Measures the bio-available form of vitamin B_{12}

An early marker of changes in B_{12} status

Direct, automated method
Laboratory Diagnosis of Vitamin B\textsubscript{12} Deficiency

For the investigation of suspected vitamin B\textsubscript{12} deficiency, measurement of serum vitamin B\textsubscript{12} is the standard test. However, the test has the following limitations:

- It measures total, not metabolically active vitamin B\textsubscript{12}
- The levels are not clearly correlated with clinical symptoms
- There is a large “grey-zone” or indeterminate range between normal and abnormal levels
- Clinically significant vitamin B\textsubscript{12} deficiency can occur with total vitamin B\textsubscript{12} levels in the apparently normal range

What is Active-B12 (holotranscobalamin)?

Not all vitamin B\textsubscript{12} in serum is bio-available

Vitamin B\textsubscript{12} (cobalamin) in serum is bound to two proteins, transcobalamin (TC) and haptocorrin (HC). The transcobalamin-cobalamin complex is called holotranscobalamin (HoloTC) or Active-B12.

The much larger fraction (about 80%) of cobalamin carried by HC is considered metabolically inert because no cellular receptors exist, except on the liver.

**Active-B12 contains the biologically available cobalamin because only transcobalamin-bound B\textsubscript{12} promotes the uptake of the cobalamin therein by all cells, via specific receptors.**

The markedly shorter half-life for Active-B12 compared to HoloHC makes a decrease of Active-B12 one of the earliest markers of cobalamin deficiency.

Recently Proposed Algorithm for B\textsubscript{12} Deficiency Subjects

Subjects at risk of B\textsubscript{12} deficiency\textsuperscript{1}

\begin{align*}
B_{12} < 150 \text{ pmol/L} & \quad \text{Likely deficient} \\
B_{12} 150 – 250 \text{ pmol/L} & \quad \text{Additional testing, such as Active-B12} \\
B_{12} > 250 \text{ pmol/L} & \quad \text{Unlikely deficient}
\end{align*}

Resolve B\textsubscript{12} indeterminate samples
Clinical Studies with Active-B12 (holotranscobalamin)

Active-B12 results by vitamin B\textsubscript{12} concentration

Methods based on specific anti-TC antibodies confirm the usefulness of Active-B12 for diagnosing B\textsubscript{12} deficiency\textsuperscript{2, 3}. A number of studies have been published to support the contention that Active-B12 would be a better indicator of early vitamin B\textsubscript{12} deficiency than total serum cobalamin\textsuperscript{4, 5, 6}.

- Active-B12 levels are low in patients with biochemical signs of vitamin B\textsubscript{12} deficiency\textsuperscript{7}.
- Low values have been reported in both vegetarians\textsuperscript{8, 9} and vegans\textsuperscript{10}, and in populations with a low intake of vitamin B\textsubscript{12}\textsuperscript{11}.
- A low serum Active-B12 (but not serum vitamin B\textsubscript{12}) was reported in patients with Alzheimer's disease compared to a healthy control group\textsuperscript{12}.
- Recent results also support that Active-B12 reflects vitamin B\textsubscript{12} status independent of recent absorption of the vitamin\textsuperscript{13}.

AxSYM Active-B12 (holotranscobalamin) Assay

Method Comparison AxSYM to Axis-Shield Active-B12 Radioimmunoassay

The AxSYM Active-B12 assay is based on two well characterised binders: A monoclonal antibody to Active-B12 (that does not recognize transcobalamin, TC) and a monoclonal antibody to TC.

The assay directly quantitates Active-B12 and avoids the sample pre-treatment step common to all vitamin B\textsubscript{12} assays.

The new AxSYM Active-B12 assay correlates well to the existing RIA method.
AxSYM Active-B12 (holotranscobalamin) Assay Characteristics

Method | Microparticle Enzyme Immunoassay (MEIA)
Throughput | Up to 45 tests/hour
Sample Type | Serum (including gel tubes), lithium heparin plasma (including gel tubes)
Sample Preparation | None
Sample Volume | 173 µl
Calibrators | 6, recombinant Active-B12 in buffer, liquid, ready-to-use
| 0, 8, 16, 32, 64, 128 pmol/l
Controls | 2, recombinant Active-B12 in serum, liquid, ready-to-use
Expected Values | 19.1 – 119.3 pmol/l (apparently healthy population, n = 281)
Suggested Cut-off | 35 pmol/l
Precision (total %CV) | <10%
Calibration Curve Stability | Typically 14 days
Limit of Detection | ≤ 1 pmol/l
Reference Method | Axis-Shield radio-immunoassay

Ordering Information

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<th>Description</th>
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<td>AxSYM HoloTC Calibrator Kit</td>
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<td>AxSYM HoloTC Assay Disk</td>
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References