INSTRUCTION FOR USE

SENSI*Spec* ELISA Crustaceans (Tropomyosin)

48 / 96 Tests

(Cat. nr. HU0030006 / HU0030030)

GOLD STANDARD DIAGNOSTICS

Enzyme Immunoassay for the Quantitative Determination of Crustacean Tropomyosin in Food

Sensitivity	0.9 ppb
Recovery	84-97%
Incubation Time	60 min

1. GENERAL INFORMATION

Not only by reason of their cross-reactivity to house dust mites crustaceans represent an important group of food allergens. In this regard tropomyosin, which can be found in all common crustacean species, is the most important protein. In cooked crustacean extracts this protein represents approximately 20% of total protein.

For crustacean allergic persons hidden crustacean proteins in food are a critical problem. Already very low amounts of the allergen can cause allergic reactions, which may lead to anaphylactic shock in severe cases. Because of this, crustacean allergic persons must strictly avoid the consumption of crustacean containing food. Cross-contamination, mostly in consequence of the production process, is often noticed. This explains why in many cases the existence of crustacean residues in food cannot be excluded. For this reason, sensitive detection systems for crustacean residues in foodstuffs are required.

The **SENSI*Spec* ELISA Crustaceans (Tropomyosin)** represents a highly sensitive detection system for tropomyosin (from penaeus indicus) and is particularly capable of the quantification of crustacean residues in fish products, soups, dressings, bakery products and meat products.

2. PRINCIPLE OF THE TEST

The **SENSI*Spec* ELISA Crustaceans (Tropomyosin)** quantitative test is based on the principle of the enzyme linked immunosorbent assay. An antibody directed against tropomyosin is bound on the surface of a microtiter plate. Tropomyosin containing samples or standards are given into the wells of the microtiter plate. After 20 minutes incubation at room temperature, the wells are washed with diluted washing solution to remove unbound material. A peroxidase conjugated second antibody directed against tropomyosin is given into the wells and after 20 minutes of incubation the plate is washed again. A substrate solution is added and incubated for 20 minutes, resulting in the development of a blue colour. The colour development is inhibited by the addition of a stop solution, and the colour turns yellow. The yellow colour is measured photometrically at 450 nm. The concentration of tropomyosin is directly proportional to the colour intensity of the test sample.

3. PRECAUTIONS

Full compliance of the following good laboratory practices (GLP) will determine the reliability of the results:

1) Prior to beginning the assay procedure, bring all reagents to room temperature (20-25°C).
2) All reagents should be mixed by gentle inversion or swirling prior to use. Do not induce foaming.
3) Once the assay has been started, all subsequent steps should be completed without interruption and within the recommended time limits.
4) Replace caps in all the reagents immediately after use. Do not interchange vial stoppers.
5) Use a separate disposable tip for each specimen to prevent cross-contamination.
6) All specimens and standards should be run at the same time, so that all conditions of testing are the same.
7) Do not mix components from different batches.
8) Do not use reagents after expiration date.
9) Check both precision and accuracy of the laboratory equipment used during the procedure (micropipets, ELISA reader etc.).

4. HEALTH AND SAFETY INSTRUCTIONS

1) Do not smoke or eat or drink or pipet by mouth in the laboratory.
2) Wear disposable gloves whenever handling patient specimens.
3) Avoid contact of substrate and stop solution with skin and mucosa (possible irritation, burn or toxicity hazard). In case of contact, rinse the affected zone with plenty of water.

4) Handling and disposal of chemical products must be done according to good laboratory practices (GLP).

5. REAGENTS

The kit contains reagents for 96/48 determinations. They have to be stored at 2-8°C. Expiry data are printed on the labels of the bottles and the outer package.

1) Microtiter plate consisting of 12/6 strips with 8 breakable wells each, coated with anti-tropomyosin antibodies.
2) Tropomyosin Standards (0; 20; 60; 200; 400 ppb of tropomyosin): 5 vials with 2.0 mL each, dyed red, ready-to-use.
3) Conjugate (anti-tropomyosin-peroxidase): 15/7.5 mL, dyed red, ready-to-use.
4) Substrate Solution (TMB): 15 mL, ready-to-use.
5) Stop Solution (0.5 M H_2SO_4): 15 mL, ready-to-use.
6) Extraction and sample dilution buffer (Tris): 2/1 x 120 mL as 10x concentrate, dyed red. Dilute 1+9 with distilled water. Stored at 4°C the diluted buffer is stable for at least one week. If during the cold storage crystals precipitate, the concentrate should be warmed up to 37°C for 15 minutes.
7) Washing Solution (PBS + Tween 20): 60 mL as 10x concentrate. Dilute 1+9 with distilled water. Stored at 4°C the diluted buffer is stable for at least 4 weeks. If during the cold storage crystals precipitate, the concentrate should be warmed up to 37°C for 15 minutes.
8) Plastic bag to store unused microtiter strips.

