

Borrelia CSF diagnosis

Instructions for use MS EXCEL macro

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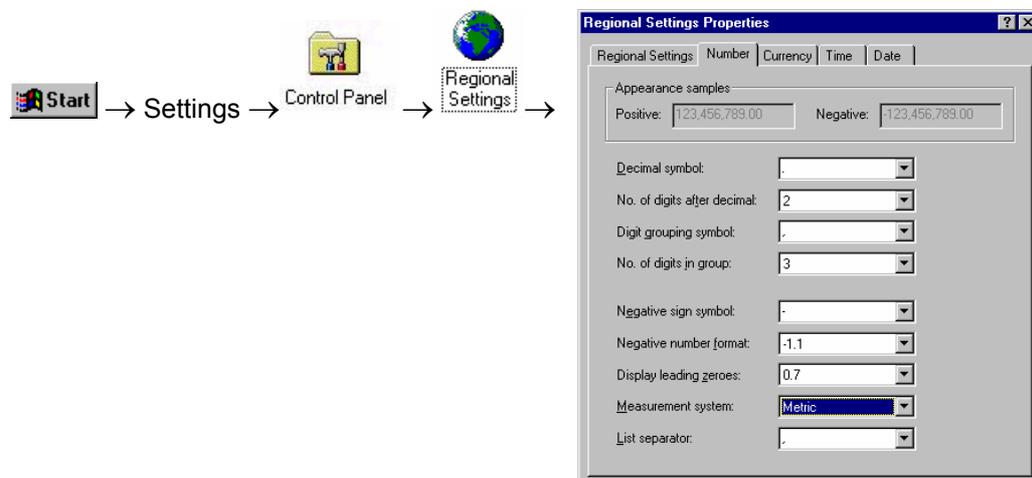
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1. System requirements and macro-start

System requirements: MS Windows 95+/NT
MS Excel 5.0/95

The MS Windows "Decimal symbol" setting is used as comma-separator in Excel.
This decimal symbol could be adjusted in Win95+/NT systems by clicking:

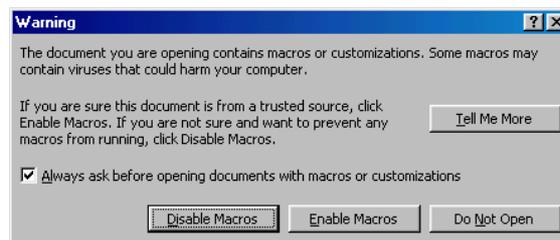


Adjust the "Decimal symbol" field according to your needs.

Start MS Excel, and load the file BORRELIA_CSF_E.XLS

This file consists of a macro, which starts automatically.

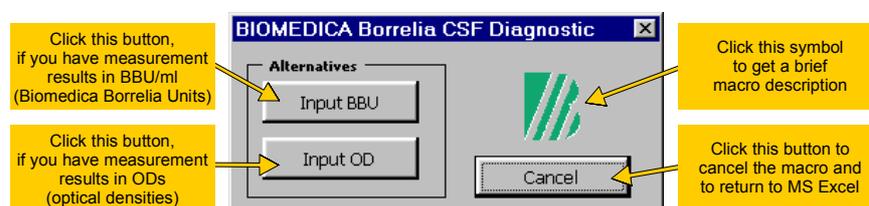
On some systems, the execution of macros is disabled. In this case, the following message is displayed:



If you clear the check box "Always ask before ...", this warning window won't be displayed any more in the future. For safety reasons we recommend you to keep this check box activated.

Click on the "Enable Macros" button.

Now the Borrelia macro starts automatically and displays the start window:



2. Input of BBU/ml (Biomedica Borrelia Units)

After clicking on **Input BBU** in the window showed on page 1, the following window is displayed:

The screenshot shows a software window titled "BIOMEDICA Borrelia CSF Diagnosis". It contains four main input sections arranged in a 2x2 grid:

- IgG serum / plasma:** Includes a "Dilution" field (pre-filled with 101), two "BBU sample" fields, a "BBU/ml" field (pre-filled with 0), and a "Borrelia negative" status label.
- IgG CSF:** Includes a "Dilution" field (pre-filled with 3), two "BBU sample" fields, a "BBU/ml" field (pre-filled with 0), and a "Borrelia negative" status label.
- IgM serum / plasma:** Includes a "Dilution" field (pre-filled with 101), two "BBU sample" fields, a "BBU/ml" field (pre-filled with 0), and a "Borrelia negative" status label.
- IgM CSF:** Includes a "Dilution" field (pre-filled with 2), two "BBU sample" fields, a "BBU/ml" field (pre-filled with 0), and a "Borrelia negative" status label.

