Current advances in research that affect patient care

Diabetes – New Test

GlycoMark is a newly FDA-approved blood test for the *intermediate-term* monitoring of glycaemic control in people with diabetes and measures 1,5-anhydroglucitol (1,5-AG) in serum or plasma. GlycoMark monitors mealtime spikes over 2 days to 2 weeks in a single, convenient blood test and provides complementary information to A1C to highlight and manage transient glycaemic excursions (postprandial hyperglycaemia). The A1c test is used primarily to monitor the glucose control of diabetics *over time*. The goal of persons with diabetes is to keep blood glucose levels normal, to help to minimize the complications caused by chronically elevated glucose levels, such as progressive damage to body organs like the kidneys, eyes, cardiovascular system and nerves. The A1c test gives a snapshot of the average amount of glucose in the blood over the last few months, and can help to ascertain if the measures being taken to control diabetes are successful or need to be adjusted.

1,5-Anhydroglucitol is a monosaccharide that is similar to glucose and is ingested through food, building a large body pool that remains in equilibrium in normal subjects. Normal mean value in serum is 17.7 μg ml^{-1} for females, and 22.5 μg ml^{-1} for males.

Because of the similarity in structure to glucose, reabsorption of 1,5-AG in the kidney is prevented by the glucose excreted in urine, resulting in rapid net decrease of 1,5-AG. Therefore, serum 1,5-AG decreases rapidly in people with hyperglycaemia above the renal threshold of glucosuria. Upon return of strict glycaemic control (no glucosuria), serum 1,5-AG levels recover at a daily rate of 0.3 μg ml^{-1}.

Although the normal range for GlycoMark is relatively wide, values under 10 μg ml^{-1} are indicative of elevated post-meal glucose levels in moderately uncontrolled patients (A1C 6.5–8.0%) (see Table 1).

It is important to note that GlycoMark values decrease when serum glucose levels increase (hyperglycaemia). For example, an increase in 1,5-AG would indicate improvement, and a decrease in 1,5-AG would indicate deterioration of glycaemic control. Upon return of improved glycaemic control, 1,5-AG increases at a constant rate of 0.3 ug ml^{-1}. This consistent recovery rate in 1,5-AG levels provides a rapid indication of the patient's response to treatment.

Table 1. **GlycoMark values in relation to diabetes assessment**

GlycoMark (μg ml^{-1})	Assessment of diabetes
14 or higher	Normal (healthy)
10.0–13.9	Well controlled
6.0–9.9	Moderately uncontrolled
2.0–5.9	Poorly controlled
1.9 or lower	Very poorly controlled

The laboratory service for GlycoMark test is currently available at LabCorp (Phone: 800-762-4344) and Esoterix Inc. (Phone: 800-444-9111 or http://www.esoterix.com).

Further Reading

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Diabetes – Inhaled Insulin

On 27 January 2006, Exubera® became the first inhaled insulin to receive US Food and Drug Administration (FDA) approval. The European Union approved Exubera for treatment of type 1 and type 2 diabetes in adults on 26 January 2006

[Exubera® (inhaled human insulin) NEKTAR. Partner: Pfizer Indication: Type I and Type II diabetes; Status: Filed in the USA; Approved in Europe; http://www.nektar.com/wt/page/exubera]. Exubera® delivers short-acting insulin via an inhaler, and offers adults with type 1 or type 2 diabetes an alternative to the insulin injections they need to control their blood sugar. The device is not approved for use by children <18 years of age.

The FDA approval requires the manufacturer to distribute medication guides along with Exubera®. The guide contains FDA-approved information written especially for patients. Exubera2 is contraindicated in smokers or people who have quit smoking within the previous 6 months. It is not recommended for people with asthma, bronchitis or emphysema. Those with colds or flu should be able to take the drug, although it may cause coughing. The FDA recommends that patients be tested for good quality lung function before beginning Exubera® treatment. These tests should be repeated every 6–12 months while treatment continues.

The device has been in development for 10 years in a joint effort by Pfizer, Sanofi-Aventis, and Nektar Therapeutics. The Exubera® device is not as small as an asthma inhaler. Folded, it is the size of a standard flashlight. A retractable inhaler tube projects from the body of the device; when extended it reaches from the chest to the mouth. A blister pack of insulin then must be inserted before the device is triggered. This is a breakthrough for those that need insulin and are 'needle-phobic'.

Further Reading

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Osteoporosis and Bisphosphonates

Bisphosphonates – such as alendronate, risedronate and ibandronate – are inhibitors of bone resorption. Extensive studies have shown that therapy with bisphosphonates improves bone density and decreases fracture risk (1, 2).

Current evidence suggests that bisphosphonates be stopped after 5 years (3). Authors of a recent study concluded that during long-term alendronate therapy, dangerous suppression of bone turnover may occur, resulting in increased susceptibility to non-spinal fractures and delayed healing (4). The authors suggested that although co-administration of oestrogen or glucocorticoids seems to be a predisposing factor, this obvious complication can also occur with monotherapy (4). Those who remain at a high risk for fractures, or who have had fractures despite bisphosphonate therapy, could be considered for treatment with intermittent PTH (parathyroid hormone) (4).

There have long been concerns about the potential oversuppression of bone turnover during long-term use of bisphosphonates and their long-term safety (5). The concern is increased when the bisphosphonate is taken concomitantly with another agent or drug that may inhibit bone turnover, such as oestrogen. The current patient package insert for Fosamax (alendronate) states, 'The long-term effects of combined Fosamax and HRT on fracture occurrence and fracture healing have not been studied.' (6). Obviously, such studies are needed (3).

Recently, osteonecrosis of the jaws have been associated with the use of bisphosphonates (7). The mechanism of bisphosphonate-mediated osteonecrosis is uncertain. The authors hypothesized that bisphosphonates, which are potent inhibitors of osteoclastic activity, could reduce vascularity in the jaws and may cause sites susceptible to pathogenic infection to exhibit bony necrosis. The effect may be amplified when bisphosphonates are combined with chemotherapeutic drugs used for cancer treatment (7). A suggestion by the authors is that a complete dental examination be performed before commencing bisphosphonate treatment so as to identify and address any dental pathology.

To tie this together, bone mineral density (BMD) in premenopausal women with type 1 diabetes, also referred to as juvenile diabetes, is 3–8% *lower* than in women without diabetes (8). A recent study reports that young diabetic women were also significantly more likely to report having a bone fracture after 20 years of age (33.3 % versus 22.6%). Because women with type 1 diabetes already had lower BMD before menopause, the authors hypothesize that they may be at substantially increased risk of developing osteoporosis after menopause (8). It is recommended that 'type 1 diabetic women be targeted for osteoporosis screening and possible fracture prevention as they transit through menopause'. When taking a medical history, it is important for oral health-care professionals to ascertain diabetes status, risk for osteoporosis and menopausal status in women, and make the appropriate medical referrals.

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