



# Human FGF-21 Immunoassay

**Catalog Number: EA800081**

For the quantitative determination of human FGF-21 concentrations in cell culture supernates, serum, and plasma.

For research use only. Not for use in diagnostic procedures.

**MANUFACTURED AND DISTRIBUTED BY:**

**OriGene Technologies, Inc.**

9620 Medical Center Drive Suite 200  
Rockville, MD 20850, USA

## TABLE OF CONTENTS

SECTION	PAGE
BACKGROUND.....	1
PRINCIPLE OF THE ASSAY.....	1
TECHNICAL HINTS AND LIMITATIONS.....	2
PRECAUTIONS.....	2
KIT COMPONENTS& STORAGE CONDITIONS.....	3
OTHER SUPPLIES REQUIRED BUT NOT SUPPLIED.....	4
SPECIMEN COLLECTION & STORAGE.....	4
REAGENTS PREPARATION.....	4
ASSAY PROCEDURE .....	6
CALCULATION OF RESULTS.....	6
PERFORMANCE CHARACTERISTICS.....	8
REFERENCES.....	10

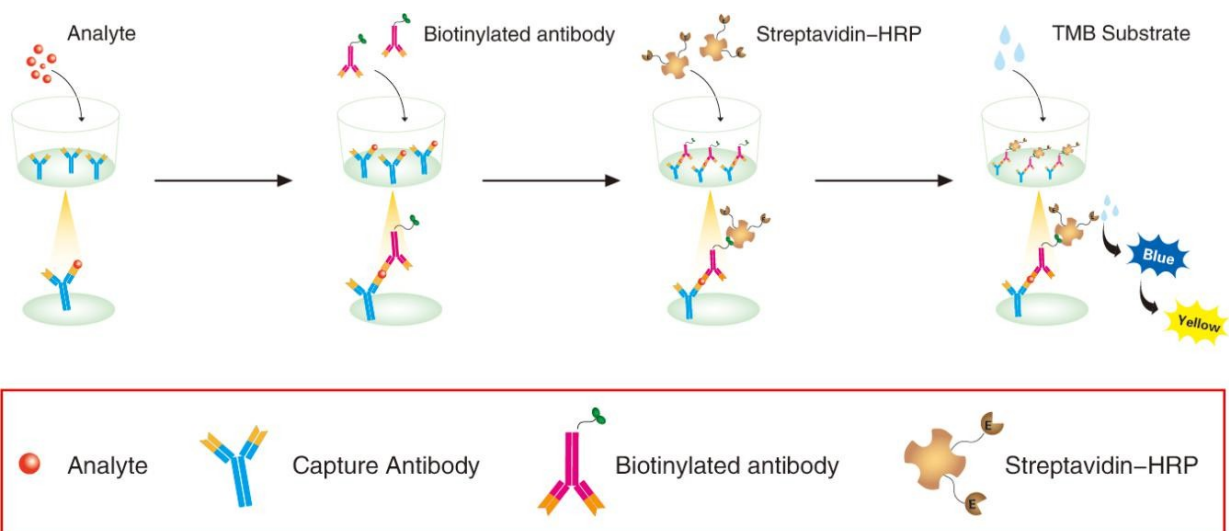
## BACKGROUND

FGF-21 (Fibroblast Growth Factor 21) is a member of an FGF subfamily that also includes FGF-19 and FGF-23. FGF-19 subfamily members lack a heparin binding domain, enabling them to freely circulate as endocrine factors and diffuse within tissues. FGF-21 signals through Klotho beta in complex with FGF receptors. It regulates cellular metabolism including glucose uptake in adipocytes and cellular sensitivity to insulin. It is basally expressed in the pancreas, thymus, liver, and adipose tissue and is upregulated in liver, muscle, and fat in obesity and diabetes. FGF-21 also plays a role in cell survival and proliferation, mesenchymal stem cell differentiation, circadian rhythm, and controlling reproductive capacity.

## PRINCIPLE OF THE ASSAY

This assay employs the quantitative sandwich enzyme immunoassay technique. A monoclonal antibody specific for FGF-21 has been pre-coated onto a microplate. Standards and samples are pipetted into the wells and any FGF-21 present is captured by the coated antibody after incubation. Following extensive washing, a biotin-conjugate antibody specific for FGF-21 is added to detect the captured FGF-21 protein in sample. For signal development, horseradish peroxidase (HRP)-conjugated Streptavidin is added, followed by tetramethyl-benzidine (TMB) reagent. Following a wash to remove any unbound combination, and enzyme conjugate is added to the wells. Solution containing sulfuric acid is used to stop color development and the color intensity which is proportional to the quantity of bound protein is measurable at 450nm.

