Linearity: To assess the linearity of the assay, pooled citrated human plasma samples containing high concentrations of antigen were serially diluted to produce samples with values within the dynamic range of the assay.

SAMPLE	1:2	1:4	1:8	1:16
N	4	4	4	4
Average % of Expected	99	89	96	102
Range	95-104%	88-90%	93-98%	97-106%

Specificity: Pooled normal plasma from rat, pig, dog, rabbit and sheep were assayed, and no significant cross-reactivity was observed. Pooled normal plasma from mouse resulted in significant background color development.

Sample Values: Samples were evaluated for the presence of the antigen at varying dilutions.

SAMPLE	Dilution	Mean (µg/ml)
Citrate Plasma	1:4,000	24.2
	1:8,000	25.4
EDTA Plasma	1:4,000	27.9
	1:8,000	32.1
Heparin Plasma	1:4,000	26.2
	1:8,000	25.9
Serum	1:4,000	38.8
	1:8,000	42.6

DISCLAIMER

This information is believed to be correct but does not claim to be all-inclusive and shall be used only as a guide. The supplier of this kit shall not be held liable for any damage resulting from handling of or contact with the above product.

REFERENCES

1. Revak SD, *et al.*: J Clin Invest. 1974, 54(3):619-627.
2. Meier HL, *et al.*: J Cli. Invest. 1977, 60(1):18-31.
3. Renné T, *et al.*: J Exp Med. 2005, 202(2):271-281.
4. Saito H, Ratnoff OD, and Pensky J: J Lab Clin Med. 1976, 88:506-514.
5. Saito H: Adv Exp Med Biol. 1979, 120A:165-172.

Example of ELISA Plate Layout:

96 Well Plate: 18 Standard wells, 78 Sample wells (ng/ml)

	1	2	3	4	5	6	7	8	9	10	11	12
A	0	0.5	1	2.5	5	10	25	50	100			
B	0	0.5	1	2.5	5	10	25	50	100			
C												
D												
E												
F												
G												
H												

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Human Total Factor XII ELISA Kit

Catalog # (SKU): IHUFXIIKTT

Strip well format.
Reagents for up to 96 tests.

INTENDED USE

This human coagulation Factor XII antigen assay is intended for the quantitative determination of total Factor XII antigen in human plasma and serum. For research use only.

BACKGROUND

Factor XII (aka Hageman Factor) is a single-chain, 615 amino acid glycoprotein zymogen [1]. Factor XII is activated by kallikrein [2]. Factor XIIa converts prekallikrein to kallikrein during the intrinsic pathway of the coagulation cascade. Although Factor XII is not thought to play an essential role in normal hemostasis, lack of Factor XII in a mouse model resulted in a 'severe defect' in thrombus formation [3].

ASSAY PRINCIPLE

Human Factor XII will bind to the affinity purified capture antibody coated on the microtiter plate. Factor XII and XIIa will react with the antibody on the plate. After appropriate washing steps, anti human Factor XII primary antibody binds to the captured protein. Excess primary antibody is washed away and bound antibody, which is proportional to the total Factor XII present in the samples, is reacted with the secondary antibody. Following an additional washing step, TMB substrate is used for color development at 450nm. A standard calibration curve is prepared along with the samples to be measured using dilutions of human Factor XII. Color development is proportional to the concentration of Factor XII in the samples.

