

Anti-SS-B ELISA (IgG) Test instruction

















ORDER NO.	ANTIBODIES AGAINST	IG CLASS	SUBSTRATE	FORMAT
EA 1597-9601 G	SS-B	IgG	Ag-coated microplate wells	96 x 01 (96)

Indication: The ELISA test kit provides a semiquantitative or quantitative in vitro assay for human autoantibodies of the immunoglobulin class IgG against SS-B in serum or plasma for the diagnosis of Sjögren's syndrome and systemic lupus erythematosus.

Application: Autoantibodies against SS-B occur with high specificity and mostly combined with autoantibodies against SS-A in Sjögren's Syndrome (SS). Autoantibodies against SS-B are also found in SLE patients and in neonatal Lupus erythematosus (neonatal LE syndrome).

Principle of the test: The test kit contains microtiter strips each with 8 break-off reagent wells coated with SS-B. In the first reaction step, diluted patient samples are incubated in the wells. In the case of positive samples, specific IgG antibodies (also IgA and IgM) will bind to the antigens. To detect the bound antibodies, a second incubation is carried out using an enzyme-labelled anti-human IgG (enzyme conjugate) catalysing a colour reaction.

Contents of the test kit:

Component	Colour	Format	Symbol
1. Microplate wells coated with antigens 12 microplate strips each containing 8 individual break-off wells in a frame, ready for use	---	12 x 8	
2. Calibrator 1 200 RU/ml (IgG, human), ready for use	dark red	1 x 2.0 ml	
3. Calibrator 2 20 RU/ml (IgG, human), ready for use	red	1 x 2.0 ml	
4. Calibrator 3 2 RU/ml (IgG, human), ready for use	light red	1 x 2.0 ml	
5. Positive control (IgG, human), ready for use	blue	1 x 2.0 ml	
6. Negative control (IgG, human), ready for use	green	1 x 2.0 ml	
7. Enzyme conjugate peroxidase-labelled anti-human IgG (rabbit), ready for use	green	1 x 12 ml	
8. Sample buffer ready for use	light blue	1 x 100 ml	
9. Wash buffer 10x concentrate	colourless	1 x 100 ml	
10. Chromogen/substrate solution TMB/H ₂ O ₂ , ready for use	colourless	1 x 12 ml	
11. Stop solution 0.5 M sulphuric acid, ready for use	colourless	1 x 12 ml	
12. Test instruction	---	1 booklet	
13. Quality control certificate	---	1 protocol	
 Lot description		 Storage temperature	 Unopened usable until
 In vitro diagnostic medical device			


Storage and stability: The test kit has to be stored at a temperature between +2°C to +8°C. Do not freeze. Unopened, all test kit components are stable until the indicated expiry date.

Waste disposal: Patient samples, calibrators, controls and incubated microplate strips should be handled as infectious waste. All reagents must be disposed of in accordance with local disposal regulations.



Preparation and stability of the reagents

Note: All reagents must be brought to room temperature (+18°C to +25°C) approx. 30 minutes before use. After first use, the reagents are stable until the indicated expiry date if stored at +2°C to +8°C and protected from contamination, unless stated otherwise below.

- **Coated wells:** Ready for use. Tear open the resealable protective wrapping of the microplate at the recesses above the grip seam. Do not open until the microplate has reached room temperature to prevent the individual strips from moistening. Immediately replace the remaining wells of a partly used microplate in the protective wrapping and tightly seal with the integrated grip seam (Do not remove the desiccant bag).
Once the protective wrapping has been opened for the first time, the wells coated with antigens can be stored in a dry place and at a temperature between +2°C and +8°C for 4 months.
- **Calibrators and controls:** Ready for use. The reagents must be mixed thoroughly before use.
- **Enzyme conjugate:** Ready for use. The enzyme conjugate must be mixed thoroughly before use.
- **Sample buffer:** Ready for use.
- **Wash buffer:** The wash buffer is a 10x concentrate. If crystallisation occurs in the concentrated buffer, warm it to +37°C and mix well before diluting. The quantity required should be removed from the bottle using a clean pipette and diluted with deionised or distilled water (1 part reagent plus 9 parts distilled water).
For example: For 1 microplate strip, 5 ml concentrate plus 45 ml water.
The working strength wash buffer is stable for 4 weeks when stored at +2°C to +8°C and handled properly.
- **Chromogen/substrate solution:** Ready for use. Close the bottle immediately after use, as the contents are sensitive to light . The chromogen/substrate solution must be clear on use. Do not use the solution if it is blue coloured.
- **Stop solution:** Ready for use.

