

Pharmaceutical products -Eluent and detection sensitivity-

Therapeutic Drug Monitoring (TDM) is the process of measuring drug concentrations in the blood to assess pharmacokinetics and ensure proper medication administration. HPLC and LC/MS are commonly utilized methods for TDM.

This study involved analyzing select drugs for TDM using L-column 3 C18 with a particle size of 2 μm and separating them with both acidic and alkaline eluents."

Key words : Therapeutic Drug Monitoring TDM UHPLC
Column : USP category: L1

[Analytical conditions]

Column : L-column3 C18 (ODS, 2 μm , 12 nm); 2.1 mm I.D. $\times$ 100 mm L.; Cat. No. 813170
Eluent : A: CH_3CN ; B: ① 5 mmol/L HCOOH in H_2O , ② 5 mmol/L NH_3 in H_2O
A/B, 5/95-95/5 (0-10 min)
Flow rate : 0.4 mL/min
Temperature : 40 $^\circ\text{C}$
Detection : ESI-MS/MS
Injection volume : 2 μL (2 mg/L)
System : LC: Ultimate 3000 Bio RS (Thermo Fisher Scientific K.K.); MS/MS: 3200 QTRAP (SCIEX)

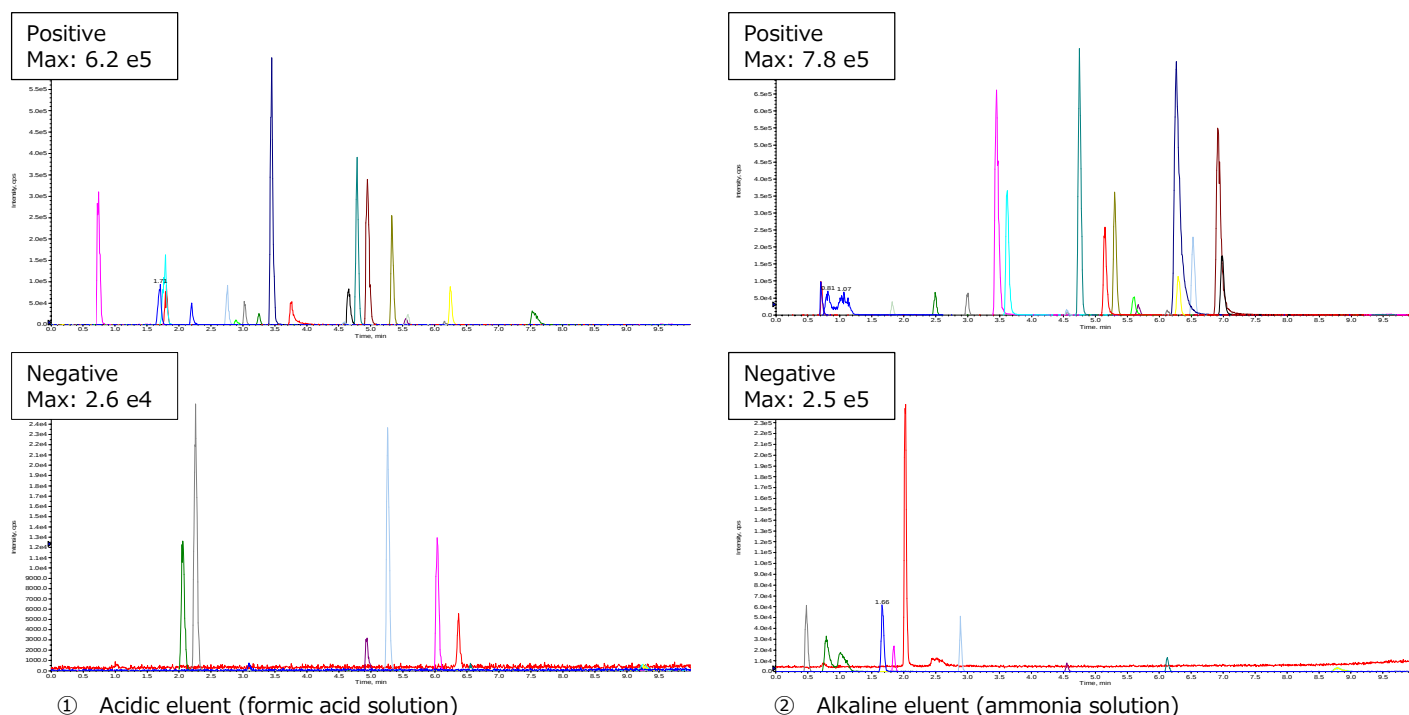


Fig.1 Extracted ion chromatogram Acidic eluent (formic acid solution) vs. alkaline eluent (ammonia solution)

When employing an alkaline eluent, several advantages can be observed in HPLC analysis. Firstly, the detection sensitivity of many drug peaks is improved, resulting in higher signal-to-noise (S/N) ratios. Secondly, the retention of basic substances is increased, allowing for better separation and identification. However, it is important to note that certain substances may decompose in alkaline solutions, and precautions should be taken accordingly.

