



## **Lucozade and the Oral Glucose Tolerance Test** **(OGTT)**

The sole source of carbohydrate (CHO) in Lucozade Sparkling Glucose Drink is glucose syrup (liquid glucose) with a dextrose equivalent of approximately 52.5<sup>1</sup>. The glucose syrup used is a solution, in water, of a mixture of CHO's, obtained by the hydrolysis of starch, ranging from glucose to high molecular weight polysaccharides. The precise CHO composition is controlled to give the optimum balance of taste and performance. The body's digestive processes convert all the sugars quickly and easily to glucose.

As early as 1959 it was shown<sup>2</sup> that glucose syrup, given orally to humans, produced a rise in blood sugar as rapidly as an equivalent amount of glucose. Furthermore the peak blood sugar level achieved was similar. Work in the USA<sup>3,4</sup> and the UK<sup>5</sup> has confirmed these findings.

Glucose syrup reduces the incidence of nausea, which often accompanies the oral administration of glucose solutions in the GTT<sup>6</sup>. It is much less sweet than other sugars. On a scale of sweetness, if sucrose scores 100, glucose scores 70 and glucose syrup 30-60 (depending on composition)<sup>7</sup>. The glucose syrup used in Lucozade scores approximately 40 on this scale. In addition glucose syrups have a lower osmotic pressure than do iso-energetic solutions of glucose<sup>8</sup>.

The World Health Organisation<sup>9</sup> suggests that it is acceptable to use partial hydrolysate of starch with an equivalent carbohydrate content as an alternative to the standard glucose load in the oral GTT, for example glucose syrup. Lucozade is a particularly acceptable presentation of glucose syrup due to its fresh, slightly astringent citrus flavour and light carbonation. It has clear advantages in that it is both highly palatable and convenient, whilst providing glucose in an acceptable form as glucose syrup. Because its palatability ensures wide acceptance, patients more readily accept the full quantity of Lucozade than the equivalent glucose solution, as evidenced by the many hospital based studies where it has been routinely used for the oral GTT<sup>10</sup>.

A glucose load equivalent to 75g of anhydrous glucose or 82.5g glucose monohydrate is now recommended by the World Health Organisation<sup>9</sup> for the oral GTT in adults. The volumes of Lucozade equivalent to various glucose loads are set out in the table below:

**Please note:** Due to manufacturing changes in the production of Lucozade the volume of Lucozade required for a Glucose Tolerance Test (GTT) has changed (effective from 1<sup>st</sup> November 2001).

**Lucozade: Sparkling Glucose Energy Drink, 73kcal/100ml formulation**

<i><b>Volume</b></i> of Lucozade to provide the equivalent of 75g anhydrous glucose or 82.5g glucose monohydrate	<i><b>Weight</b></i> of Lucozade to provide the equivalent of 75g anhydrous glucose or 82.5g glucose monohydrate
<b>394ml</b>	<b>421g</b>

**N.B.** For children the recommended test load is 1.75g glucose per kg body weight up to a total of 75 g of glucose, this is equivalent to 9.2ml Lucozade per kg body weight up to a total of 394ml of Lucozade.

**The ingredients of Lucozade Sparkling Glucose Energy Drink are given below.**

**Single and multi-serve bottles:**

Carbonated Water, Glucose Syrup, Citric Acid, Lactic Acid, Flavourings (including Caffeine), Preservatives (Sodium Benzoate, Sodium Metabisulphite), Antioxidant (Ascorbic Acid), Colour (Sunset Yellow), Vitamins (Niacin, Pantothenic Acid, B<sub>6</sub>, B<sub>2</sub>, B<sub>12</sub>).

**Cans:**

Carbonated Water, Glucose Syrup, Citric Acid, Lactic Acid, Acidity Regulator (Sodium Citrate), Flavourings (including Caffeine), Preservative (Sodium Benzoate), Antioxidant (Ascorbic Acid), Colour (Sunset yellow), Vitamins (Niacin, Pantothenic Acid, B<sub>6</sub>, B<sub>2</sub>, B<sub>12</sub>).

## **Supporting calculations of the volume of Lucozade Energy for a Glucose Tolerance Test (GTT)**

Calculation of the volume of Traditional Lucozade Energy, (Lucozade: Sparkling Glucose Energy Drink, 73kcal/100ml formulation) required to provide 75g of anhydrous glucose (WHO 1999) as the glucose load for an adult GTT :-

Traditional Lucozade Energy contains a glucose syrup with a Dextrose Equivalent (DE) of 52.5

The current formulation of this Lucozade contains 165 litres of glucose syrup per 1000 litres of finished volume = 16.5% v/v

Weight per ml (g/ml @ 20°C) of the glucose syrup is 1.400

Therefore: 16.5% v/v = 23.1% w/v

The dry substance of glucose = 77.5% w/w

Therefore: Dry glucose solids in current Lucozade = 77.5% of 23.1 % w/v  
= 17.9% w/v

The hydrolysis factor (used for the conversion of the complex carbohydrates to glucose on digestion of glucose syrup in the body) for the glucose syrup used in current Lucozade = 1.063\*

Therefore anhydrous glucose content of Lucozade = 17.9 x 1.063 % w/v  
= 19.03 % w/v

Volume of Lucozade equivalent to 75g anhydrous glucose =  $75/19.03 \times 100$

**Volume of Lucozade equivalent to 75g anhydrous glucose = 394ml**

The equivalent weight of glucose with a wt per ml of 1.068 (g/ml @ 20°C) is 421g.

394ml of Lucozade Energy will also provide equivalent of 82.5g glucose monohydrate.

\* The Hydrolysis Factor used in our calculations is derived from average data from our glucose syrup suppliers.

	<u>% w/w</u>	<u>Hyd. Factor</u>	<u>Weighted Value</u>
Dextrose	28.5	1	0.285
Maltose	21.9	1.053	0.231
Maltotriose	10.4	1.071	0.111
Higher Sugars	39.2	1.111	<u>0.436</u>

**Hydrolysis Factor 1.063**

Please Note. These calculations have been derived by theoretical means and must, therefore, be considered approximate.

## REFERENCES

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