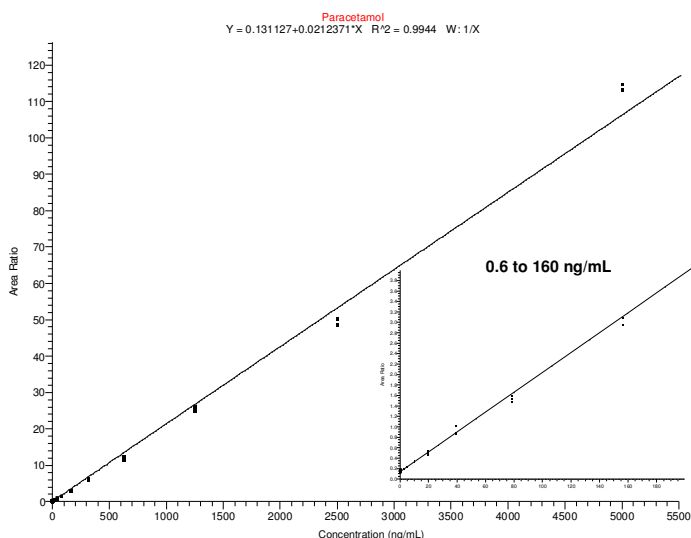
### RSD of 2.4% over 1008 replicates



**Figure 2** LDTD-MS/MS repeatability on paracetamol/ISTD ratio over 1008 human plasma crash replicates.

### Paracetamol Calibration Curve

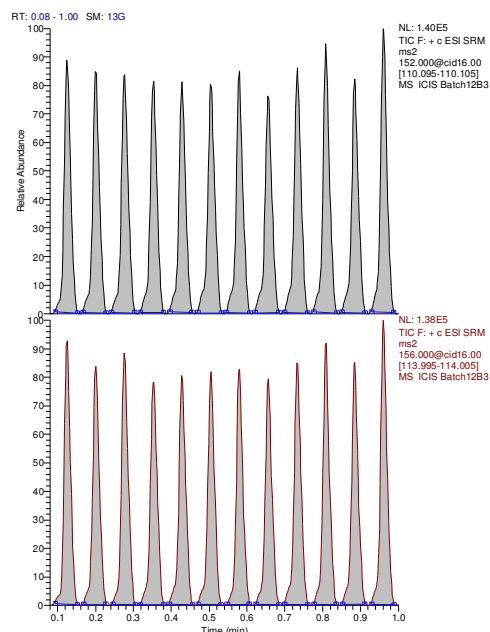
Quantitative determination of paracetamol in human plasma crash can be achieved over a nominal concentration range of 0.6 to 5000 ng/mL (**Figure 3**). An excellent linearity is obtained over the concentration range ( $R^2 = 0.9944$ ).



**Figure 3** Paracetamol calibration curve in human plasma crash (3 replicates at each concentration).

### Paracetamol and Paracetamol-d4 LDTD Desorption Profile

The Laser Diode Thermal Desorption process performed in **1.5 seconds** allows an excellent paracetamol signal width of 1.8 seconds. No carryover, no overlapping peak and no matrix effect are observed (**Figure 4**).



**Figure 4** Area count of 12 samples of paracetamol in human plasma crash (40 ng/mL) analyzed in LDTD-MS/MS.

### MS Parameters

APCI (+)	
Collision gas pressure	1.5 mTorr (Argon)
Collision energy	16 V
Tube lens	51 V
Scan time	0.050 s
Scan width	0.010 amu
Needle voltage	4500 V
Q1 width	0.30 amu
Q3 width	0.70 amu
Paracetamol SRM transition	152.0 → 110.1 amu
Paracetamol-d4 SRM transition	156.0 → 114.1 amu

### LDTD Parameters

Laser power pattern	0 to 25 % in 1.0 s Hold at 25 % for 0.5 s
Carrier gas flow	3.0 L/min (Air)

### Conclusions

LDTD-MS/MS allows ultra-fast paracetamol thermal desorption in **1.8 seconds** with a sample-to-sample run time of 4.5 seconds. The LDTD-MS/MS signal is stable over 1008 replicates as show by a RDS of 2.4 % with no matrix effect and no observed carryover. Paracetamol quantification can be performed over a 4-fold concentration range with an excellent linearity.

**High-throughput analysis with excellent repeatability and linearity can be achieved using LDTD as ion source in mass spectrometry.**

For more information about your specific application, visit [www.phytronix.com](http://www.phytronix.com)

Phytronix Technologies  
Parc technologique du Québec métropolitain  
4535, boulevard Wilfrid-Hamel, suite 120, Québec (Qc) Canada G1P 2J7  
[www.phytronix.com](http://www.phytronix.com)