### Schematic diagram:





## TECHNICAL HINTS AND LIMITATIONS

1. This ELISA should not be used beyond the expiration data on the kit label.
2. To avoid cross-contamination, use a fresh reagent reservoir and pipette tips for each step.
3. To ensure accurate results, some details, such as technique, plasticware and water sources should be emphasized.
4. A thorough and consistent wash technique is essential for proper assay performance.
5. A standard curve should be generated for each set of samples assayed.
6. It is recommended that all standards and samples be assayed in duplicate.
7. Avoid microbial contamination of reagents and buffers. Buffers containing protein should be made under aseptic conditions and be prepared fresh daily.
8. In order to ensure the accuracy of the results, the standard curve should be made every time.

## PRECAUTIONS

The Stop Solution suggested for use with this kit is an acid solution. Wear protective gloves, clothing, eye, and face protection. Wash hands thoroughly after handling.

## KIT COMPONENTS & STORAGE CONDITIONS

<b>PART</b>	<b>SIZE</b>	<b>STORAGE OF OPENED/ RECONSTITUTED MATERIAL</b>
<b>Microwell Plate</b> - antibody coated 96-well Microplate (8 wells ×12 strips)	1 plate	Return unused wells to the foil pouch containing the desiccant pack. Reseal along entire edge of the zip-seal. May be stored for up to 1 month at 2 – 8°C**
<b>Standard</b> - lyophilized,2000 pg/ml upon reconstitution	2 vials	Aliquot and Store at -20°C** for six months
<b>Concentrated Biotin-Conjugated antibody(100X)</b> - 120 ul/vial	1 vial	Store at 2-8°C **for six months
<b>Concentrated Streptavidin-HRP solution(100X)</b> - 120 ul/vial	1 vial	Store at 2-8°C** for six months
<b>Standard /sample Diluent</b> - 16 ml/vial	1 bottle	Store at 2-8°C** for six months
<b>Biotin-Conjugate antibody Diluent</b> - 16 ml/vial	1 bottle	Store at 2-8°C** for six months
<b>Streptavidin-HRP Diluent</b> - 16 ml/vial	1 bottle	Store at 2-8°C** for six months
<b>Wash Buffer Concentrate (20x)</b> - 30 ml/vial	1 bottle	Store at 2-8°C** for six months
<b>Substrate Solution</b> - 12 ml/vial	1 bottle	Store at 2-8°C** for six months
<b>Stop Solution</b> - 12 ml/vial	1 bottle	Store at 2-8°C** for six months
<b>Plate Cover Seals</b>	4 pieces	

\*\*Provided this is within the expiration date of the kit.

## OTHER SUPPLIES REQUIRED BUT NOT SUPPLIED

1. Microplate reader capable of measuring absorbance at 450 nm.
2. Pipettes and pipette tips.
3. Deionized or distilled water.
4. Squirrt bottle, manifold dispenser, or automated microplate washer.
5. 500 mL graduated cylinder.

## SPECIMEN COLLECTION & STORAGE

**Cell Culture Supernates** - Centrifuge cell culture media at 1000×g to remove debris. Assay immediately or aliquot and store samples at  $\leq -20$  °C. Avoid repeated freeze-thaw cycles.

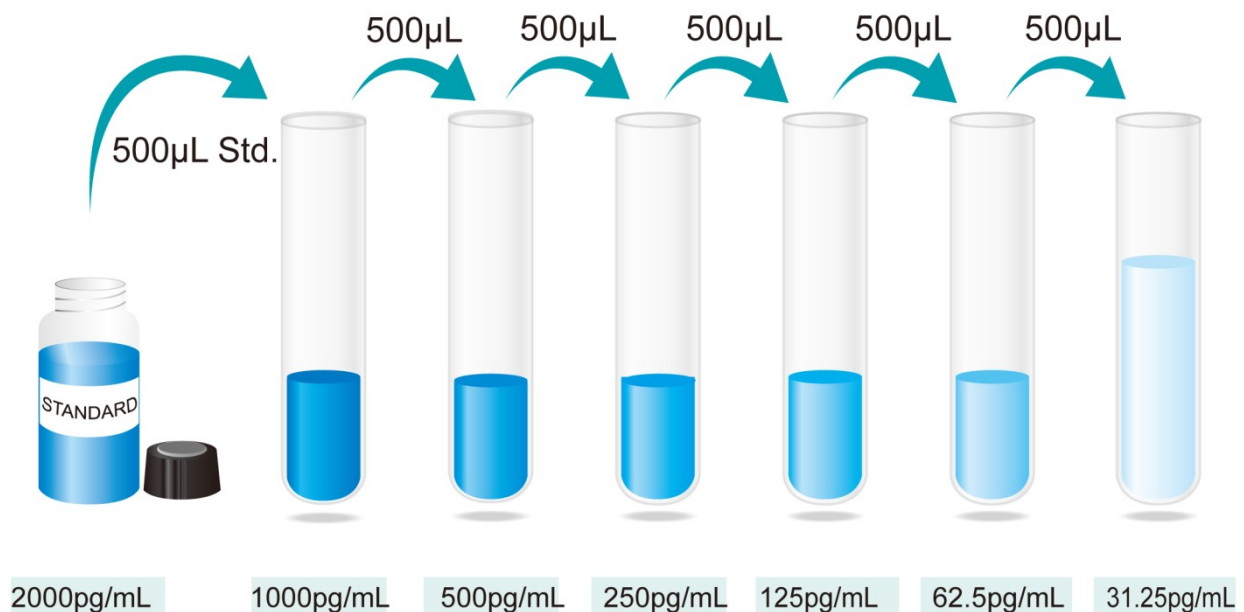
**Serum** - Use a serum separator tube (SST) and allow samples to clot for 2 hours at room temperature or overnight at 2-8°C. Centrifuge approximately for 15 minutes at 1000×g. Assay immediately or aliquot and store samples at  $\leq -20$  °C. Avoid repeated freeze-thaw cycles.