Warning: Calibrators and controls of human origin have tested negative for HBsAg, anti-HCV, anti-HIV-1 and anti-HIV-2. Nonetheless, all materials should be treated as being a potential infection hazard and should be handled with care. Some of the reagents contain the agent sodium azide in a non-declarable concentration. Avoid skin contact.

Preparation and stability of the patient samples

Sample material: Human serum or EDTA, heparin or citrate plasma.

Stability: Patient samples to be investigated can generally be stored at +2°C to +8°C for up to 14 days. Diluted samples should be incubated within one working day.

Sample dilution: Patient samples are diluted **1:201** in sample buffer. For example: dilute 5 µl sample in 1.0 ml sample buffer and mix well by vortexing (sample pipettes are not suitable for mixing).

NOTE: The calibrators and controls are prediluted and ready for use, do not dilute them.



Incubation

For **semiquantitative analysis** incubate **calibrator 2** along with the positive and negative controls and patient samples. For **quantitative analysis** incubate **calibrators 1, 2 and 3** along with the positive and negative controls and patient samples.

(Partly) manual test performance

Sample incubation: (1st step) Transfer 100 µl of the calibrators, positive and negative controls or diluted patient samples into the individual microplate wells according to the pipetting protocol. Incubate for **30 minutes** at room temperature (+18°C to +25°C).

Washing: Manual: Empty the wells and subsequently wash 3 times using 300 µl of working strength wash buffer for each wash.
Automatic: Wash the reagent wells 3 times with 450 µl of working strength wash buffer (program setting: e.g. TECAN Columbus Washer "Overflow Mode").

Leave the wash buffer in each well for 30 to 60 seconds per washing cycle, then empty the wells. After washing (manual and automated tests), thoroughly dispose of all liquid from the microplate by tapping it on absorbent paper with the openings facing downwards to remove all residual wash buffer.

Note: Residual liquid (>10 µl) remaining in the reagent wells after washing can interfere with the substrate and lead to false low extinction values. Insufficient washing (e.g., less than 3 wash cycles, too small wash buffer volumes, or too short residence times) can lead to false high extinction values.

Free positions on the microplate strip should be filled with blank wells of the same plate format as that of the parameter to be investigated.

Conjugate incubation: (2nd step) Pipette 100 µl of enzyme conjugate (peroxidase-labelled anti-human IgG) into each of the microplate wells. Incubate for **30 minutes** at room temperature (+18°C to +25°C).

Washing: Empty the wells. Wash as described above.

Substrate incubation: (3rd step) Pipette 100 µl of chromogen/substrate solution into each of the microplate wells. Incubate for **15 minutes** at room temperature (+18°C to +25°C) protect from direct sunlight.

Stopping: Pipette 100 µl of stop solution into each of the microplate wells in the same order and at the same speed as the chromogen/substrate solution was introduced.

Measurement: **Photometric measurement** of the colour intensity should be made at a **wavelength of 450 nm** and a reference wavelength between 620 nm and 650 nm **within 30 minutes of adding the stop solution**. Prior to measuring, slightly shake the microplate to ensure a homogeneous distribution of the solution.



Test performance using fully automated analysis devices

Sample dilution and test performance are carried out fully automatically using an analysis device. The incubation conditions programmed in the respective software authorised by EUROIMMUN may deviate slightly from the specifications given in the ELISA test instruction. However, these conditions were validated in respect of the combination of the EUROIMMUN Analyzer I, Analyzer I-2P or the DSX from Dynex and this EUROIMMUN ELISA. Validation documents are available on enquiry.

Automated test performance using other fully automated, open-system analysis devices is possible. However, the combination should be validated by the user.