Below these sections are two text input fields: "Patient-no.:" and "Patient-name:". At the bottom, there are four buttons: "Documentation", "<< Back", "Next >>", and "Cancel".

Yellow callout boxes provide the following instructions:

- Input the dilution of the IgG serum/plasma sample. The preset value is 1:101 (= standard dilution).
- Input single or double BBU values for IgG. If you have single values, leave one field empty.
- Input the dilution of the IgM serum/plasma sample. The preset value is 1:101 (= standard dilution).
- Input single or double BBU values for IgM. If you have single values, leave one field empty.
- Input the patient-no. and patient-name for subsequent documentation.
- Click here to return to the start window. Input data won't get lost.
- A brief hint tells you what to do next.
- Click here to cancel the macro and return to Excel. Input data will be lost.

Input either IgG- or IgM-results, or both.

Remember to use only the digits 0..9 and the comma symbol for input of the measurement results.

The next page shows how to enter these data.

As soon as you start entering BBU-values, the window changes dynamically and you are granted to input CSF (cerebrospinal fluid)-values into the corresponding IgG/IgM fields:

The screenshot shows the 'BIOMEDICA Borrelia CSF Diagnosis' window. It is divided into four quadrants for data entry and results display:

- IgG serum / plasma:** Dilution: 101, BBU sample 1: 10.5, BBU sample 2: 10, BBU/ml: 10.25. Result: **Borrelia borderline**.
- IgG CSF:** Dilution: 3, BBU sample 1: (empty), BBU sample 2: (empty), BBU/ml: 0. Result: **Borrelia negative**.
- IgM serum / plasma:** Dilution: 101, BBU sample 1: 31, BBU sample 2: (empty), BBU/ml: 31. Result: **Dilute sample**.
- IgM CSF:** Dilution: 2, BBU sample 1: 15, BBU sample 2: (empty), BBU/ml: 15. Result: **Borrelia positive**.

At the bottom, there are fields for 'Patient-no.: 001' and 'Patient-name: John Lyme', and buttons for 'Documentation', '<< Back', 'Next >>', and 'Cancel'.

Yellow callout boxes provide the following information:

- Top-left:** The average BBU/ml is automatically calculated.
- Left side (IgG serum):** An initial assessment of the serum/plasma sample is displayed: negative = <9 BBU, borderline = 9-11 BBU, positive = >11 BBU.
- Right side (IgG CSF):** An initial assessment of the CSF sample is displayed: negative = <5 BBU, positive = ≥5 BBU.
- Bottom-left (IgM serum):** This sample is outside the linear range of up to 30 BBU, and has to be diluted higher.
- Bottom-right (IgM CSF):** Although a valid CSF-result has been entered, the program still deactivates the NEXT-button, because the serum/plasma value of 31 BBU is outside the linear range of up to 30 BBU.
- Bottom (Buttons):** As soon as the first result is input, this button becomes activated. If you click it, all input data are copied into the underlying Excel sheet for documentation. Input fields will be cleared.

Please note, that the "NEXT>>" button which is used to switch to the final window, is only activated if evaluable results are input.

Evaluable results are IgG/IgM serum/plasma-CSF-pairs, which are inside the linear measurement range of ≤30 BBU/ml.

Additionally, at least one IgG- or IgM-CSF result must be ≥5 BBU/ml to activate the "NEXT>>" button, because results <5 BBU/ml indicate the absence of Borrelia antibodies in CSF, which means that there is no need for estimation of the antibody-indexes.

The next page shows how to enter an evaluable result.

In the window below, an evaluable result is input for IgG CSF:

BIOMEDICA Borrelia CSF Diagnosis

Parameter	IgG serum / plasma	IgG CSF	IgM serum / plasma	IgM CSF
Dilution	101	3	101	2
BBU sample 1	10.5	9	31	15
BBU sample 2	10			
BBU/ml	10.25	9	31	15
Result	Borrelia borderline	Borrelia positive	Dilute sample	Borrelia positive

Please input the Biomedica Borrelia Units (BBU/ml) of the IgG and/or IgM-CSF samples, and the sample dilutions (1:x).

