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SAMPLING OF VENOUS AND CAPILLARY BLOOD FOR THE DETERMINATION OF LEAD OR CADMIUM CONCENTRATION

AS 2636—1994
Sampling of venous and capillary blood for the determination of lead or cadmium concentration 8pp D
Specifies the procedures for the sampling of blood, using needle and syringes or vacuum systems, for the subsequent determination of cadmium or lead. The Standard also includes appendices which describe the method for determining the contaminant analyte level in collection equipment, containers and swabs.
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The following interests are represented on Committee CH/6:

Adelaide Children's Hospital Inc.

Australasian Institute of Mining and Metallurgy

Australian Association of Clinical Biochemists

Australian Institute of Medical Laboratory Scientists

Australian Mineral Development Laboratories

Department of Health, N.S.W.

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AUSTRALIAN STANDARD

SAMPLING OF VENOUS AND CAPILLARY BLOOD FOR THE DETERMINATION OF LEAD OR CADMIUM CONCENTRATION

AS 2636—1988

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PREFACE

This Standard was prepared by the Association's Committee for the Analysis of Body Fluids for Metals Content under the direction of the Chemical Standards Board. This Standard supersedes AS 2636—1983, *Sampling of venous and capillary blood for the determination of lead content*.

The sampling of blood for the determination of lead and cadmium presents a number of problems, the major one being the possibility of contamination of the sample. This Standard has been prepared to provide advice about the best procedure for obtaining samples of both venous and capillary blood, free from contamination and suitable for use in the determination of lead and/or cadmium concentration.

Venous blood samples should be used in preference to capillary samples to minimize contamination with lead or cadmium from the skin or from other sources. Capillary samples are suitable for screening large populations, provided that elevated concentrations of lead or cadmium are confirmed immediately by the analysis of venous samples.

This Standard should be read in conjunction with the analytical methods for lead (AS 2787 and AS 2411) and cadmium (AS 3503).

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

SAMPLING OF VENOUS AND CAPILLARY BLOOD FOR THE DETERMINATION OF LEAD OR CADMIUM CONCENTRATION

1 SCOPE. This Standard sets out procedures for the sampling of venous and capillary blood for the subsequent determination of their lead and cadmium concentration. It does not extend to the collection of serum and plasma. A method for the determination of lead or cadmium contamination from syringes, tubes and swabs is set out in Appendix A.

NOTE: In this document analyte refers to lead and/or cadmium.

2 REFERENCED DOCUMENTS. The documents below are referred to in this Standard:

AS

2134 Recommended practice for chemical analysis by atomic absorption spectrometry
Part 1: Flame atomic absorption spectrometry (AS 2134.1)

2787 Whole blood—Determination of lead—Electrothermal atomization atomic absorption spectrometric method

3503 Whole blood—Determination of cadmium—Furnace atomic absorption spectrometric method

3 SAMPLING OF VENOUS BLOOD.

3.1 General. Blood is drawn from the vein in the ante-cubital fossa, or any other suitable vein, normally by means of a disposable needle and syringe.

3.2 Equipment.

3.2.1 *General.* All equipment and reagents used for the handling and treatment of blood samples shall be checked for either lead or cadmium contamination as appropriate. Suitable procedures for performing these checks and maximum contamination levels acceptable are contained in Appendix A.

3.2.2 *Plasticsware.* Both coloured and non-coloured plasticsware may be used. In some cases however, coloured plasticsware may give rise to contamination from cadmium colouring compounds and should be duly tested by the procedure described in Appendix A.

3.2.3 *Syringes and needles.* Each batch of syringes and needles used shall be examined by systematic sampling to ascertain whether or not these items contain a significant amount of the analyte.

3.2.4 *Blood containers.* Blood containers shall be shown to be free of significant amounts of the analyte in accordance with the procedure described in Appendix A. A wide variety of containers is available and the containers are usually supplied with anticoagulants. Suitable anticoagulants are lithium heparin, ammonium heparin, sodium heparin, and di-potassium and di-sodium salts of ethylenediaminetetra-acetic acid (EDTA).

Recommended levels of anticoagulant are—

(a) heparin—10 IU/mL to 15 IU/mL of whole blood; or

(b) EDTA (di-potassium salt)—1 to 1.5 mg/mL of whole blood.

These materials, whether in the tube at purchase or subsequently added to the container, shall be shown to be free of significant amounts of the analyte.

NOTE: Heparin or any of its preparations is not recommended unless the sample is to be analysed within 48 h. These anticoagulants may lead to the formation of clots upon storage of the sample.

3.2.5 *Swabs.* Swabs or preparations used in conjunction with swabs, shall be shown to be free of significant amounts of the analyte in accordance with the procedure described in Appendix A.

3.3 Preparation of the sampling site. The procedure shall be as follows:

(a) If the arm is soiled, wash the area around the vein thoroughly with soap and water.

(b) Wipe the site vigorously with an alcohol impregnated swab (4.2.4(a)).

(c) Dry the site using absorbent sterile cotton wool or gauze swab (4.2.4(b)).

3.4 Collection of venous blood. The blood specimen is ideally taken after the patient has been seated for 10 min. The concentration of lead in the blood sample is related to the packed red cell volume, hence the use of a tourniquet should be avoided if possible. Should a tourniquet be required to enable the vein to be located, it is preferable for the tourniquet to be released prior to the withdrawal of the sample.

3.5 Transfer of the sample to the container and storage of the sample. The blood shall be transferred from the syringe as soon as possible to avoid coagulation of the sample in the syringe. Both the container size and the amount of anticoagulant should be matched to the volume of the blood sample collected.

The needle shall be removed from the syringe before the blood is transferred to the sample container. Squirting the blood through the needle can cause the blood to haemolyse, rendering the sample unsuitable for haematological examination.

The blood sample shall be mixed thoroughly by inversion.

If the sample is to be split, it is advisable to introduce air into the syringe after it has been withdrawn from the patient so that several inversions of the syringe will ensure mixing of the blood to avoid any possibility of stratification.

4 SAMPLING OF CAPILLARY BLOOD.

4.1 General. Capillary blood samples are taken by puncturing the skin to obtain a free flow of blood.

Up to 1.0 mL of blood may be collected by this procedure.

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