**Plasma** - Collect plasma using EDTA, heparin, or citrate as an anticoagulant. Centrifuge for 15 minutes at 1000×g within 30 minutes of collection. Assay immediately or aliquot and store samples at  $\leq -20$  °C. Avoid repeated freeze-thaw cycles.

**Note: The normal human serum or plasma samples are suggested to make a 1:2 dilution.**

## REAGENTS PREPARATION

1. **Temperature returning** - Bring all kit components and specimen to room temperature (20-25°C) before use.
2. **Wash Buffer** - Dilute 30mL of Wash Buffer Concentrate with 570mL of deionized or distilled water to prepare 600mL of Wash Buffer. If crystals have formed in the concentrate Wash Buffer, warm to room temperature and mix gently until the crystals have completely dissolved.
3. **Standard/Sample** - Reconstitute the Standard with 1.0mL of Standard/Sample Diluent. This reconstitution produces a stock solution of 2000pg/mL. Allow the standard to sit for a minimum of 15 minutes with gentle agitation prior to making dilutions. Pipette 500µL of Standard/Sample Diluent into 1000pg/ml tube and the remaining tubes. Use the stock solution of 2000pg/mL to produce a 2-fold dilution series (below). Mix each tube thoroughly and change pipette tips between each transfer. The 2000 pg/mL standard comes as the high standard. The



### Preparation of FGF-21 standard dilutions

**\*If you do not run out of re-melting standard, store it at -20°C. Diluted standard shall not be reused.**

- 4. Working solution of Biotin-Conjugate anti-human FGF-21 antibody:** Make a 1:100 dilution of the concentrated Biotin-Conjugate solution with the Biotin-Conjugate antibody Diluent in a clean plastic tube.

**\*The working solution should be used within one day after dilution.**

- 5. Working solution of Streptavidin-HRP:** Make a 1:100 dilution of the concentrated Streptavidin-HRP solution with the Streptavidin-HRP Diluent in a clean plastic tube.

**\*The working solution should be used within one day after dilution.**

## ASSAY PROCEDURE

Prepare all reagents and standards as directed. Wash the plate 3 times before assay.



Add 100µl standard or samples to each well, incubate 90 minutes, 37°C.



Aspirate and wash 4 times

Add 100µl working solution of Biotin-Conjugate anti-human FGF-21 antibody to each well, incubate 60 minutes, 37°C.

↓ Aspirate and wash 4 times

Add 100µl working solution of Streptavidin-HRP to each well, incubate 30 minutes, 37°C.
---

↓ Aspirate and wash 5 times

Add 100µl Substrate solution to each well, incubate 15 minutes, 37°C. Protect from light.
---

