Technical Secretariat



Office of the Deputy Director-General S/545/2006 6 February 2006 Original: ENGLISH

NOTE BY THE TECHNICAL SECRETARIAT

QUESTIONNAIRE ON THE CAPABILITIES OF MEMBER STATES WITH REGARD TO THE ANALYSIS OF BIOMEDICAL SAMPLES

- 1. Paragraphs 16 and 17 of the Verification Annex to the Chemical Weapons Convention provide for the collection of biomedical samples during investigations by the OPCW of the alleged use of chemical weapons. Analysing these samples may help inspection teams to draw conclusions regarding such alleged use.
- 2. Based on the recommendations of the Scientific Advisory Board (SAB) in the report of its Sixth Session (SAB-6/1, dated 18 February 2004), the Director-General constituted a temporary working group on biomedical samples. At a meeting it held from 17 to 19 November 2004, the temporary working group recommended that the OPCW "build up and maintain an inventory of laboratories of Member States that are active in the field of biomedical analysis, and of their capabilities". In the report of its Seventh Session, the SAB endorsed that recommendation (SAB-7/1, dated 11 March 2005).
- 3. In anticipation of further work in this area by the temporary working group, the Technical Secretariat (hereinafter "the Secretariat") has prepared a questionnaire, which is annexed hereto, on the capabilities of Member States with regard to the analysis of biomedical samples.
- 4. National Authorities are requested to forward copies of this questionnaire to laboratories that they believe may have the capabilities required.
- 5. Laboratories are requested to fill out the questionnaire and to return it to the OPCW Laboratory no later than 31 March, 2006. Questionnaires should be sent to:

Mr Mieczyslaw Sokolowski Acting Head OPCW Laboratory Heulweg 28-30 22288 GN Rijswijk The Netherlands S/545/2006 page 2

Annex (English only):

Questionnaire on the Capabilities of Member States regarding the Analysis of Biomedical Samples

- Appendix 1: Sampling and Analysis of Biomedical Samples for the Presence of Chemical Agents: Key Methods
- Appendix 2: Analytical Methods in Use in Your Laboratory

Annex

QUESTIONNAIRE ON THE CAPABILITIES OF MEMBER STATES REGARDING THE ANALYSIS OF BIOMEDICAL SAMPLES

1.	State Party				
2.	Laboratory name				
3.	Contact person	Family name:		First name:	
4.	Contact address	Street			
	(Please do not give a	Number	Post	code	
	post-office box number)	City			
		Country			
5.	E-mail address				
6.	Telephone numbers,	Work			
	including country and city	Mobile			
	codes				
7.	Fax numbers, including	Home			
	country and city codes	Work			
8.	Is your laboratory currently of	conducting	Yes	No 🗌	
	research into techniques for a	analysing	If so, please provide a separate list		
	biomedical samples for the p	resence of	of references to any publications by		
	scheduled chemicals, their fr	ee metabolites, or	your laboratory in this area and, if		
	other conjugated biomarkers	of exposure,	possible, copies of any of these		
	such as DNA of protein addi	icts?	publicati	ons that have appeared	
9	If your laboratory is active		within ti	ie last live years.	
).	in biomedical sampling and				
	analysis, please describe				
	the quality-control systems				
	it has in place, such as				
	external accreditation, and				
	recognition for Good				
	Laboratory Practice.				
10.	Is your laboratory	Yes	N	10 🗌	
	interested in participating	Please provide an	y commen	nts in the space below.	
	in an effort to establish an				
	OPCW capability to				
	analyse biomedical				
	samples?				

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11.	Is your laboratory willing to be designated by the Director-General of the Secretariat to analyse biomedical samples in the context of OPCW activities and proficiency testing?	Yes No Please provide any comments in the space below.
12.	Is your laboratory willing to participate in inter-laboratory confidence-building exercises?	Yes No Please provide any comments in the space below.
13.	Is your laboratory willing to participate in proficiency testing with a view to being selected as an OPCW Designated Laboratory?	Yes No Please provide any comments in the space below.
14.	Is your laboratory willing to share its knowledge and skills regarding the analysis of biomedical samples— for example, by providing training to technicians from other Member States?	Yes No No Please provide any comments in the space below.
15.	Would your laboratory be willing to analyse samples obtained by the OPCW in connection with an investigation into the alleged use of chemical weapons?	Yes No Please provide any comments in the space below.

Appendix 1

SAMPLING AND ANALYSIS OF BIOMEDICAL SAMPLES FOR THE PRESENCE OF CHEMICAL AGENTS: KEY METHODS¹

The following tables list analytical methods that the temporary working group on biomedical samples considers to be particularly useful. Please indicate, in the fourth column, what capability, if any, your laboratory has for each method listed. Please make any additional comments in the last column.

