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"DOCTOR AT SEA" a monthly Column in The Islander Magazine

Diabetes mellitus - a sweetness flowing

Diabetes is a familiar condition but maybe translation of the Greek root is less familiar and refers to the sweetness of glucose in the urine of a diabetic. There are stories of old-style autocratic consultants putting a finger in the urine and then deftly licking a different finger whilst asking the unfortunate medical students to taste the urine. Health and safety regulations were a thing of the future!

According to the World Health Organisation nearly 3% of the world's population were diabetic in 2000 and the number is growing. It is almost certain that each of us knows someone with the condition. The production of insulin by a University of Toronto research group in 1921 must be one the major milestones in medicine and, perhaps another feature of old-style medicine, they sold their patent to the University for one dollar! Members of the group went on to receive the Nobel Prize for Medicine in 1923.

Broadly speaking, there are two types of diabetes – Type I affects younger people and is characterised by a lack of insulin secreted by the pancreas and, by definition, is managed by insulin injections – Type II affects older people usually and is characterised by inadequate "worn-out" insulin secretion and can be managed by a hierarchy of treatments starting with diet, then tablets and lastly insulin injections.. Type II diabetes creeps up on older, often overweight, people without them realising that their blood glucose is gradually rising and can take months or even years before the condition produces symptoms. For this reason there are many undiagnosed diabetics for whom a simple urine dipstick test would pick up the condition. Type I symptoms are much more dramatic because the rise in blood glucose is accelerated in the absence of insulin and a young person presenting with increased urination and excessive thirst as well as abdominal discomfort and possible altered mental function is Type I diabetic until proved otherwise.

Insulin converts blood glucose into chemical energy to power biochemical reactions that build, for example, muscles and other complex processes that allow us to move and to keep warm. Without insulin, the blood glucose does not convert to energy but accumulates in the blood and eventually becomes so high that it exceeds the threshold of the kidneys to retain it so it spills over and is wasted in the urine. The osmotic effect of this is to draw more water into the urine and to cause excessive urination and a compelling thirst. This is typically the dramatic presentation in a young adult but can be similar although slower in the older Type II diabetic. If left undiagnosed and untreated, the rising blood glucose can cause reduced mental function, confusion, coma and death.

In both types of diabetes the crucial weakness is the inadequate or absent insulin to facilitate conversion of blood

glucose to energy so the body turns to fat deposits to create chemical energy and, as a by-product, produces ketones which have a pear drop/nail lacquer/acetone smell. A dipstick urine test in these circumstances will test positive for glucose and also for ketones and is a sign of serious diabetes in a person who is clearly unwell. Less serious (emerging Type II) will only test positive for glucose.

Dipstick urine analysis is an important part of the ENG1 medical because it picks up underlying Type II diabetes before it has become a significant problem. Interestingly, some healthy people will test positive for ketones when their urine glucose is normal. This is common in patients who have missed breakfast and worked through lunch then turn up at 3pm for their ENG1 having fasted since the night before. We depend heavily on food for blood glucose and, when fasting, our bodies switch energy metabolism from glucose breakdown to fat breakdown and out come the ketones and down goes the weight!

It is possible to pass the ENG1 medical as a Type II diabetic but, if this becomes insulin dependent, there are much tighter restrictions and these restrictions also apply to young people who are Type I diabetics and who, by definition, are on insulin – this may seem harsh especially to young adults with a history of good diabetes control but insulin and long voyages do not mix.

The need for food to support blood glucose stems from our relative inability to store glucose so we draw on the all too easily stored reserves of fat but there are actually small reserves of stored glucose in the liver and these are released by the hormone glucagon. Occasionally you may have an insulin-dependent guest on board who develops a very low blood glucose (a hypo attack) because they have exercised more than normal or because they have had a brief illness or maybe made a mistake with their insulin. If they are still conscious then some oral glucose is best, or else some other sweet food, and if they become unconscious, an intramuscular injection of glucagon is essential. Alternatively your guest may be a Type II diabetic who has missed their medication for the trip and their blood glucose is going higher and higher and ultimately their conscious level is affected. This is much more complicated and needs medical advice. Senior yacht officers may need to administer glucagon and this is very safe but you should never have to make a decision on your own about injecting insulin unless a prescribed management plan is already in place.

This kind of material is covered in standard Medical Care Onboard Ship Courses and should give more confidence in dealing with people suffering loss of diabetic control. Treatment regimes are improving all the time and Type I diabetics can live normal lives generally with much more flexibility with newer insulin regimes and better delivery devices. There is even research in progress to transplant insulin-producing cells into the pancreas and, if successful, it is possible this could revolutionise things even for seafarers.

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