It is worth noting that L-column3 can withstand pH levels up to 12, offering flexibility in selecting the appropriate pH for the eluent based on the analyte properties."

Fig.1 (Positive) Name	Retention time (min)		S/N		
	HCOOH	NH ₃	HCOOH ①	NH ₃ ②	Ratio ②/①
Carbamazepine	4.786	4.750	5137	10426	2.03
Diazepam	6.249	6.299	1188	1609	1.35
Disopyramide	3.448	6.268	7776	10561	1.36
Haloperidol	4.654	6.983	1148	2473	2.15
Imatinib	3.761	5.147	660	3171	4.80
Lidocaine	2.755	6.528	1148	3163	2.76
Methotrexate	2.198	0.708	636	1180	1.86
Mycophenolate	5.581	1.821	313	483	1.54
N-Acetyl procainamide	1.781	3.619	2053	5201	2.53
Nordazepam	5.551	5.669	194	414	2.13
Primidone	3.029	2.996	688	857	1.25
Procainamide	0.739	3.451	4122	9039	2.19
Propafenone	4.949	6.921	4735	7924	1.67
Quinidine	2.893	5.599	142	757	5.33
Theophylline	1.802	0.714	1061	1195	1.13
Zonisamide	3.252	2.493	342	844	2.47
Voriconazole	5.335	5.302	3321	4936	1.49

Fig.1 (Negative) Name	Retention time (min)		S/N		
	HCOOH	NH ₃	HCOOH ①	NH ₃ ②	Ratio ②/①
Acetaminophen	2.058	0.793	357	900	2.52
Acetazolamide	2.258	0.479	707	1666	2.36
Digitoxin	6.555	6.127	16	359	22.44
Digoxin	4.932	4.556	88	218	2.48
Ethosuximide	3.093	1.670	16	1680	105.00
Mycophenolate	6.037	1.846	370	656	1.77
Phenytoin	5.263	2.890	663	1288	1.94
Sirolimus1	9.259	8.796	15	93	6.20
Sirolimus2	9.265	8.794	10	94	9.40
Valproate	6.367	2.026	136	1100	8.09

S/N ratio□: Less than 2 times ■: 2 times or more, less than 5 times ▀: 5 times or more

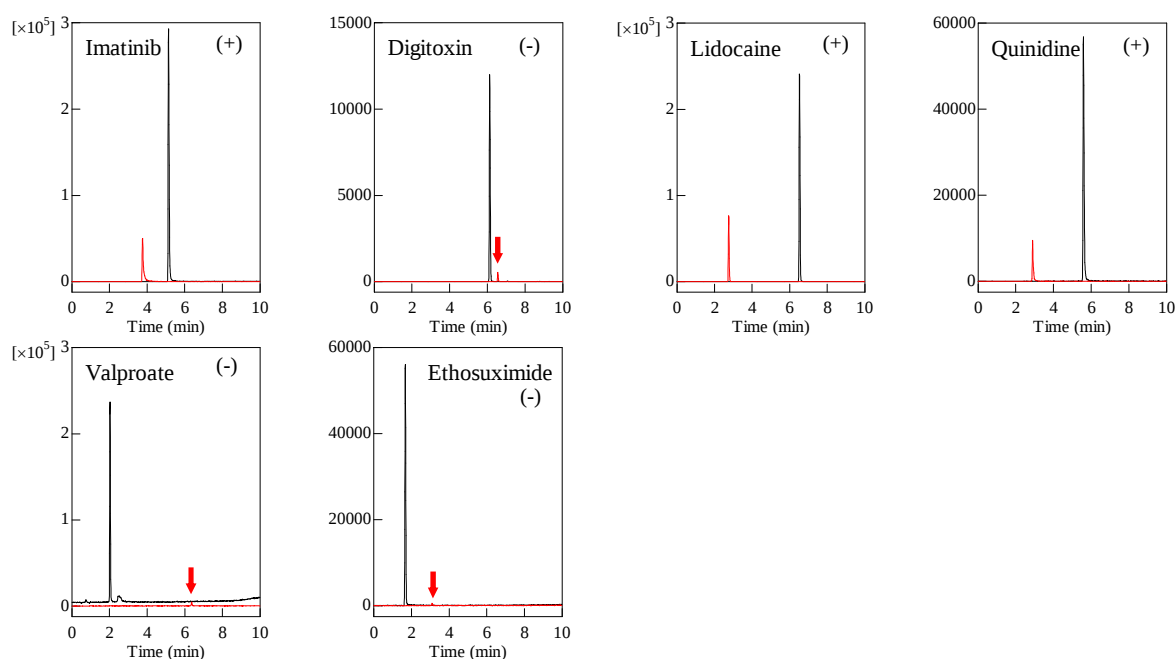


Fig.2 Extracted ion chromatogram Acidic eluent (red) vs. alkaline eluent (black)