Appendix N Methods of urinary iodine analysis and quality control

N.1 Introduction

From the start of Year 6 of the NDNS RP a spot urine sample was collected for iodine analysis from participants aged four years and over from whom consent had been obtained. Information regarding the collection, processing and storage of spot urine samples is provided in appendix M.

N.2 Iodine

Spot urine iodine concentrations were determined by measuring the ^{127}I isotopes using an inductively coupled plasma mass spectrometer (ICP-MS). Samples were introduced to the ICP-MS via a flow injection system combined with the Sea spray nebulizer and cyclonic spray chamber arrangement.

Urine samples and quality control (QC) materials were prepared in diluent which included Tellurium (Te) as internal standard. The iodine isotope signal was compared against the internal standard, enabling any signal fluctuation due to instrument drift to be accounted for.

Matrix matched external calibration standards were prepared in pooled human urine (collected at the Medical Research Council Elsie Widdowson Laboratory (MRC EWL)) for each analytical batch.

Prior to analysis the ICP-MS instrument was tuned for optimum signal sensitivity and minimum oxide species and doubly charged ion formation. Unknown samples, blanks, calibration standards and QCs were analysed in each batch and the signal data generated was converted to concentration data via the calibration plot.

Quality controls for Iodine

In order to establish quality assurance of each analytical batch and inter-batch variation across the year's cohort as a whole, ClinChek Urine Control Lyophilised for Trace Elements Level 1 and 2 (Recipe Chemicals and Instruments GmbH) QC samples were analysed in conjunction with the blanks, calibration standards and samples.

Inter-batch variability

Tables N.1 and N.2 summarise the measured concentration of iodine following analysis of these QC samples for each individual year of the NDNS RP. For each year the mean measured concentration of the QC was within the target concentration range defined by the manufacturer and CV was ≤5% for each of the years described, showing that for each year there was acceptable analytical accuracy and precision.

Table N.1: QC analysis for Year 7 of the NDNS RP

	ClinChek urine	
	Level 1	**Level 2**
Lot number	122	
Target Concentration /Range (µg/L)	115 (92.0 – 138)	501 (401 – 601)
Mean Measured Concentration (µg/L)	123	504
N (QC samples)	24	24
SD	5	14
%CV	4	3
Lot number	432	
Target Concentration /Range (µg/L)	120 (89.9 - 150)	497 (373 - 622)
Mean Measured Concentration (µg/L)	125	510
N (QC samples)	35	35
SD	4	15
%CV	3	3

Table N.2: QC analysis for Year 8 of the NDNS RP

	ClinChek urine	
	Level 1	**Level 2**
Lot number	432	
Target Concentration /Range (µg/L)	120 (89.9 - 150)	497 (373 - 622)
Mean Measured Concentration (µg/L)	117	493
N (QC samples)	72	72
SD	5	15
%CV	4	3

External Quality Controls for Iodine in Urine

EWL participates in the Interlaboratory Comparison Program for Ensuring the Quality of Urinary Iodine Procedures (EQUIP), operated by the US Centers for Disease Control and Prevention (CDC). Iodine analysis of urine samples gives values which are within the criteria defined in this multi-laboratory programme achieving a "Successful Participation Certificate" with a laboratory score greater than 80%.