



**WHO International Standard  
Insulin-like growth factor-I (IGF-I) for bioassay  
NIBSC code: 91/554  
Instructions for use  
(Version 5.0, Dated 11/12/2008)**

## 1. INTENDED USE

The First International Standard for insulin-like growth factor-I, 91/554, consists of a batch of ampoules of lyophilized recombinant DNA-derived human insulin-like growth factor-I prepared by expression in yeast. The preparation is intended to serve as the primary standard for calibration of *in vivo* and *in vitro* bioassays for insulin-like growth factor-I.

Although 91/554 was available as an interim reference preparation for immunoassay, the primary standard for the calibration of immunoassays is now the First International Standard for IGF-I, human, recombinant, for immunoassay coded 02/254.

## 2. CAUTION

**This preparation is not for administration to humans or animals in the human food chain**

The preparation contains material of human origin, and either the final product or the source materials, from which it is derived, have been tested and found negative for HBsAg, anti-HIV and HCV RNA. As with all materials of biological origin, this preparation should be regarded as potentially hazardous to health. It should be used and discarded according to your own laboratory's safety procedures. Such safety procedures should include the wearing of protective gloves and avoiding the generation of aerosols. Care should be exercised in opening ampoules or vials, to avoid cuts.

## 3. UNITAGE

**For bioassay:**

150 International Units per ampoule, by definition.

For practical purposes it may be assumed that 1 International Unit of the International Standard for IGF-I is equivalent to 1 microgram.

**For immunoassay:**

In the collaborative study in which 91/554 was established, estimates of 91/554 by immunoassay in terms of 87/518 gave a geometric mean estimate (n=10) of 191.9 (162.7 – 226.1) µg per ampoule. However, the primary standard for the calibration of immunoassays is now the First International Standard for IGF-I, human, recombinant, for immunoassay coded 02/254.

We would appreciate any feedback on the suitability of this material in different assay systems.

## 4. CONTENTS

Each ampoule contains the freeze dried residue of 0.5 ml of a 0.1M sodium phosphate buffer containing:

0.5 mg human serum albumin  
2.5 mg mannitol  
recombinant IGF-I

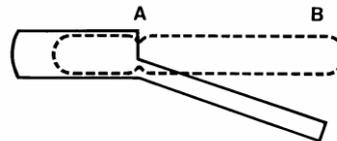
## 5. STORAGE

Unopened ampoules should be stored at -20°C

**Please note: because of the inherent stability of lyophilized material, NIBSC may ship these materials at ambient temperature.**

## 6. DIRECTIONS FOR OPENING

Tap the ampoule gently to collect the material at the bottom (labelled) end. Ensure ampoule is scored all round at the narrow part of the neck, with a diamond or tungsten carbide tipped glass knife file or other suitable implement before attempting to open. Place the ampoule in the ampoule opener, positioning the score at position 'A'; shown in the diagram below. Surround the ampoule with cloth or layers of tissue paper. Grip the ampoule and holder in the hand and squeeze at point 'B'. The ampoule will snap open. Take care to avoid cuts and projectile glass fragments that enter eyes. Take care that no material is lost from the ampoule and that no glass falls into the ampoule.



Side view of ampoule opening device containing an ampoule positioned ready to open. 'A' is the score mark and 'B' the point of applied pressure.

## 7. USE OF MATERIAL

For all practical purposes each ampoule contains the same amount of the above materials. Dissolve the total contents in a known amount of suitable buffer solution with carrier protein (free of peptidase), where extensive dilution is required, to minimise loss by surface adsorption.

No attempt should be made to weigh out portions of the freeze-dried powder.

For economy of use it is recommended that the solution be subdivided into several small containers, which are frozen rapidly to below -70°C and then stored below -30°C in the dark. Repeated freezing and thawing should be avoided.

The material has not been sterilized and the ampoules contain no bacteriostat.

## 8. PREPARATION OF AMPOULES

Highly purified IGF-I, prepared by recombinant DNA technology in yeast was generously donated by CIBA-GIEGY, Basel, through the good offices of Drs Lingner, Beck, Kabay and Rineker. IGF-I was dissolved in 0.1M phosphate buffer pH7.0 containing 1mg/ml human serum albumin, and 5 mg/ml mannitol, and dispensed into glass ampoules in 0.5ml aliquots. The ampouled preparation was then lyophilized and sealed according to procedures described by WHO for International Biological Standards (WHO Technical Report Series No. 800, 1990, p181-214).

## 9. COLLABORATIVE STUDY

Data were received from 13 laboratories in 7 countries. Based on the nominal ampoule content, the specific biological and immunological activities were consistent with those of house standards, and the immunological activity was consistent with that of the previously established International Reference Reagent for IGF-I, 87/518. The overall mean of bioassay estimates in terms of local standards was 150µg/ampoule. However, the nominal ampoule content, and estimates by HPLC assay were somewhat lower (approx.120µg/ampoule). It was therefore considered appropriate to assign the biological activity in units. Accordingly, the Expert Committee on Biological Standardisation of WHO formally established the preparation coded 91/554 as the first International Standard for insulin-like growth factor-I, with a defined ampoule content of 150 International Units/ampoule, but recognised that for practical purposes, the preparation coded 91/554 could be assumed to contain the equivalent of 1 International Unit per µg IGF-I.

