**NOTICE FOR USERS OF LABORATORY MEDICINE SERVICES:**

**BIOTIN: Interference in Laboratory Tests**

**Background**

Biotin (vitamin B7) is present in serum/plasma from all healthy individuals. Biotin is also used in a number of immunoassay-based tests in laboratory medicine, where the strong interaction between biotin and streptavidin is exploited to bind antibodies to solid phases, for example. When biotin is present in patient samples at normal, physiological concentrations, this does not cause any problems with biotin-dependent tests. However, where patients are taking high doses of biotin there is the potential for interference in these tests.

Standard multi-vitamin supplements typically contain 50 to 300 % of the EU nutrient reference value for biotin (50 μg/day for adults). Supplementation at these levels will not cause interference. However, there are over-the-counter preparations containing high doses of biotin – up to 12,000 μg/day (240 times the recommended intake). These high-dose preparations are typically marketed as promoting hair and nail health. Published pharmacokinetic data indicate that doses of biotin between 5,000 and 20,000 μg/day can increase biotin concentrations to levels that may interfere with biotin-dependent tests.

Some patient groups may be prescribed very high doses of biotin, with preparations containing 100,000 to 300,000 μg/day suggested for certain conditions. Very high dose biotin may be prescribed for patients with certain rare inherited metabolic/mitochondrial disorders and has been investigated as a therapy in multiple sclerosis. These very high doses of biotin may cause gross interference in susceptible immunoassays.

**What can we do about this?**

Awareness of this issue amongst clinicians requesting and interpreting these tests is important. The tables below list the Blood Sciences tests susceptible to interference from high concentrations of biotin. In some cases this would lead to negative interference (i.e. lower results) and in others, positive interference (i.e. high results). The threshold at which biotin interference becomes significant is also listed. To put these biotin concentrations into perspective, taking 10,000 μg/day (found in some OTC preparations) can lead to peak serum biotin concentrations between 50 and 150 μg/L. Patients prescribed very high dose biotin are likely to have peak serum biotin concentrations significantly higher than this.

To avoid interference in affected assays, patients taking biotin should undergo a ‘washout’ period before taking blood samples. It has been suggested that for patients on 10,000 μg biotin/day, there should be at least 8 hours between the last biotin dose and blood sampling. For those on very high-dose biotin (greater than 10,000 μg/day) an extended washout of up to 72hrs may be required to avoid interference. In cases where there is suspicion of biotin interference and it is not possible to wait for a washout period, the duty biochemist (x29719 at RVI, x48889 at FH) can be contacted to discuss this further.

**Blood Sciences assays susceptible to biotin interference**

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| --- | --- | --- | --- | --- |
| **Potential NEGATIVE interference in presence of high biotin concentrations** | | | | |
| **Test** | **Biotin threshold\* (ug/L)** |  | **Test** | **Biotin threshold\* (ug/L)** |
| AFP1 | 60 |  | IGF-13 | 73 |
| AMH1 | 30 |  | LH1 | 50 |
| Anti-GAD2 | No data |  | MBL2 | No data |
| β-crosslaps (CTX)1 | 30 |  | NT-proBNP1 | 30 |
| CA 1251 | 35 |  | Prolactin1 | 40 |
| CA 15-31 | 100 |  | PSA1 | 60 |
| CA 19-91 | 100 |  | PTH1 | 50 |
| CEA1 | 120 |  | Renin2 | 6 |
| Ferritin1 | 50 |  | SHBG1 | 60 |
| FSH1 | 60 |  | Thyroglobulin4 | 10 |
| Growth hormone3 | 73 |  | Troponin T1 | 20 |
| hCG1 | 80 |  | TSH1 | 25 |
| IgE (total)1 | 100 |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Potential POSITIVE interference in presence of high biotin concentrations** | | | | |
| **Test** | **Biotin threshold \*(ug/L)** |  | **Test** | **Biotin threshold\* (ug/L)** |
| Aldosterone3 | 5 |  | Free T31 | 70 |
| Anti-thyroglobulin1 | 60 |  | Free T41 | 20 |
| Anti-TPO1 | 10 |  | Oestradiol1 | 36 |
| Cortisol (serum)1 | 30 |  | Progesterone1 | 30 |
| DHEA-S1 | 30 |  | Testosterone1 | 30 |
| Digoxin1 | 100 |  | Vitamin B121 | 50 |
| Folate1 | 21 |  | Vitamin D (25OHD)1 | 30 |

\*Manufacturer’s data

Note that this information relates to the methods currently used by NUTH Blood Sciences:

1 = Roche Elecsys immunoassay, 2 = ELISA kit, 3 = IDS iSYS immunoassay, 4 = Beckman Access 2 immunoassay

**Viral Serology**

Some viral serological assays (such as those used to diagnose HIV and viral hepatitis) also include biotin and could be affected by high serum biotin levels. These are generally highly sensitive qualitative assays and biotin interference is therefore less likely to cause an incorrect result than with a quantitative biochemical assay. There have been no case reports of incidents related to this. There is a theoretical risk of a false negative result, principally at lower levels of antibody seen soon after infection. As with all patients a repeat test should be considered if the patient is potentially in the infection window. If there is concern following a negative result, consider a ‘washout’ period as above and discuss with a virologist 0191 28 (21104).