REAGENTS PROVIDED

- **96-well antibody coated microtiter strip plate** (removable wells 8x12) containing anti-human Factor XII antibody, blocked and dried.
- **10X Wash buffer:** 1 bottle of 50ml
- **Human Factor XII standard:** 1 vial lyophilized standard
- **Anti-human Factor XII primary antibody:** 1 vial lyophilized monoclonal antibody
- **Anti-mouse horseradish peroxidase secondary antibody:** 1 vial concentrated HRP labeled antibody
- **TMB substrate solution:** 1 bottle of 10ml solution

OTHER REAGENTS & SUPPLIES REQUIRED

- Microtiter plate shaker capable of 300 rpm uniform horizontally circular movement
- Manifold dispenser/aspirator or automated microplate washer
- Microplate reader capable of measuring absorbance at 450 nm
- Pipettes and Pipette tips
- Deionized or distilled water
- Polypropylene tubes for dilution of standard
- Paper towels or laboratory wipes
- 1N H_2SO_4 or 1N HCl
- Bovine Serum Albumin Fraction V (BSA)
- Tris(hydroxymethyl)aminomethane (Tris)
- Sodium Chloride (NaCl)

PRECAUTIONS - *FOR LABORATORY RESEARCH USE ONLY. NOT FOR DIAGNOSTIC USE*

- **DO NOT** mix any reagents or components of this kit with any reagents or components of any other kit. This kit is designed to work properly as provided.
- Always pour peroxidase substrate out of the bottle into a clean test tube. **DO NOT** pipette out of the bottle as contamination could result.
- Keep plate covered except when adding reagents, washing, or reading.
- **DO NOT** pipette reagents by mouth and avoid contact of reagents and specimens with skin.
- **DO NOT** smoke, drink, or eat in areas where specimens or reagents are being handled.

STORAGE & STABILITY

Store all kit components at 4°C upon arrival. Return any unused microplate strips to the plate pouch with desiccant. Reconstituted standard and primary may be stored at -80°C for later use. Do not freeze-thaw the standard and primary antibody more than once. Store all other unused kit components at 4°C. This kit should not be used beyond the expiration date.

PREPARATION OF REAGENTS

- **TBS buffer:** 0.1M Tris, 0.15M NaCl, pH 7.4
- **Blocking buffer (BB):** 3% BSA (w/v) in TBS
- **1X Wash buffer:** Dilute 50ml of 10X wash buffer concentrate with 450ml of deionized water

SAMPLE COLLECTION

Collect plasma using EDTA or citrate as an anticoagulant. Centrifuge for 15 minutes at 1000xg within 30 minutes of collection. Assay immediately or aliquot and store at ≤ -20°C. Avoid repeated freeze-thaw cycles.

ASSAY PROCEDURE NOTES

Perform assay at room temperature. Vigorously shake plate (300rpm) at each step of the assay.

SEE THE CERTIFICATE OF ANALYSIS (C of A) for SPECIFIC INSTRUCTIONS

Preparation of Standard: Reconstitute standard according to the C of A. Agitate gently to completely dissolve contents.

Dilution table for preparation of human Factor XII standard:

Factor XII concentration (ng/ml)	Dilutions
100	900µl (BB) + 100µl (from vial)
50	500µl (BB) + 500µl (100ng/ml)
25	500µl (BB) + 500µl (50ng/ml)
10	600µl (BB) + 400µl (25ng/ml)
5	500µl (BB) + 500µl (10ng/ml)
2.5	500µl (BB) + 500µl (5ng/ml)
1	600µl (BB) + 400µl (2.5ng/ml)
0.5	500µl (BB) + 500µl (1ng/ml)
0	500µl (BB) Zero point to determine background

NOTE: Dilutions for the standard curve and zero standard must be made and applied to the plate immediately.

Standard & Unknown Addition: Remove microtiter plate from bag and add 100µl Factor XII standards (in duplicate) and unknowns to wells. Carefully record position of standards and unknowns. Shake plate at 300rpm for 30 minutes. Wash wells three times with 300µl wash buffer. Remove excess wash by gently tapping plate on paper towel or kimwipe. **NOTE:** The assay measures Factor XII antigen in the 0.5-100 ng/ml range. If the unknown is thought to have high Factor XII levels, dilutions may be made in blocking buffer. A 1:5,000-1:10,000 dilution for normal plasma and serum is suggested for best results.