Patient-no.: 001
Patient-name: John Lyme

Buttons: Documentation, << Back, Next >>, Cancel

Callout: The NEXT-button has been activated, because evaluable results for IgG serum/plasma and IgG CSF have been entered.

Click on the "NEXT>>" button to move to the final window.

The next page shows how to enter the remaining data in order to calculate and interpret the antibody-indexes.

In the final window below, total-IgG, total-IgM and albumin-concentrations have to be entered in the corresponding input fields.

These fields are activated/deactivated according to the inputs in the previous window.

BIOMEDICA Borrelia CSF Diagnostic

Serum

Total-IgG mg/l

Total-IgM mg/l

Total-albumin mg/l

CSF

Total-IgG mg/l

Total-IgM mg/l

Total-albumin mg/l

Antibody-indexes

AI_{IgG} : 0

AI_{IgM} : 0

Patient-no. :

Patient-name :

Input of Total-IgM values are deactivated, because in the previous window the IgM serum/plasma result was outside the linear measurement range of up to 30 BBU

If you click this button, all input data are copied into the underlying Excel sheet for documentation. Input fields will be cleared.

Click here to return to the BBU input window. Input data won't get lost.

Click here to cancel the macro and return to Excel. Input data will be lost.

After the last concentration value has been input, the antibody-index(es) are calculated automatically, and a final sample assessment is shown:

BIOMEDICA Borrelia CSF Diagnostic

Serum

Total-IgG mg/l

Total-IgM mg/l

Total-albumin mg/l

CSF

Total-IgG mg/l

Total-IgM mg/l

Total-albumin mg/l

Antibody-indexes

AI_{IgG} : 29.9734

AI_{IgM} : 0

Strong evidence for an intrathecal production of anti-Borrelia antibodies.

Neuroborreliosis suspect

Patient-no. :

Patient-name :

Antibody-indexes are calculated automatically, as soon as all concentration values have been input.

Now you should click this button, because all inputs and calculations have been completed. Input fields will be cleared.

An interpretation of the antibody-indexes is shown: normal = AI ≤ 1.3
borderline = AI > 1.3 < 1.5
pathologic = AI ≥ 1.5

After clicking the "DOCUMENTATION" button, all relevant data are copied to the underlying Excel sheet, the form is cleared and the macro is ready for input of the measurement results of the next patient.

When you've finished the evaluation of all patient results, click the "CANCEL" button.

You can then print the Excel sheet with its documented results by clicking the "PRINT" icon in the menu bar.

Before leaving Excel, you should save your work by clicking the "SAVE" icon in the menu bar.

3. Input of ODs (optical densities)

Important note:

If you use OD results, ensure that all ODs for blank, cutoff and samples have been determined within one single IgG or IgM assay run.

After clicking on **Input OD** in the window showed on page 1, the following window is displayed:

The screenshot shows the 'BIOMEDICA Borrelia CSF Diagnostic' window. It is divided into several sections for data entry:

- Blank:** Includes an 'OD Blank' field. A yellow callout points to it with the text: "First, input the blank."
- IgG cutoff - controls:** Includes 'OD cutoff 1', 'OD cutoff 2', and 'Average' fields. A yellow callout points to the 'OD cutoff 1' field with the text: "A brief hint tells you what to do next."
- IgM cutoff - controls:** Includes 'OD cutoff 1', 'OD cutoff 2', and 'Average' fields.
- IgG serum / plasma:** Includes 'Dilution', 'OD sample 1', 'OD sample 2', 'BBU/ml', and 'Borrelia negative' fields.
- IgG CSF:** Includes 'Dilution', 'OD sample 1', 'OD sample 2', 'BBU/ml', and 'Borrelia negative' fields.
- IgM serum / plasma:** Includes 'Dilution', 'OD sample 1', 'OD sample 2', 'BBU/ml', and 'Borrelia negative' fields.
- IgM CSF:** Includes 'Dilution', 'OD sample 1', 'OD sample 2', 'BBU/ml', and 'Borrelia negative' fields.
- Patient information:** Includes 'Patient-no.' and 'Patient-name' fields. A yellow callout points to the 'Patient-no.' field with the text: "Input the patient-no. and patient-name for subsequent documentation."
- Buttons:** 'Documentation', '<< Back', 'Next >>', and 'Cancel'. A yellow callout points to the 'Cancel' button with the text: "Click here to cancel the macro and return to Excel. Input data will be lost."
- Hint:** A yellow callout points to the 'OD Blank' field with the text: "Please input the optical density (OD) of the blank."
- Return button:** A yellow callout points to the '<< Back' button with the text: "Click here to return to the start window. Input data won't get lost."

