

**A STUDY TO DETERMINE THE EFFECT OF *SACCHARUM  
OFFICINALE* 9CH AND 200CH ON GLUCOSE METABOLISM IN  
HEALTHY NON-DIABETIC HUMANS**

A dissertation submitted to the Faculty of Health and Biotechnology, Technikon  
Witwatersrand, in partial fulfilment of requirements for the degree of  
Master in Technology: Homoeopathy

Johannesburg, 2004

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## DECLARATION

I, Désirée Latsky declare that this dissertation is my own work. It is being submitted as a partial fulfillment for the Degree of Master of Technology: Homoeopathy, at the Technikon Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination at this or any other institution.

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\_\_\_\_\_ Day of \_\_\_\_\_ 2004

## ABSTRACT

Nutrient metabolism consists of a series of chemical processes concerned with supplying energy to the body. This enables the body to perform various physiological processes and to maintain homeostasis (Guyton and Hall, 2000). In healthy, non-diabetic subjects, plasma glucose concentrations are held within a narrow range throughout the day, despite wide fluctuations in nutritional intake and physical exercise, as well as other physiological, psychological and iatrogenic influences (Owens, 2002).

The purpose of this research study was to determine the effect of the homoeopathic preparations, *Saccharum officinale* 9cH and 200cH, on glucose metabolism in healthy, non-diabetic humans.

This research study was a double blind, placebo-controlled clinical trial. A group of thirty participants were required to undergo an oral glucose tolerance test for three hours. Timing started as soon as the participants started drinking the glucose solution. In addition, ten drops of the homoeopathically prepared medicine or a placebo were administered at each of the following times: -15 minutes, 27 minutes, 87 minutes and 147 minutes. Group one received the placebo (20% alcohol), Group two received *Saccharum officinale* 9cH and Group three received *Saccharum officinale* 200cH. Blood glucose concentrations were measured, using capillary blood samples and a glucose meter, at the following times: -30 minutes, 30 minutes, 60 minutes, 90 minutes, 120 minutes, 150 minutes, and 180 minutes. Vital signs were measured at: 10 minutes, 50 minutes, 110 minutes and 170 minutes in order to ascertain any detrimental changes in health. Data was expressed as mean  $\pm$  standard error. Differences between the groups were determined using the one-way repeated measures analysis of variance method.

The hypoglycaemic effect of *Saccharum officinale* 9cH and 200cH was not proven to be effective in reducing the rate of glucose disposal in the body. Even though a slight difference between the experimental groups and the control group was observed, these changes could not be attributed to the therapeutic effect of the remedy and was regarded as statistically insignificant.

I would like to dedicate this research report to my family,  
for their support, encouragement and inspiration.

## ACKNOWLEDGEMENTS

I wish to thank the following people for their guidance and contribution in making this research project possible:

- Dr. Natasha Wolf for her invaluable support and guidance as a supervisor
- Mr. Neil de Villiers for his contribution as a specialist supervisor, and for all his time and assistance with the statistical analysis and presentation of data
- Dr. Radmilla Razlog of the School of Homoeopathy for her remarkable patience and willing assistance throughout this research project
- Ms. Gizelle Williams from Bayer who willingly sponsored glucose strips and a glucometer
- Mr. Carl Botes from Life Scan who so kindly sponsored lancets and glucose strips
- The Technikon Witwatersrand Library staff for their assistance in tracing references for this report
- Ms. Riette Eiselen from Statkon for her contribution with the statistical analysis of data

And, of course, to all the research participants, for their valuable time and patience throughout the study. Thank you for contributing to the development of Homoeopathy.

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## GLOSSARY OF TERMS

**Adenohypophysis:** the anterior lobe of the pituitary gland also known as the hypophysis, which is suspended from the base of the brain

**Adipose:** derived from the Latin word *adeps*, *adipis* denoting soft, animal fat, lard, grease

**Adenosine diphosphate:** formed from the hydrolysis of the last phosphate group of adenosine triphosphate

**Adrenal:** near or upon the kidney; denoting the pyramidal-shaped suprarenal glands atop the kidney. It contains two portions, the outer cortex and the inner medulla

**Alpha cells:** cells of the islets of Langerhans of the pancreas that secrete glucagon

**Arachidonic acid:** an unsaturated fatty acid and an important component of cellular membranes

**Adenosine triphosphate:** the primary energy currency of the cell

**Beta cells:** the predominant cells of the islets of Langerhans which produce insulin

**Catabolism:** the breaking down in the body of complex chemical compounds into simpler ones, often accompanied by the liberation of energy

**Coeliac plexus:** a network of nerves located in the abdomen, mainly formed by the contributions of the greater splanchnic and the vagus nerve

**Coenzyme:** a molecule or atom essential for the action of a larger molecule, i.e. enzymes

**Cortisol:** a steroid hormone secreted by the adrenal cortex; excessive secretion can lead to the development of Cushing's syndrome

**Cytokines:** hormone-like proteins, secreted by many cell types, which regulate the intensity and duration of immune-responses and are involved in cell-to-cell communication

**Decarboxylation:** a reaction involving the removal of a molecule of carbon dioxide from a carboxylic acid (-COOH)

**Diabetogenic:** causing diabetes

**Diffusion:** the random movement of molecules or ions or small particles in solution or suspension toward a uniform distribution throughout the available volume

**Disulphide:** a molecule containing two atoms of sulphur chemically bound (-S-S-)

**Electrochemical gradient:** is the distribution of ions involving both a chemical and an electrical gradient interacting to determine the direction of diffusion

**Electron:** negatively charged subatomic particle; orbits the atoms' nucleus

**Epinephrine:** neurohormone of the adrenal medulla; stimulates adrenergic receptors which results in glycogenolysis and lipolysis