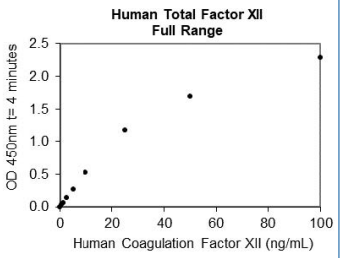
Primary Antibody Addition: Reconstitute primary antibody by adding 10ml of blocking buffer directly to the vial and agitate gently to completely dissolve contents. Add 100µl to all wells. Shake plate at 300rpm for 30 minutes. Wash wells three times with 300µl wash buffer. Remove excess wash by gently tapping plate on paper towel or kimwipe.

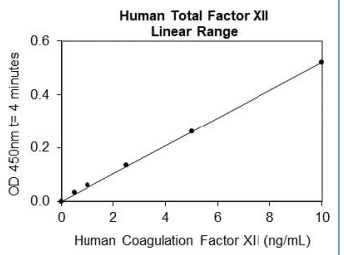
Secondary Antibody Addition: Briefly centrifuge vial before opening. **See C of A for lot specific dilution instructions**. Add 100µl of your dilution to all wells. Shake plate at 300rpm for 30 minutes. Wash wells three times with 300µl wash buffer. Remove excess wash by gently tapping plate on paper towel or kimwipe.

CALCULATION OF RESULTS

Plot A_{450} against the amount of Factor XII in the standards. Fit a straight line through the linear points of the standard curve using a linear fit procedure if unknowns appear on the linear portion of the standard curve. Alternatively, create a standard curve by analyzing the data using a software program capable of generating a four parameter logistic (4PL) curve fit. The amount of Factor XII in the unknowns can be determined from this curve. If samples have been diluted, the calculated concentration must be multiplied by the dilution factor.

A typical standard curve (EXAMPLE ONLY):





EXPECTED VALUES

The concentration of Factor XII in normal human plasma has been found to be 29 µg/mL, with variation among individuals from 15 to 47 µg/mL [1]. Another series of studies found values in the 35-40 µg/mL range [4,5].

Substrate Incubation: Add 100µl TMB substrate to all wells and shake plate for 4-10 minutes. Substrate will change from colorless to different strengths of blue. Quench reaction by adding 50µl of 1N H_2SO_4 or HCl stop solution to all wells when samples are visually in the same range as the standards. Add stop solution to wells in the same order as substrate upon which color will change from blue to yellow. Mix thoroughly by gently shaking the plate.

Measurement: Set the absorbance at 450nm in a microtiter plate spectrophotometer. Measure the absorbance in all wells at 450nm. Subtract zero point from all standards and unknowns to determine corrected absorbance (A_{450}).

PERFORMANCE CHARACTERISTICS

Sensitivity: The minimum detectable dose (MDD) was determined by adding two standard deviations to the mean optical density value of twenty zero standard replicates and calculating the corresponding concentration. **See C of A for lot specifications.**

Intra-assay Precision: Three samples of known concentration were tested twenty times on one plate to assess intra-assay precision.

SAMPLE	1	2	3
n	20	20	20
Mean (ng/ml)	4.81	7.00	43.8
Standard Deviation	0.24	0.49	2.03
CV (%)	5.06	7.00	4.63

Inter-assay Precision: Three samples of known concentration were tested in ten independent assays to assess inter-assay precision.

SAMPLE	1	2	3
n	10	10	10
Mean (ng/ml)	3.93	7.66	37.0
Standard Deviation	0.39	0.62	3.97
CV (%)	9.98	8.05	10.7

Recovery: The recovery of antigen spiked to levels throughout the range of the assay in blocking buffer was evaluated.

SAMPLE	1	2	3	4
n	4	4	4	4
Mean (ng/ml)	4.02	7.05	19.4	58.2
Average % Recovery	100	94	97	97
Range	96-106%	91-96%	93-99%	93-101%