Pipetting protocol

	1	2	3	4	5	6	7	8	9	10	11	12
A	C 2	P 6	P 14	P 22			C 1	P 4	P 12	P 20		
B	pos.	P 7	P 15	P 23			C 2	P 5	P 13	P 21		
C	neg.	P 8	P 16	P 24			C 3	P 6	P 14	P 22		
D	P 1	P 9	P 17				pos.	P 7	P 15	P 23		
E	P 2	P 10	P 18				neg.	P 8	P 16	P 24		
F	P 3	P 11	P 19				P 1	P 9	P 17			
G	P 4	P 12	P 20				P 2	P 10	P 18			
H	P 5	P 13	P 21				P 3	P 11	P 19			

The pipetting protocol for microtiter strips 1 to 4 is an example for the **semiquantitative analysis** of 24 patient samples (P 1 to P 24).

The pipetting protocol for microtiter strips 7 to 10 is an example for the **quantitative analysis** of 24 patient samples (P 1 to P 24).

The calibrators (C 1 to C 3), the positive (pos.) and negative (neg.) controls, and the patient samples have each been incubated in one well. The reliability of the ELISA test can be improved by duplicate determinations for each sample.

The wells can be broken off individually from the strips. Therefore, the number of tests performed can be matched to the number of samples, minimising reagent wastage.

Both positive and negative controls serve as internal controls for the reliability of the test procedure. They should be assayed with each test run.

Calculation of results

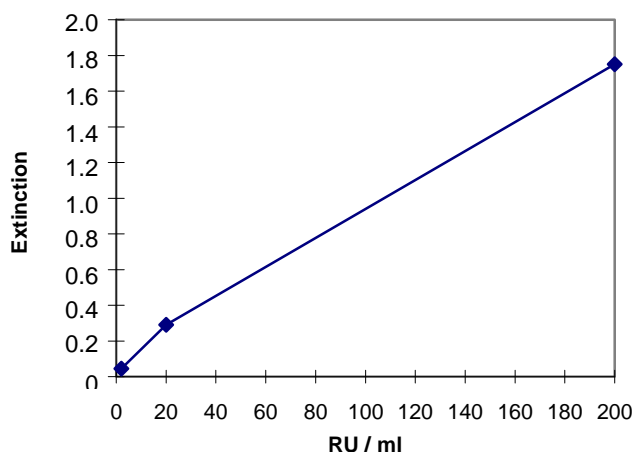
Semiquantitative: Results can be evaluated semiquantitatively by calculating a ratio of the extinction value of the control or patient sample over the extinction value of calibrator 2. Calculate the ratio according to the following formula:

$$\frac{\text{Extinction of the control or patient sample}}{\text{Extinction of calibrator 2}} = \text{Ratio}$$

EUROIMMUN recommends interpreting results as follows:

Ratio <1.0:	negative
Ratio ≥1.0:	positive

Quantitative: The standard curve from which the concentration of antibodies in the serum samples can be taken is obtained by point-to-point plotting of the extinction values measured for the 3 calibration sera against the corresponding units (linear/linear). Use "point-to-point" plotting for calculation of the standard curve by computer. The following plot is an example of a typical calibration curve. Please do not use this curve for the determination of antibody concentrations in patient samples.



If the extinction for a patient sample lies above the value of calibrator 1 (200 RU/ml), the result should be reported as ">200 RU/ml". It is recommended that the sample be retested at a dilution of 1:800. The result in RU/ml read from the calibration curve for this sample must then be multiplied by a factor of 4.

The upper limit of the normal range (**cut-off**) recommended by EUROIMMUN is 20 relative units (RU)/ml. EUROIMMUN recommends interpreting results as follows:

<20 RU/ml:	negative
≥20 RU/ml:	positive

For duplicate determinations the mean of the two values should be taken. If the two values deviate substantially from one another, EUROIMMUN recommends retesting the samples.

For diagnosis, the clinical symptoms of the patient should always be taken into account along with the serological results.

Test characteristics

Calibration: As no international reference serum exists for the quantitative detection of antibodies against SS-B, the calibration is performed in relative units (RU)/ml. The reactivity of the Anti-SS-B ELISA was verified using the human reference serum CDC-ANA #2 of the "Centers for Disease Control" (Atlanta, USA).

For every group of tests performed, the extinction values of the calibrators and the relative units and/or ratio determined for the positive and negative controls must lie within the limits stated for the relevant test kit lot. A quality control certificate containing these reference values is included. If the values specified for the controls are not achieved, the test results may be inaccurate and the test should be repeated.