## 10. USE OF THE STANDARD



The preparation coded 91/554 has been made available to serve as the primary reference reagent for the calibration of bioassays for IGF-I.

### 11. STABILITY

NIBSC follows the policy of WHO with respect to its reference materials.

It is the policy of WHO not to assign an expiry date to their international reference materials. They remain valid with the assigned potency and status until withdrawn or amended.

Reference materials are held at NIBSC within assured, temperature-controlled storage facilities. Reference Materials should be stored on receipt as indicated on the label. In addition, once reconstituted, diluted or aliquoted, users should determine the stability of the material according to their own method of preparation, storage and use.

Users who have data supporting any deterioration in the characteristics of any reference preparation are encouraged to contact NIBSC.

### 12. FURTHER INFORMATION

Further information can be obtained as follows;

This material: [enquiries@nibsc.org](mailto:enquiries@nibsc.org)

WHO Biological Standards:

<http://www.who.int/biologicals/en/>

JCTLM Higher order reference materials:

<http://www.bipm.org/en/committees/jc/jctlm/>

Derivation of International Units:

[http://www.nibsc.org/standardisation/international\\_standards.aspx](http://www.nibsc.org/standardisation/international_standards.aspx)

Ordering standards from NIBSC:

<http://www.nibsc.org/products/ordering.aspx>

NIBSC Terms & Conditions:

[http://www.nibsc.org/terms\\_and\\_conditions.aspx](http://www.nibsc.org/terms_and_conditions.aspx)

### 13. CUSTOMER FEEDBACK

Customers are encouraged to provide feedback on the suitability or use of the material provided or other aspects of our service. Please send any comments to [enquiries@nibsc.org](mailto:enquiries@nibsc.org)

### 14. CITATION

In all publications, including data sheets, in which this material is referenced, it is important that the preparation's title, its status, the NIBSC code number, and the name and address of NIBSC are cited and cited correctly.

### 15. MATERIAL SAFETY SHEET

Classification in accordance with Directive 2000/54/EC, Regulation (EC) No 1272/2008: Not applicable or not classified

Physical and Chemical properties	
Physical appearance: Freeze dried powder	Corrosive: No
Stable: Yes	Oxidising: No
Hygroscopic: Yes	Irritant: No
Flammable: No	Handling: See caution, Section 2
Other (specify): Contains material of human origin	
Toxicological properties	
Effects of inhalation: Not established, avoid inhalation	
Effects of ingestion: Not established, avoid ingestion	
Effects of skin absorption: Not established, avoid contact with skin	
Suggested First Aid	
Inhalation:	Seek medical advice
Ingestion:	Seek medical advice
Contact with eyes:	Wash with copious amounts of water. Seek medical advice
Contact with skin:	Wash thoroughly with water.
Action on Spillage and Method of Disposal	
Spillage of ampoule contents should be taken up with absorbent material wetted with an appropriate disinfectant. Rinse area with an appropriate disinfectant followed by water. Absorbent materials used to treat spillage should be treated as biological waste.	

### 16. LIABILITY AND LOSS

In the event that this document is translated into another language, the English language version shall prevail in the event of any inconsistencies between the documents.

Unless expressly stated otherwise by NIBSC, NIBSC's Standard Terms and Conditions for the Supply of Materials (available at [http://www.nibsc.org/About\\_Us/Terms\\_and\\_Conditions.aspx](http://www.nibsc.org/About_Us/Terms_and_Conditions.aspx) or upon request by the Recipient) ("Conditions") apply to the exclusion of all other terms and are hereby incorporated into this document by reference. The Recipient's attention is drawn in particular to the provisions of clause 11 of the Conditions.

### 17. INFORMATION FOR CUSTOMS USE ONLY

<b>Country of origin for customs purposes*:</b> United Kingdom
* Defined as the country where the goods have been produced and/or sufficiently processed to be classed as originating from the country of supply, for example a change of state such as freeze-drying.
<b>Net weight:</b> 3mg
<b>Toxicity Statement:</b> Non-toxic
<b>Veterinary certificate or other statement</b> if applicable.
<b>Attached:</b> No

### 17. CERTIFICATE OF ANALYSIS

NIBSC does not provide a Certificate of Analysis for WHO Biological Reference Materials because they are internationally recognised primary reference materials fully described in the instructions for use. The reference materials are established according to the WHO Recommendations for the preparation, characterization and establishment of international and other biological reference standards [http://www.who.int/bloodproducts/publications/TRS932Annex2\\_Inter\\_biol](http://www.who.int/bloodproducts/publications/TRS932Annex2_Inter_biol)



efstandardsrev2004.pdf (revised 2004). They are officially endorsed by the WHO Expert Committee on Biological Standardization (ECBS) based on the report of the international collaborative study which established their suitability for the intended use.