WHO Reference Reagent  
Factor V Leiden, Human gDNA. 1st International Genetic Reference Panel  
NIBSC code: 04/224  
Instructions for use  
(Version 5.0, Dated 06/12/2017)

1. INTENDED USE
The ampoules contain freeze-dried purified gDNA samples extracted from EBV transformed cell lines. They are intended for use as a reference panel in genetic tests for Factor V Leiden (FVL). The panel was established in 2004 as the 1st International Genetic Reference Panel for Factor V Leiden by the Expert Committee on Biological Standardization (ECBS) of the World Health Organization (WHO). N.B. these materials should not be put to any other use.

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
There is no unitage assigned to these materials.

4. CONTENTS
Country of origin of biological material: United Kingdom.

The panel comprises three individually coded ampoules, each containing approximately 10 μg of human gDNA;

03/254 Wild Type Factor V  
03/248 Factor V Leiden Heterozygote  
03/260 Factor V Leiden Homozygote

The DNA samples were extracted using a 'salting out' method and suspended in Tris/EDTA buffer with 5 mg/ml Trehalose as an excipient before freeze-drying.

The factor V gene in all three preparations has been sequenced between 378bp 5’ and 322bp 3’ of the FVL SNP. Only the expected G>A polymorphism in exon 10 was detected. The remaining sequence in all three preparations was identical to the published sequence Ensemble Gene ID ENSG00000056213.

5. STORAGE
Store all unopened ampoules of the freeze-dried preparations at -20°C or below.

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

6. DIRECTIONS FOR OPENING
DIN ampoules have an ‘easy-open’ coloured stress point, where the narrow ampoule stem joins the wider ampoule body. Various types of ampoule breaker are available commercially. To open the ampoule, tap the ampoule gently to collect material at the bottom (labelled) end and follow manufactures instructions provided with the ampoule breaker.

7. USE OF MATERIAL
a. Open ampoules as described in section 6. above.

b. Reconstitute freeze-dried material at room temperature with 100μL of sterile nuclease-free water.
c. Transfer the entire contents to nuclease-free tubes.
d. If your normal pipette tips do not reach the samples at the bottom of the ampoule, please use long tips provided.
e. We recommend that the material is used directly after reconstitution and is not stored beyond this point, but if this is desired, then the material should be stored in sealed tubes between +2 to +8°C if the samples are to be tested within 3 months. For longer periods, store in aliquots at -20°C or below. Care should be taken to avoid cross-contamination with other samples.

8. STABILITY
NIBSC follows the policy of WHO with respect to its reference materials. Reference materials are held at NIBSC within assured, temperature controlled storage facilities and they should be stored on receipt as indicated on the label. It is the policy of WHO not to assign an expiry date to their international reference materials. Accelerated degradation studies have indicated that this material is suitably stable, when stored at -20°C or below, for the assigned values remain valid until the material is withdrawn or replaced. These studies have also shown that the material is suitably stable for shipment at ambient temperature without any effect on the assigned values. Users who have data supporting any deterioration in the characteristics of any reference preparation are encouraged to contact NIBSC.

9. REFERENCES
The following publication describes the International Collaborative Study which was carried out in order to characterise the panel; E Gray, JR Hawkins, M Morrison, M Hawkins, E Byrne, S Kitchen, I Jennings, M Makris, FE Preston, and P Metcalfe. Establishment of the 1st International Genetic Reference Panel for Factor V Leiden (G1691A), Human gDNA. Thrombosis and Haemostasis 2006, 96 215-219.

10. ACKNOWLEDGEMENTS
We would like thank the staff of the UK NEQAS for Blood Coagulation and the Royal Hallamshire Hospital, Sheffield, UK for supplying blood samples.

11. FURTHER INFORMATION
Further information can be obtained as follows;
This material: enquiries@nibsc.org
WHO Biological Standards:  
http://www.who.int/biologicals/en/  
JCTLM Higher order reference materials:  
Derivation of International Units:  
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

12. 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

13. 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.

14. 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 solid | Corrosive: | No |
| Stable: | Oxidising: | No |
| Hygroscopic: | Irritant: | No |
| Flammable: | 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.

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15. **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.

16. **INFORMATION FOR CUSTOMS USE ONLY**

- **Country of origin for customs purposes**: United Kingdom
- **Net weight**: 0.0028 - 0.0030g
- **Toxicity Statement**: Toxicity not assessed
- **Veterinary certificate or other statement if applicable**: Attached: 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_Interbiolrefstandardsrev2004.pdf](http://www.who.int/bloodproducts/publications/TRS932Annex2_Interbiolrefstandardsrev2004.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.