The binding activity of the antibodies and the activity of the enzyme used are temperature-dependent. It is therefore recommended using a thermostat in all three incubation steps. The higher the room temperature (+18°C to +25°C) during the incubation steps, the greater will be the extinction values. Corresponding variations apply also to the incubation times. However, the calibrators are subject to the same influences, with the result that such variations will be largely compensated in the calculation of the result.

Antigen: The microplate wells were coated with SS-B purified by affinity chromatography from calf thymus.

The SS-B antigen is a phosphoprotein with a molecular weight of 48 kDa. It is mainly localised in the cell nucleus, only 10% of the antigen also occur in the cytoplasm. In the cell nucleus, SS-B acts as a chaperon of RNA polymerase III: this synthesises low-molecular RNA, such as U6-RNA, pre-5S-RNA, pre-tRNA, 7-2-RNA and Y-RNA. During transcription, SS-B binds to the developing RNA and after conclusion of the transcription, SS-B is released again.

SS-B and La are biochemically identical. They are named after the disease with which the antibodies are most frequently associated (Sjögren's syndrome, antigen B) and after the patient in whom the antibodies were first described (La, first letters of the patient's name).



Linearity: The linearity of the Anti-SS-B ELISA (IgG) was determined by assaying 4 serial dilutions of different patient samples. The Anti-SS-B ELISA (IgG) is linear at least in the tested concentration range (21 RU/ml to 191 RU/ml).

Detection limit: The lower detection limit is defined as the mean value of an analyte-free sample plus three times the standard deviation and is the smallest detectable antibody titer. The lower detection limit of the Anti-SS-B ELISA (IgG) is 0.6 RU/ml.

Cross reactivity: This ELISA specifically detects autoantibodies of class IgG directed against SS-B. Cross reactions with other autoantibodies were not found in samples from patients with the following antibodies: ribosomal P protein (n = 2), RNP (n = 2), Sm (n = 2), SS-A (n = 2), Scl-70 (n = 2), Jo-1 (n = 2) and centromeres (n = 2).

Interference: Haemolytic, lipaemic and icteric samples showed no influence on the result up to a concentration of 10 mg/ml for haemoglobin, 20 mg/ml for triglycerides and 0.4 mg/ml for bilirubin in this ELISA.

Reproducibility: The reproducibility of the test was investigated by determining the intra- and inter-assay coefficients of variation (CV) using 3 samples. The intra-assay CVs are based on 20 determinations and the inter-assay CVs on 4 determinations performed in 6 different test runs

<i>Intra-assay-Variation, n = 20</i>		
Sample	Mean value (RU/ml)	CV (%)
1	73	5.4
2	81	2.8
3	85	3.2

<i>Inter-assay-Variation, n = 4 x 6</i>		
Sample	Mean value (RU/ml)	CV (%)
1	74	7.6
2	80	4.6
3	83	3.3

Reference range: The levels of the anti-SS-B antibodies (IgG) were analysed with this EUROIMMUN ELISA in a panel of 206 healthy blood donors. With a cut-off of 20 RU/ml, all blood donors were anti-SS-B negative.

Clinical significance

Antibodies (AAb) against nuclear antigens (ANA) are directed against various cell nuclear components. Among the most important nuclear antigens, including cytoplasmic antigens, are nRNP/Sm, Sm, SS-A (Ro), SS-B (La), Scl-70, PM-Scl, Jo-1, centromeres, PCNA, dsDNA, nucleosomes, histones and ribosomal P-proteins. They are mainly components of functional nuclear particles, are bound to nucleic acids or fulfil functions in the cell cycle, e.g. in transcription or translation.

The investigation of ANA and subsequent differentiation within the ANA (or ENA) spectrum contributes greatly to establishing a diagnosis, particularly in the following rheumatic diseases:

- systemic lupus erythematosus (SLE),
- Sharp syndrome (mixed connective tissue disease = MCTD),
- Sjögren's syndrome (SS),
- systemic sclerosis (SSc), and
- poly-/dermatomyositis (PM/DM).

