Diagnostic Tools

Chair: ***Dalip Ragoobirsingh***

A_{1c} as a Diagnostic Tool

Rosemarie Wright-Pascoe

Over 40 years ago, haemoglobin A_{1c} (HBA_{1c}, A_{1c}) was noted to be an unusual haemoglobin in subjects with diabetes mellitus. Haemoglobin A_{1c} is formed through a non-enzymatic glycation pathway when haemoglobin in the red blood cells is exposed to plasma glucose.

The A_{1c}-Derived Average Glucose (ADAG) study established conclusively the relationship between A_{1c} and the average glucose. The relationship between A_{1c} and prevalent and incident retinopathy is similar to that of fasting or postprandial glucose, with the same or even better sensitivity and specificity. No preparation is necessary to do this test, making it an ideal screening and diagnostic test for diabetes mellitus. However, haemoglobinopathies, anaemias and conditions with rapid red blood cell turnover may impair its accuracy. In addition, there are several haemoglobin A_{1c} assays and they were not standardized.

In 2005, The World Health Organization (WHO), along with the International Diabetes Federation (IDF), considered A_{1c} to be too inaccurate to be used to make the diagnosis of diabetes mellitus despite the ease of its use. But international and local harmonization of HbA_{1c} standards has been done. In an addendum in 2011, the WHO/IDF report agreed that HbA_{1c} may be used to diagnose diabetes providing that appropriate conditions apply.

The choice to use HbA_{1c} as a diagnostic test should, however, be based on cost, the availability of equipment, the population characteristics, and the presence of a national quality assurance system.

In this presentation, it is proposed to discuss these issues in more detail.

Monitoring Guidelines

Marshall Tulloch-Reid

There are several guidelines currently available for monitoring of patients with diabetes. Most utilize a combination of history taking, physical examination and laboratory testing. Over the years, the aspects of diabetes that are monitored have remained the same but the intensity of evaluation and the choice of tests have been modified based on new clinical data and the setting in which persons with diabetes access care. In this presentation, some of the current guidelines for the monitoring of patients with different forms of diabetes throughout the stages of life will be reviewed.

New Therapies in Diabetes Management

Michael Boyne

The prevalence of diabetes mellitus is expected to increase by 37−60% over the next 20 years, increasing the burden of the disease and its associated costs dramatically. Thus, clinicians will need more therapeutic options as they struggle to contain the epidemic. Thankfully, the armamentarium of novel therapies is expected to increase.

Several anti-obesity pharmacological agents have been approved, such as lorcaserin, phentermine/topiramate and liraglutide, which have the potential to prevent diabetes. However, the long-term efficacy and safety of these agents are not known.

For treatment of hyperglycaemia, there are several novel agents that are now available or in development. Sodium-glucose cotransporter 2 (SGLT2)-inhibitors have a novel mechanism of action by increasing glycosuria. Long-acting glucagon-like peptide-1 (GLP-1) receptor agonists will help to improve compliance. Their once-weekly administration schedule also makes them a very attractive option to be combined with long-acting (*eg* once weekly) basal insulin analogues. Continuous glucose monitoring systems are improving in accuracy, are more user friendly, but remain expensive. Smartphone apps can help integrate blood glucose levels, food intake and the calculated dosing of insulin. The development of an artificial pancreas is advanced and this would close the loop between blood glucose level and insulin delivery, especially if they integrate meal data along with dual hormone delivery (insulin and glucagon).

There are also new options for diabetic complications *eg* intravitreal injection of anti-vascular endothelial growth factor (VEGF) agents can help preserve vision. Diabetic wounds may be improved with bioengineered skin substitutes, growth factors, and negative pressure wound therapy.

JANSSEN SATELLITE SESSION AND LAUNCH OF INVOKANA

Improving Glucose Control in Type 2 Diabetes through the Kidney

Luis Alberto Ramirez

The kidney plays an important role in glucose homeostasis. In people without diabetes, the kidneys filter and reabsorb proximally 180 grams of glucose daily, mediated through a group of transporters called sodium glucose cotransporters (SGLT) in the proximal tubule of the kidney, therefore, there is no glucose in the urine. However, people with diabetes have an increased amount of filtered glucose and also an abnormal increased reabsorption of glucose, which worsens hyperglycaemia.

A new family of medications like canaglifozin, known as SGLT-2 inhibitors, whose mechanism of action is through inhibition of SGLT-2 (sodium glucose cotransporter type 2 in the kidney) has demonstrated in numerous studies – in monotherapy or in combination therapy with other oral antidiabetics including insulin – that they improve glucose control, lower haemoglobin A_{1C}, and also produce weight loss.

The American and European Diabetes Association and also the American Association of Clinical Endocrinologists have included the use of this group of medications in their guidelines. We can now add to our medications to control diabetes, a novel medication like canaglifozin (Invokana 100 and 300 mg tablets) which improves glucose control and is insulin independent, glucose dependent, and with the additional benefit of weight loss and low risk of hypoglycaemia.