

**Therapeutic drug monitoring of antiseizure medications using volumetric absorptive  
microsampling: where are we?**

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**Supplemental material**

**TABLE S1 Summary of stability studies**

Table S1a: Summary of short time stability studies

Analyte	T (°C)	Percentage difference from day 1 (%)				
		D'Urso, A. et al, 2019 [30]		Canisius T.P.I.J.M. et al, 2020 [28]		
		%QC low	%QC high			
		10 d		2 d	3 d	1 w
10-OH-oxcarbazepine (10-OHOXC)	-20°	-7.6	-5.1			<±15
	+4°	-9.5	-5.2			
	+37°	-12.6	-8.6	<±15		
	+10°	-4.1	2.3			
	RT			<±15	<±15	>±15
Brivaracetam (BRV)	-20°			>±15		
	+37°					<±15
	RT			<±15	<±15	>±15
Ethosuximide (ETS)	-20°	-8.7	-8.4			
	+4°	-11.7	-10.0			<±15
	+37°	-14.5	-7.3	<±15		
	+10°	-5.0	-3.3			
	RT			<±15	>±15	>±15
Felbamate (FBM)	-20°	0.6	1.2			
	+4°	4.4	-2.2			
	+37°	-1.7	-0.6			
	+10°	-3.4	-11.4			
Gabapentin (GBP)	-20°					<±15
	+37°			<±15		
	RT			<±15	<±15	<±15
Lacosamide (LCS)	-20°	-10.2	-3.9			<±15
	+4°	-1.9	-8.5			
	+37°	-8.6	-4.2	<±15		
	+10°	-2.0	-11.4			
	RT			<±15	<±15	<±15
Levetiracetam (LEV)	-20°	-2.9	-3.1			<±15
	+4°	-3.6	-4.0			
	+37°	-6.2	-0.7	<±15		
	+10°	-6.0	-9.0			
	RT			<±15	<±15	<±15
Lamotrigine (LTG)	-20°	-9.5	-3.0			<±15
	+4°	-5.9	-4.4			
	+37°	-3.2	-3.3	<±15		
	+10°	2.2	-9.5			
	RT			<±15	>±15	>±15
Oxcarbazepine (OXC)	-20°	7.3	-2.7			<±15
	+4°	-13.1	3.3			
	+37°	-1.4	-14.7	<±15		
	+10°	-3.5	-8.4			
	RT			>±15	>±15	>±15
Perampanel (PMP)	-20°	-3.5	-3.5			
	+4°	3.2	3.2			
	+37°	-11.2	-11.2			
	+10°	-3.3	-0.5			

Pregabalin (PGB)	-20°					<±15
	+37°			<±15		
	RT			<±15	<±15	>±15
Primidone (PRM)	-20°	-0.4	-9.4			<±15
	+4°	2.5	-8.0			
	+37°	-2.4	-4.8	<±15		
	+10°	-3.0	-3.4			
	RT			<±15	<±15	>±15
Rufinamide (RFN)	-20°	-14.8	-9.4			
	+4°	-12.1	-11.3			
	+37°	-12.9	-6.8			
	+10°	-3.2	-2.6			
Topiramate (TPM)	-20°	-8.2	-13.8			<±15
	+4°	3.0	-9.9			
	+37°	-9.0	-12.4	<±15		
	+10°	2.6	-6.4			
	RT			<±15	<±15	<±15
Zonisamide (ZNS)	-20°	-6.1	-12.2			
	+4°	-1.4	-13.1			
	+37°	-1.2	-14.1			
	+10°	0.9	-4.4			

**Legend:** d) days; w) weeks; QC low) low level Quality Control; QC high) high level Quality Control. **Red bold numbers** represent numbers exceeding allowable stability limit (<±15). Data are expressed as mean percentage difference in concentration with respect to day 1.