Sjögren's syndrome (SS) is a chronic inflammatory autoimmune disease of the exocrine glands which can be found in one to four million people in the US alone. Nine out of ten patients are women. The main clinical feature of primary SS is ocular and oral dryness as a result of the destruction of lachrymal and salivary glands by lymphocytic infiltration. The pancreatic glands, mucous secreting glands of the intestine, bronchia, vagina and sudoriferous glands may also be affected. Around 5% of SS patients develop malignant lymphoma. In secondary SS, primary SS symptoms accompany rheumatoid arthritis (RA), SSc, SLE, PM/DM, primary biliary cirrhosis and autoimmune hepatitis.



Antibodies against SS-B are detected in 40 to 95% of SS cases. They mostly occur in parallel with autoantibodies against SS-A (anti-Ro). Autoantibodies against SS-B are also found in 5 to 35% of SLE patients and in neonatal lupus erythematosus (neonatal LE syndrome) with a prevalence of 75 to 80%. The antibodies are transmitted diaplacentally to the foetus and often cause congenital AV block in addition to inflammatory reactions when the mother is anti-SS-A or anti-SS-B positive (level I-III).

Antibodies against	Disease	Prevalence
SS-B (La)	Sjögren's syndrome (SS)	40% - 95%
	Systemic lupus erythematosus (SLE)	5% - 35%
	Neonatal lupus erythematosus	75% - 80%

Literature references

- Alba P, Bento L, Cuadrado MJ, Karim Y, Tungekar MF, Abbs I, Khamashta MA, D'Cruz D, Hughes GR. **Anti-dsDNA, anti-Sm antibodies, and the lupus anticoagulant: significant factors associated with lupus nephritis.** Ann Rheum Dis 62 (2003) 556-560.
- Burbelo PD, Ching KH, Issa AT, Loftus CM, Li Y, Satoh M, Reeves WH, Iadarola MJ. **Rapid serological detection of autoantibodies associated with Sjögren's syndrome.** J Transl Med 24 (2009) 7:83. 1-8.
- EUROIMMUN AG. Stöcker W, Schlumberger W, Krüger C. **Alle Beiträge zum Thema Autoimmun-diagnostik.** In: Gressner A, Arndt T (Hrsg.) Lexikon der Medizinischen Laboratoriumsdiagnostik. 2. Auflage. Springer Medizin Verlag, Heidelberg (2012).
- Hartung K, Seelig HP. **Laboratory diagnostics of systemic autoimmune diseases. Part 1. Collagenoses.** [Article in German] Z Rheumatol 65 (2006) 709-724.
- Peene I, Meheus L, Veys EM, De Keyser F. **Diagnostic associations in a large and consecutively identified population positive for anti-SSA and/or anti-SSB: the range of associated diseases differs according to the detailed serotype.** Ann Rheum Dis 61 (2002) 1090-1094.
- Phan TG, Wong RC, Adelstein S. **Autoantibodies to extractable nuclear antigens: making detection and interpretation more meaningful.** Clin Diagn Lab Immunol 9 (2002) 1-7.
- Smedby KE, Baecklund E, Askling J. **Malignant lymphomas in autoimmunity and inflammation: a review of risks, risk factors, and lymphoma characteristics.** Cancer Epidemiol Biomarkers Prev 15 (2006) 2069-2077.
- Tan EM, Chan EK, Sullivan KF, Rubin RL. **Antinuclear antibodies (ANAs): diagnostically specific immune markers and clues toward the understanding of systemic autoimmunity.** Clin Immunol Immunopathol 47 (1988) 121-141.
- Tzioufas AG, Voulgarelis M. **Update on Sjögren's syndrome autoimmune epithelitis: from classification to increased neoplasias.** Best Pract Res Clin Rheumatol 21 (2007) 989-1010.
- Vitali C, Bombardieri S, Jonsson R, Moutsopoulos HM, Alexander EL, Carsons SE, Daniels TE, Fox PC, Fox RI, Kassan SS, Pillemer SR, Talal N, Weisman MH, and the European Study Group on Classification Criteria for Sjögren's Syndrome. **Classification criteria for Sjögren's syndrome: a revised version of the European criteria proposed by the American-European Consensus Group.** Ann Rheum Dis 61 (2002) 554-558.