As soon as you start entering the blank OD, further input fields are enabled:

This screenshot shows the same window as above, but with some fields populated:

- Blank:** 'OD Blank' is now filled with '0.05'.
- IgG cutoff - controls:** 'OD cutoff 1' is filled with '0.05'. A yellow callout points to it with the text: "Input IgG and/or IgM cutoff OD values. Input either single or double values. If you have single values, leave one field empty."
- IgM cutoff - controls:** 'OD cutoff 1' is filled with '0.05'.
- BBU/ml:** In the IgG and IgM serum/plasma sections, the 'BBU/ml' field is now filled with '-500000'.
- Patient information:** 'Patient-no.' is filled with '001' and 'Patient-name' is filled with 'John Lyme'.
- Hint:** A yellow callout points to the 'OD cutoff 1' field with the text: "Please input the optical densities (OD) of the IgG- and/or IgM cutoff-controls."

As soon as you start entering the cutoff ODs, the remaining fields are enabled which is shown on the next page.

Now enter the OD values into the respective input fields:

BIOMEDICA Borrelia CSF Diagnostic

Blank
OD Blank: 0,05

IgG serum / plasma
Dilution: 101
OD sample 1:
OD sample 2:
BBU/ml: 0
Borrelia negative

IgG CSF
Dilution: 3
OD sample 1:
OD sample 2:
BBU/ml: 0
Borrelia negative

IgM serum / plasma
Dilution: 101
OD sample 1:
OD sample 2:
BBU/ml: 0
Borrelia negative

IgM CSF
Dilution: 2
OD sample 1:
OD sample 2:
BBU/ml: 0
Borrelia negative

Please enter the optical densities (OD) of the IgM serum/plasma/CSF-samples, and the sample dilution (1:x).

Patient-no.: 001
Patient-name: John Lyme

Documentation << Back Next >> Cancel

Callout boxes:

- Input the dilution of the IgG serum/plasma sample. The preset value is 1:101 (= standard dilution)
- Input single or double OD values for IgG. If you have single values, leave one field empty.
- Input the dilution of the IgM serum/plasma sample. The preset value is 1:101 (= standard dilution)
- Input single or double OD values for IgM. If you have single values, leave one field empty.
- Input the dilution of the IgG CSF sample. The preset value is 1:3 (= standard dilution)
- Input single or double OD values for IgG CSF. If you have single values, leave one field empty.
- Input the dilution of the IgM CSF sample. The preset value is 1:2 (= standard dilution)
- Input single or double OD values for IgM CSF. If you have single values, leave one field empty.

After you've started to enter OD-values, the window contents change dynamically:

BIOMEDICA Borrelia CSF Diagnostic

Blank
OD Blank: 0,05

IgG serum / plasma
Dilution: 101
OD sample 1: 1,5
OD sample 2:
BBU/ml: 32.22222
Dilute sample

IgG CSF
Dilution: 3
OD sample 1: 0,75
OD sample 2:
BBU/ml: 15.55555
Borrelia positive

IgM serum / plasma
Dilution: 101
OD sample 1: 0,4
OD sample 2:
BBU/ml: 10
Borrelia borderline

IgM CSF
Dilution: 2
OD sample 1:
OD sample 2:
BBU/ml: 0
Borrelia negative

Please enter the optical densities (OD) of the IgM serum/plasma/CSF-samples, and the sample dilution (1:x).

Patient-no.: 001
Patient-name: John Lyme

Documentation << Back Next >> Cancel

Callout boxes:

- This sample is outside the linear range of up to 30 BBU, and has to be diluted higher
- The average BBU/ml is automatically calculated
- An initial assessment of the serum/plasma sample is displayed: negative = <9 BBU, borderline = 9-11 BBU, positive = >11 BBU
- As soon as the first result is input, this button becomes activated. If you click it, all input data are copied into the underlying Excel sheet for documentation. Input fields will be cleared.
- Although a valid CSF-result has been entered, the program still deactivates the NEXT-button, because the serum/plasma value of 32.2 BBU is outside the linear range of up to 30 BBU
- An initial assessment of the CSF sample is displayed: negative = <5 BBU, positive = ≥5 BBU

Please note, that the "NEXT>>" button which is used to switch to the final window, is only activated if evaluable results are input.