Table S1b: Summary of long time stability studies

Analyte	T (°C)	Percentage difference from day 1 (%)														
		Velghe, S., Stove C.P., 2018 [29]						D'Urso, A. et al, 2019 [30]		Canisius T.P.I.J.M. et al, 2020 [28]			Velghe, S. et al, 2020 [26]			
		4 d		1 w		1 mo		10 d		2 d	3 d	1 w	3 mo		6 mo	
		%QC low	%QC high	%QC low	%QC high	%QC low	%QC high	%QC low	%QC high				%QC low	%QC high	%QC low	%QC high
Carbamazepine (CBZ)	-20°	-0.4	-3.6	-13.4	-14.9	-1.8	1.7	-3.8	-9.3			<±15	5.1	-1.5	-5.5	-4.9
	+4°	-0.3	4.7	-13.9	-13.5	-3.6	-0.9	-5.2	6.6							
	+10°							-0.7	1.8							
	RT	-9.2	-5.5	-13.7	-8.8	-4.6	3.2			<±15	<±15	<±15				
	+37°							-6.6	5.1	<±15						
	+60°	-12.1	-5.1	-10.9	-12.3	-10.8	0.9									
Carbamazepine -epoxide (CBZ-E)	-20°	17.5	0.0	5.0	-0.8	5.1	-0.2	-9.9	-7.6			>±15				
	+4°	15.9	5.3	6.9	-5.4	11.4	-1.7	-1.9	-9.5							
	+10°							-1.1	-4.1							
	RT	7.5	-4.3	5.9	-0.1	4.0	-4.1			<±15	<±15	<±15				
	+37°							-9.6	-12.6	<±15						
	+60°	2.9	-9.2	-5.9	-15.3	-23.6	-26.1									
Phenobarbital (PB)	-20°	8.3	-6.2	-3.1	-11.8	13.2	7.4	-7.4	-8.6			<±15	12.5	4.1	-6.9	-10.4
	+4°	5.2	-0.4	-7.2	-13.6	7.0	5.9	4.3	-2.0							
	+10°							2.5	-3.3							
	RT	-5.3	-6.2	-6.0	-10.5	5.1	0.3			<±15	>±15	>±15				
	+37°							4.8	-2.4	<±15						
	+60°	0.0	-7.8	0.6	-13.0	15.5	6.8									
Phenytoin (PHT)	-20°	1.5	10.0	-6.1	5.2	9.5	7.4	4.3	3.1			>±15				
	+4°	-0.8	12.4	-8.4	3.8	11.8	7.8	-2.0	-0.4							
	+10°							-1.8	-2.8							
	RT	-8.4	4.2	-8.3	9.6	11.9	9.2			<±15	>±15	>±15				
	+37°							-0.3	-4.9	<±15						
	+60°	-4.9	3.0	-10.3	2.3	11.0	13.3									
Valproic acid	-20°	12.1	0.3	11.8	-4.4	15.5	17.6					<±15	15.2	10.3	-1.4	-1.4

(VPA)	<b>+4°</b>	2.1	2.0	11.8	-8.0	<b>15.1</b>	<b>18.0</b>									
	<b>RT</b>	-6.0	-9.3	11.5	0.7	<b>17.6</b>	10.4			<±15	<±15	<±15				
	<b>+37°</b>									<±15						
	<b>+60°</b>	2.3	-2.3	6.3	-8.0	<b>16.3</b>	<b>28.1</b>									

**Legend:** **d)** days; **w)** weeks; **m)** months; **QC low)** low level Quality Control; **QC high)** high level Quality Control. **Red bold numbers** represent numbers exceeding allowable stability limit (<±15). Data are expressed as mean percentage difference in concentration with respect to day 1.

Table S1c: Summary of CBD stability studies

Analyte	T (°C)	Percentage difference from day 1 (%)															
		Moorthy, G.S. et al, 2019 [23]								Pigliasco, F. et al, 2020 [24]							
		1 w		2 w		1 mo		2 mo		1 w		2 w		3 w		4 w	
		QC low	QC high	QC low	QC high	QC low	QC high	QC low	QC high	LLOQ	QC high	LLOQ	QC high	LLOQ	QC high	LLOQ	QC high
Cannabidiol (CBD)	-78°			94.6 ± 9.93 (envelope)	92.6 ± 4.64 (envelope)			106 ± 3.04 (autorack)	109 ± 4.18 (autorack)								
	-20°			92.4 ± 5.36 (envelope)	100 ± 10.2 (envelope)	101 ± 5.08 (autorack)	113 ± 0.658 (autorack)			91% (6%)	92% (7%)	99% (8%)	97% (6%)	98% (4%)	99% (3%)	99% (3%)	98% (8%)
	+4°			90.2 ± 11.4 (envelope)	101 ± 8.13 (envelope)	80.1 ± 22.3 (autorack)	86.9 ± 3.66 (autorack)										
	RT			105 ± 8.07 (envelope)	89.2 ± 7.18 (envelope)	112 ± 6.13 (autorack)	116 ± 5.12 (autorack)			97% (8%)	94% (1%)	94% (6%)	91% (4%)	98% (4%)	90% (3%)	97% (6%)	91% (8%)
	+40°	112 ± 5.42 (envelope) 111 ± 5.85 (autorack)	107 ± 5.92 (envelope) 105 ± 5.63 (autorack)														

**Legend:** **w)** weeks; **m)** months; **LLOQ)** Quality control set at lower level of quantification; **QC low)** low level Quality Control; **QC high)** high level Quality Control. **Red bold numbers** represent numbers exceeding allowable stability limit (<±15). Data are expressed as: Accuracy±CV(%) in ref [23] and accuracy and CV percentage in ref [24]. Stability data in [23] were obtained either putting VAMS in a transport bag (envelope) or in a VAMS dedicated storage rack (autorack).