TABLE 1: ANALYTICAL METHODS TO CHECK FOR THE PRESENCE OF SULFUR MUSTARD

Sample Type	Key Biomarkers	Analytical Methods Currently Available	Is the Method Available in Your Laboratory?		Comments
			Yes	No	
Urine	Thiodiglycol (TDG)	GC-MS-MS			
	TDGO β-lyase metabolites	LC-MS-MS			
Blood	Protein adducts:	Chemical or enzymatic digestion, followed by:			
	N-terminal valine on Hb	GC-MS or GC-MS-MS			

1	Adapted from Appendix 6 to the	he report of the Seventh Session of the SAB (SAB	-7/1).	
	Legend for abbreviations used	in this Annex:		
	BA: Benzilic acid	DNA: Deoxyribose nucleic acid	Hb: Haemoglobin	Q: 3-q
	BuChE: Butyryl-	EI: Electron impact	HETE: Hydroxyethylthioethyl	TDGC
	cholinesterase	-		oxide
	BZ: 3-quinuclidinyl benzilate	ELISA: Enzyme-linked immunosorbent assay	HR: High resolution	
	CVAA: 2-chlorovinyl-	GC-MS-MS: gas chromatography-mass	LC-MS-MS: Liquid chromatography-	
	arsenous acid	spectrometry-mass spectrometry	mass spectrometry-mass spectrometry	

Q: 3-quinuclidinol **TDGO:** Thiodiglycol oxide

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Sample Type	Key Biomarkers	Analytical Methods Currently Available	Is the Method Available in Your Laboratory?		Comments
			Yes	No	
Blood, continued	Protein adducts: Histidine residues on Hb	Chemical or enzymatic digestion, followed by: LC-tandem MS			
	Cysteine residue on albumin Aspartic acid/glutamic acid residues on	LC-tandem MS GC-MS			
	blood proteins and keratin				
Urine	DNA adducts: Alkylation of deoxyguanosine (N7)	LC-MS-MS for N7- HETE-guanine			
Blood	Alkylation of deoxyguanosine (N7)	ELISA for N7-HETE- guanosine-5'-phosphate			
	Other biomarkers				

Sample Type	Key Biomarkers	Analytical Methods Recommended	Is the Method Available in Your Laboratory?		Comments
			Yes	No	
Blood	Cholinesterase activity				
Blood	Fluoride reactivation method:				
	Phosphylated BuChE (and	GC-MS			
	other proteins)	GC-HR-MS with large-volume injection			
Blood	Analysis of phosphylated peptides:				
	Phosphylated BuChE	LC-MS-MS (after enzymatic digestion of modified cholinesterase)			
Urine/serum	Hydrolysis products:				
	Alkyl methyl- phosphonic	GC-MS-MS			
	acids (does not include tabun)	LC-MS-MS			

TABLE 2: ANALYTICAL METHODS TO CHECK FOR THE PRESENCE OF NERVE AGENTS

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Sample Type	Key Biomarkers	Analytical Methods Recommended	Is the Method Available in Your Laboratory?		Comments
			Yes	No	
	Other biomarkers				

TABLE 3: ANALYTICAL METHODS TO CHECK FOR THE PRESENCE OF LEWISITE

Sample Type	Key Biomarkers	Analytical Methods Recommended	Is the Method Available in Your Laboratory?		Comments
			Yes	No	
Urine	CVAA	Solid-phase micro- extraction headspace sampling, followed by GC-MS with EI ionisation			
Blood	CVAA (globin bound and free)	GC-MS			
	Other biomarkers				

TABLE 4: ANALYTICAL METHODS TO CHECK FOR THE PRESENCE OF PHOSGENE

Sample Type	Key Biomarkers	Analytical Methods Recommended	Is the Method Available in Your Laboratory?		Comments
			Yes	No	
Blood	Protein adduct: Albumin peptide	LC-MS-MS			
	Other biomarkers				

TABLE 5: ANALYTICAL METHODS TO CHECK FOR THE PRESENCE OF CYANIDE

Sample Type	Key Biomarkers	Analytical Methods Recommended	Is the Method Available in Your Laboratory?		Comments
			Yes	No	
Blood	Cyanide itself	GC			
Urine	Cystine adduct SCN 2-amino- thiazoline, 4- carboxylic acid	HPLC GC–LC GC–LC			
	Other biomarkers				

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TABLE 6: ANALYTICAL METHODS TO CHECK FOR THE PRESENCE OF BZ

Sample Type	Key Biomarkers	Analytical Methods Recommended	Is the Method Available in Your Laboratory?		Comments
			Yes	No	
Urine	BZ, BA Q	LC-MS-MS			
	Other biomarkers				

Appendix 2

ANALYTICAL METHODS IN USE IN YOUR LABORATORY²

Sample Type ³	Biomarker ⁴	Analytical Technique and Instrumentation ⁵	Comments ⁶

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5 GC-MS, LC-MS-MS, and so on

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² Please include additional copies of this page if necessary.

³ Blood, urine, and so on

⁴ Phosphylated BuChE, CVAA, and so on

⁶ Please mention any relevant quality-control procedures, any accreditation the laboratory has earned in respect of this method, and so on.