6. ADDITIONAL INSTRUMENTATION AND REAGENTS (NOT PROVIDED)

6.1 Instrumentation

- 100 - 1000 µL micropipets
- Volumetric flask
- Analytical balance
- Mortar, mixer
- Water bath
- Centrifuge
- ELISA reader (450 nm)

6.2 Reagents

- Double distilled water

7. SAMPLE PREPARATION

Due to high risk of cross-contamination all applied instruments like applicator, mortar, glass vials etc. have to be **cleaned thoroughly** before and after each sample. Tropomyosin could adhere to different surfaces. To identify possible cross-contamination caused by previous extractions it is strongly recom-mended to note the sequence of the extractions.

The following sample preparation should be applied for solid samples:

1) To maximize homogeneity and representativeness of the sample drawing, a minimum of 5 g sample should be pulverized finely in a mortar, impact mill etc.
2) 1 g of the homogenized mixture is suspended in 20 mL of **pre-diluted** extraction and sample dilution buffer. Afterwards the suspension is incubated for 15 min in a preheated water bath at **40°C**. To ensure good homogeneity, the samples should be shaken every two minutes.
3) The samples are centrifuged for 10 minutes at ≥ 2000 g. If it is not possible to separate the supernatant from the precipitate completely, the suspension should be filtrated if necessary.
4) 100 µL of particle-free solution are applied per well. If the results of a sample are out of the measuring range, further dilution with the **pre-diluted** extraction and sample dilution buffer is necessary. The additional dilution has to be considered when calculating the concentration.

The following sample preparation should be applied for liquid samples:

1 mL of liquid sample is diluted in 19 mL of **pre-diluted** extraction and sample dilution buffer. Afterwards the suspension is incubated for 15 min in a preheated water bath at **40°C**. To ensure good homogeneity, the samples should be shaken every two minutes. The process is continued at point 3 of solid sample extraction process.

Attention:

- *Do not shake the final extract to prevent from re-suspension.*
- *If after centrifugation a third layer at the top appears due to a high fatty matrix, only the middle aqueous phase should be applied to the wells.*

8. PROCEDURE

The washing solution is supplied as 10x concentrate and has to be **diluted** 1+9 with double distilled water before use.

In any case the **ready-to-use** standards provided should be determined twofold. When samples in great quantities are determined, the standards should be pipetted once before the samples and once after the samples. For final interpretation the arithmetic mean is used for calculation.

In consideration of GLP and quality control requirements a duplicate measurement of samples is recommended.
The procedure is according to the following scheme:

1) Prepare samples as described above.
2) Pipet 100 µL **ready-to-use** standards or prepared samples in duplicate into the appropriate wells of the microtiter plate.
3) Incubate for 20 minutes at room temperature.
4) Wash the plate three times as follows: Discard the contents of the wells (dump or aspirate). Pipet 300 µL of diluted washing solution into each well. After the

third repetition empty the wells again and remove residual liquid by striking the plate against a paper towel. The wash procedure is critical. Insufficient washing will result in poor precision and falsely elevated absorbencies.

5) Pipet 100 µL of conjugate (anti-tropomyosin-peroxidase) into each well.
6) Incubate for 20 minutes at room temperature.
7) Wash the plate as outlined in 4.
8) Pipet 100 µL of substrate solution into each well.
9) Allow the reaction to develop in the dark (e.g. cupboard or drawer; the chromogen is light-sensitive) for 20 minutes at room temperature.
10) Stop enzyme reaction by adding 100 µL of stop solution (0.5 M H_2SO_4) into each well. The blue colour will turn yellow upon addition.
11) After thorough mixing, measure absorbance at 450 nm (reference wavelength 620 nm), using an ELISA reader. The colour is stable for 30 minutes.

9. CALCULATION OF RESULTS

The ready-to-use standards are prepared for a direct determination of sample concentrations. The dilution of samples in the extraction process as described in the above stated sample preparation procedure is already considered. Additional dilution due to high sample concentration has to be accounted for.

1) Calculate the average optical density (OD 450 nm) for each set of reference standards or samples.
2) Construct a standard curve by plotting the mean optical density obtained for each reference standard against its concentration in ppb on semi-log graph paper with the optical density on the vertical (y) axis and the concentration on the horizontal (x) axis. Alternatively, the evaluation can be carried out by software. In this case the 4-parameter method should be preferred.
3) Using the mean optical density value for each sample, determine the corresponding concentration of tropomyosin in ppb from the standard curve. Depending on experience and/or the availability of computer capability, other methods of data reduction may be employed.