Evaluable results are IgG/IgM serum/plasma-CSF-pairs, which are inside the linear measurement range of ≤30 BBU/ml. Additionally, at least one IgG- or IgM-CSF result must be ≥5 BBU/ml to activate the "NEXT>>" button, because results <5 BBU/ml indicate the absence of Borrelia antibodies in CSF, which means that there is no need for estimation of the antibody-indexes.

The next page shows how to enter an evaluable result.

In the window below, an evaluable result is input for IgM CSF:

BIOMEDICA Borrelia CSF Diagnostic

Section	Parameter	Value	Result
Blank	OD Blank:	0.05	
	Average:	0.45	
IgG serum / plasma	Dilution:	101	
	OD sample 1:	1.5	
	BBU/ml:	32.22222	Dilute sample
IgG CSF	Dilution:	3	
	OD sample 1:	0.75	
	BBU/ml:	15.55555	Borrelia positive
IgG cutoff - controls	OD cutoff 1:	0.5	
	Average:	0.45	
IgM serum / plasma	Dilution:	101	
	BBU/ml:	10	Borrelia borderline
IgM CSF	Dilution:	2	
	OD sample 1:	0.37	
	BBU/ml:	9.142857	Borrelia positive
IgM cutoff - controls	OD cutoff 1:	0.4	
	Average:	0.35	

Please enter the optical densities (OD) of the IgM serum/plasma/CSF-samples, and the sample dilution (1:).
Patient-no.: 001
Patient-name: John Lyme

Buttons: Documentation, << Back, Next >>, Cancel

The NEXT-button has been activated, because evaluable results for IgM serum/plasma and IgM CSF have been entered.

Click on the "NEXT>>" button to move to the final window.

The next page shows how to enter the remaining data in order to calculate and interpret the antibody-indexes.

In the final window below, total-IgG, total-IgM and albumin-concentrations have to be entered in the corresponding input fields.

These fields are activated/deactivated according to the inputs in the previous window.

The screenshot shows the 'BIOMEDICA Borrelia CSF Diagnostic' window. It has two main columns: 'Serum' and 'Cerebrospinal fluid'. Each column has three input fields: 'Total-IgG', 'Total-IgM', and 'Total-Albumin', each followed by 'mg/l'. Below these is an 'Antibody-indexes' section with 'AI_{IgG} : 0' and 'AI_{IgM} : 0'. At the bottom, there are fields for 'Patient-no.' (001) and 'Patient-name' (John Lyme). Three buttons are at the bottom: 'Documentation', '<< Back', and 'Cancel'. Yellow callout boxes provide instructions: one points to the IgG fields stating they are deactivated if the previous result was outside the 0-30 BBU range; another points to the 'Documentation' button stating it copies data to Excel; a third points to the 'Back' button stating it returns to the previous window; and a fourth points to the 'Cancel' button stating it returns to Excel and clears data.

After the last concentration value has been input, the antibody-index(es) are calculated automatically, and a final sample assessment is shown:

The screenshot shows the same window after data entry. The 'Serum' fields now contain '9500', '49000', and '63.4145' (AI_{IgM}). The 'Cerebrospinal fluid' fields contain '6.3' and '60.2'. The 'Antibody-indexes' section shows 'AI_{IgG} : 0' and 'AI_{IgM} : 63.4145'. A text box states: 'Strong evidence for an intrathecal production of anti-Borrelia antibodies.' Below this, 'Neuroborreliosis suspect' is written in large red text. A legend box on the right explains the AI scale: normal = AI ≤ 1.3, borderline = AI > 1.3 < 1.5, pathologic = ≥ 1.5. Yellow callout boxes explain: one points to the AI_{IgM} field stating it is calculated automatically; another points to the 'Neuroborreliosis suspect' text stating it is an interpretation of the AI values; and a third points to the 'Documentation' button stating it should be clicked to save data and clear the form.

After clicking the "DOCUMENTATION" button, all relevant data are copied to the underlying Excel sheet, the form is cleared and the macro is ready for input of the of the measurement results of the next patient.

When you've finished the evaluation of all patient results, click the "CANCEL" button.

You can then print the Excel sheet with its documented results by clicking the "PRINT" icon in the menu bar.

Before leaving Excel, you should save your work by clicking the "SAVE" icon in the menu bar.