↓

Add 50µl Stop solution to each well. Read at 450nm within 30 minutes.
---

## CALCULATION OF RESULTS

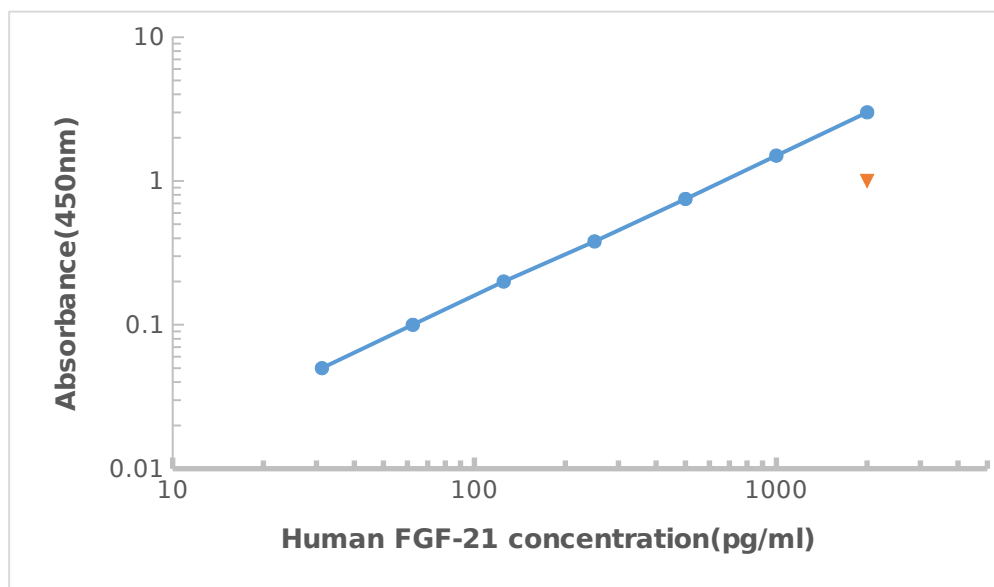
1. The standard curve is used to determine the amount of specimens.
2. First, average the duplicate readings for each standard, control, and sample. All O.D. values are subtracted by the mean value of blank control before result interpretation.
3. Construct a standard curve by reducing the data using computer software capable of generating a four parameter logistic (4-PL) curve-fit. As an alternative, construct a standard curve by plotting the mean absorbance for each standard on the y-axis against the concentration on the x-axis and draw a best fit curve through the points on the graph.
4. The data may be linearized by plotting the log of the FGF-21 concentrations versus the log of the O.D. and the best fit line can be determined by regression analysis. This procedure will produce an adequate but less precise fit of the data. If samples have been diluted, the concentration read from the standard curve must be multiplied by the dilution factor.
5. This standard curve is provided for demonstration only. A standard curve should be generated for each set of samples assayed.

**Typical data using the FGF-21 ELISA**

Standard (pg/ml)	OD.	OD.	Average	Corrected
0	0.046	0.049	0.0475	-----
31.25	0.086	0.087	0.0865	0.039
62.5	0.189	0.203	0.196	0.1485



125	0.332	0.351	0.3415	0.294
250	0.502	0.534	0.518	0.4705
500	0.847	0.819	0.833	0.7855
1000	1.469	1.438	1.4535	1.406
2000	2.536	2.588	2.562	2.5145



**Representative standard curve for FGF-21 ELISA.**

## Performance Characteristics

**SENSITIVITY:** The minimum detectable dose was 15 pg/mL.

**SPECIFICITY:** This assay recognizes both natural and recombinant human FGF-21. The factors



listed below were prepared at 100ng/ml in Standard /sample Diluent and assayed for cross-reactivity and no significant cross-reactivity or interference was observed.

#### Factors assayed for cross-reactivity

Recombinant human	Recombinant mouse	Recombinant porcine
FGF-3	FGF-8b	
FGF-4	FGF-23	
FGF5	FGF-8c	
FGF-6		
FGF-9		
FGF-10		
FGF-12		
FGF-16		
FGF-17		
FGF-18		

**REPEATABILITY:** The coefficient of variation of both intra-assay and inter-assay were less than 10%.

**RECOVERY:** The recovery of FGF-21 spiked to three different levels in four samples throughout the range of the assay in various matrices was evaluated.

#### Recovery of FGF-21 in two matrices

Sample Type	Average % of Expected Range (%)	Range (%)
Citrate plasma	98	93-108
Cell culture supernatants	103	92-112

**LINEARITY:** To assess the linearity of the assay, three samples were spiked with high concentrations of FGF-21 in various matrices and diluted with the appropriate Sample Diluent to produce samples with values within the dynamic range of the assay. (The plasma samples were initially diluted 1:1)

Dilution ratio	Recovery (%)	Citrate plasma	Cell culture supernatants
1:2	Average% of Expected	95	104
	Range (%)	90-102	97-109
1:4	Average% of Expected	93	101
	Range (%)	90-97	99-105
1:8	Average% of Expected	95	102
	Range (%)	91 – 102	90 – 114
1:16	Average% of Expected	101	105
	Range (%)	95 – 104	94 – 116

## REFERENCES

1. Itoh, N. and D.M. Ornitz (2004) Trends Genet. 20:563.



2. Ryden, M. (2009) Cell. Mol. Life Sci. 66:2067.
3. Goetz, R. et al. (2007) Mol. Cell. Biol. 27:3417.
4. Nishimura, T. et al. (2000) Biochim. Biophys. Acta 1492:203.
5. Moore, D.D. (2007) Science 316:1436.
6. Kharitononkov, A. et al. (2005) J. Clin. Invest. 115:1627.
7. Yie, J. et al. (2009) FEBS Lett. 583:19.
8. Micanovic, R. et al. (2009) J. Cell Physiol. 219:227.
9. Kurosu, H. and M. Kuro-o (2009) Mol. Cell. Endocrinol. 299:72.