The determined amount of tropomyosin [ppb] can be used to calculate the amount of the corresponding crustacean raw product (dry weight). Therefore, the amount of tropomyosin has to be multiplied with a conversion factor (F).

The following conversion factors were determined by validation experiments:

Black tiger prawns, raw	39
Black tiger prawns, cooked	205
Lobster, raw	82
Lobster, cooked	481
Crawfish, raw	118
Crawfish, cooked	128
Spiny lobster, raw	119
Spiny lobster, cooked	368
Shrimp, raw	34
Shrimp, cooked	117
Crab, blanched	158
Crab, cooked	1880

***Please note:** : for calculation of results, it is suggested to use the Excel spreadsheet that is available in the Document Repository section of the Gold Standard Diagnostics web site (www.goldstandarddiagnostics.com).*

10. TYPICAL STANDARD VALUES

The following table contains an example for a typical standard curve. The binding is calculated as percent of the absorption of the 400 ppb standard. These values are only an example and should not be used instead of the standard curve which has to be measured in each new test.

Tropomyosin (ppb)	% binding of 400 ppb
400	100
200	64
60	22
20	9
0	3

11. PERFORMANCE

11.1 Sensitivity

The limit of detection (LOD) of the **SENSI*Spec* ELISA Crustaceans (Tropomyosin) test** is 0.9 ppb (Tropomyosin, penaeus indicus).

Validation experiments with common matrices resulted in the following LODs [ppb]

Soy sauce	1.7
Vegetable soup	3.6
Bakery products	0.9
Fish	8.5
Meat	10.3

The limit of quantification (LOQ) of the **SENSI*Spec* ELISA Crustaceans (Tropomyosin) test** is 20 ppb (Tropomyosin, penaeus indicus).
As matrices can have variable influence on the LOD in specific cases, and the range of matrices that was tested is of course limited, the end user if needed may evaluate its own LOD values depending on the matrices to be analyzed. Alternatively, any results below LOQ should be just reported quantitatively as "< LOQ".

11.2 Precision

Intra-assay Precision	6-8%
Inter-assay Precision	5-12%

11.3 Recovery

Mean recovery was determined by spiking samples with different amounts of tropomyosin:

Soy sauce	84%
Vegetable soup	93%
Bakery products	90%
Fish	93%
Meat	97%

11.4 Linearity

The serial dilution of spiked samples (soy sauce, vegetable soup, bakery products, fish, meat) resulted in dilution linearity of 86-97%.

11.5 Cross reactivity

For the following foods no cross-reactivity could be detected:

Adzuki bean	Cumin	Paprika
Almond	Dill	Pea
Apricot	Duck	Peach
Barley	Egg	Peanut
Bean, white	Fennel	Pecan
Beef	Ewe´s milk	Pepper, black
Bovine gelatin	Fenugreek	Pine seed
Brazil nut	Fish Gelatin	Pistachio
Buckwheat	Flaxseed	Plum
Cabbage, white	Garden cress	Poppy
Caraway	Garlic, fresh	Pork
Cardamom	Garlic, granulated	Potato
Carob gum	Gliadin	Pumpkin seed
Carrot	Goat's milk	Rapeseed
Cashew	Guar gum	Rice
Cayenne	Hazelnut	Rye
Celery	Horseradish	Saccharose
Chervil	Isinglass	Sesame
Chestnut	Kiwi	Soy flour
Chia seeds	Lamb	Soy lecithin
Chicken	Leek	Sunflower seed
Chickpea	Lentil	Thyme
Chili	Lupin	Tofu
Cinamon	Macadamia	Tomato
Cocoa	Mustard, yellow	Turkey
Coconut	Nutmeg	Turmeric
Cod	Oats	Walnut
Corn	Onion	Wheat
Cow's milk		

For the following commodities of the table above the results were between 0.5*LOQ and LOQ of the kit. So, it cannot be completely excluded that these matrices may provide values above the LOQ in specific cases:

Caraway	Cocoa	Hazelnut
Pecan	Sesame	Walnut

The following cross reactions were determined:

Clove	0.000005%
Cherry	0.000002%
Cockroach (protein)	0.01%

12. LIABILITY

Gold Standard Diagnostics shall not be liable for any damages to the customer caused by the improper use of the kit and for any action undertaken as a consequence of results.

Gold Standard Diagnostics Budapest shall not be liable for the unsafe use of the kit out of the current European safety regulations.