**Fatty acids:** linear chains of carbon and hydrogen atoms with an organic acid group on the one end. A constituent of fat

**Glucagon:** a hormone produced by pancreatic alpha cells

**Glycaemic index:** a value used to express the rise in blood glucose levels after eating a particular food. The standard value of 100 is based on the rise seen after ingestion of glucose

**Glycerol:** a modified monosaccharide (a sugar alcohol)

**Glycogen:** main carbohydrate stored in animal cells; a polysaccharide

**Glycolytic:** relating to glycolysis, which is the breakdown of glucose to pyruvic acid – an anaerobic process

**Growth Hormone:** a hormone secreted by the anterior lobe of the pituitary gland. Excessive secretion leads to enlargement of the face, head, hands and feet – a disorder known as acromegaly

**Half-life:** time required for the serum concentration of a substance to decline by fifty percent

**Hepatocyte:** a liver cell

**Homeostasis:** the state of equilibrium in the body with respect to various functions and to the chemical compositions of the fluids and tissues

**Hydrogen ion:** a hydrogen atom minus its electron and therefore carries a positive charge (proton)

**Iatrogenic:** denoting a negative response to medical or surgical treatment, induced by the treatment itself

**Islets of Langerhans:** cellular masses varying from a few to hundreds of cells lying in the interstitial tissue of the pancreas; they are the source of insulin and glucagon

**Kupffer cells:** phagocytic cells of the mononuclear phagocyte series found on the luminal surface of the hepatic sinusoids

**Lipid:** organic compound formed of carbon, hydrogen and oxygen. It consists of a fatty acid and an organic alcohol bound chemically. Examples are fats and cholesterol

**Lymphocytes:** agranular white blood cell that arises from bone marrow and becomes functionally mature in the lymphoid organs of the body

**Macrophage:** protective cell type common in connective tissue, lymphatic tissue, and certain body organs that phagocytises tissue cells, bacteria, and other foreign debris; important as an antigen-presenter to T cells and B cells in the immune response

**Metalloprotein:** a protein with a tightly bound metal ion or ions, e.g. haemoglobin

**Metamorphosis:** transition from one developmental stage to another

**Mitochondria:** cytoplasmic organelles responsible for ATP generation for cellular activities; it has two sets of membranes, a smooth continuous outer coat and an inner membrane arranged in tubules or folds

**Molecule:** particle consisting of two or more atoms joined together by chemical bonds

**Monocyte:** large single nucleus white blood cell; agranular leukocyte

**Mother tincture:** the first solution obtained from dissolving a substance in a mixture of alcohol and water (usually in the ratio 9/10 pure alcohol to 1/10 distilled water)

**Nucleoside:** a nucleic acid constituent, consisting of a sugar residue bonded to a heterocyclic purine or pyrimidine base

**Opioid:** central nervous system depressant

**Oxidation:** process of substances combining with oxygen or the removal of hydrogen; e.g. beta-oxidation is the process by which fatty acids are metabolized to acetyl coenzyme A in the mitochondria

**Paracrine:** relating to a kind of hormone function in which the effects of the hormone are restricted to the local environment; as opposed to endocrine hormones which have systemic effects

**Pharmacological doses:** a dose of a chemical agent that is so much larger or more potent than would occur naturally that it might have qualitatively different effects

**Photosynthesis:** the process by which green plants, using chlorophyll and the energy of sunlight, produce carbohydrates from water and carbon dioxide, liberating molecular oxygen in the process

**Polymer:** a substance of high molecular weight with long, chainlike molecules consisting of many similar units

**Post-prandial:** following a meal

**Potentiation:** a stepwise process of diluting and succussing / vigorously shaking a remedy

**Saccharides:** a group of carbohydrates that includes the sugars. Saccharides are classified as mono-, di-, tri-, and polysaccharides, according to the number of saccharide units ( $C_6H_{10}O_5$ ) composing them

**Saccharum officinale:** white or cane sugar

**Samuel Hahnemann:** (1755 – 1843) German physician who at the turn of the eighteenth to nineteenth century began to develop Homoeopathy

**Somatotropes:** a subclass of pituitary acidophilic cells; site of synthesis of growth hormone

**Synthase or Synthetase** an enzyme catalyzing the synthesis of a specific substance, e.g. ATP synthase catalyses the formation of ATP from ADP

**Thyroxin:** the active iodine compound existing normally in the thyroid gland

**Triglycerides:** fats and oils composed of fatty acids and glycerol; are the body most concentrated source of energy fuel; also known as neutral fats

**VLDL:** very low density lipoprotein. It transports endogenously produced fat to adipose tissue

## LIST OF ABBREVIATIONS

**ADP:** adenosine diphosphate

**ANOVA:** analysis of variance

**ATP:** adenosine triphosphate

**C:** centesimal / 100

**cH:** centesimal potency

**CO<sub>2</sub>:** carbon dioxide

**e<sup>-</sup>:** electron

**FAD:** flavin adenine dinucleotide

**GDM:** gestational diabetes mellitus

**H<sup>+</sup>:** hydrogen ion

**IFG:** impaired fasting glycaemia

**IGT:** impaired glucose tolerance

**mg/dL:** milligram per decilitre

**mmol/L:** millimol per litre

**NAD:** nicotinamide adenine dinucleotide

**OGTT:** oral glucose tolerance test

**OGT:** oral glucose tolerance

**P:** phosphate

**TAFGC:** three-hour-area-average above fasting glucose concentration

**TCA:** tricarboxylic acid

**TNF- $\alpha$ :** tumour necrosis factor alpha

**VLDL:** very low density lipoprotein

**X:** decimal / 10