# IC7 – New actions for glucose and weight control

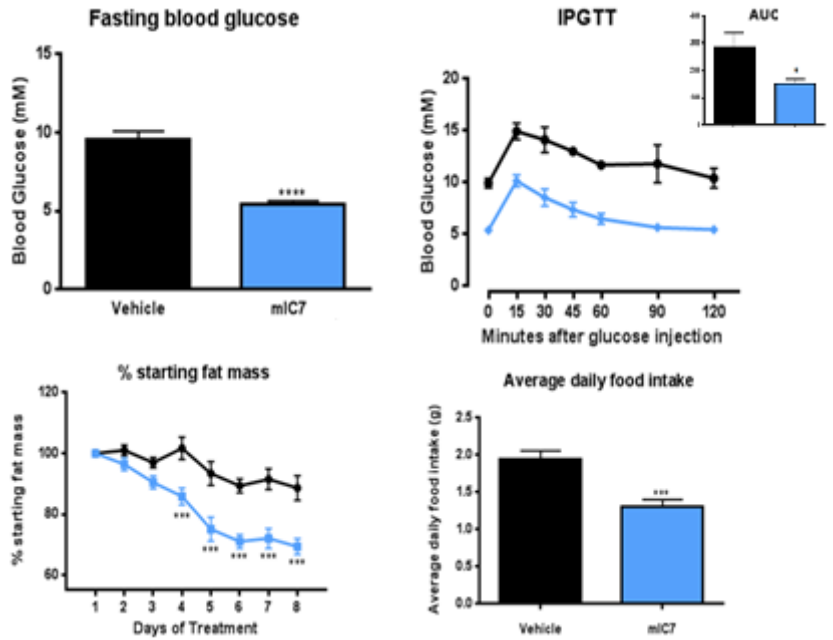
## A designed cytokine based on ciliary neurotrophic factor (CNTF) optimised to provide a new treatment for type 2 diabetes, with a subcutaneous daily dosage.

## Summary


Baker IDI researchers, in collaboration with researchers at the University of Kiel, have synthesised a first-in-class therapy for insulin sensitisation in diabetic patients to address the treatment gap. The biological agent, IC7, underwent preclinical optimisation to achieve a daily, injectable treatment regime for those with T2D who are already faced with the option of insulin injections to manage the progressive nature of their disease.

CNTF has anti-obesity central and peripheral effects. It was developed as Axokine by Regeneron Ltd but failed in phase III trials due to antibodies developing and reducing its efficacy. To overcome this problem, IC7, a chimeric protein that combines the beneficial properties of CNTF with those of interleukin-6 (IL6), has been developed, based on the discovery that receptor binding domains of Gp30 cytokines are modular. IC7 utilises the IL-6 receptor to initiate CNTF-like signalling but does not present immunogenic properties. IC7 has been modified by Fc fusion to extend circulating half life. Using insulin-resistant mice, modified IC7 (mIC7) has been shown to significantly reduce fasting blood glucose, food intake, fat mass, gluconeogenesis and hepatic lipid deposition, improve glucose tolerance, and increase fatty acid oxidation. These results strongly suggest that the long-term use of mIC7 could help treat T2D and support patient weight loss efforts.


## Key Data




*Mice fed a high fat diet were treated daily for 7 days. Fasting blood glucose and glucose tolerance are shown at day 5; weight and food intake were measured daily.*


### Contact Details

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Baker IDI
HEART & DIABETES INSTITUTE

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## Key Advantages

- Combines glycemic control and weight loss
- Minimises hepatic steatosis
- Does not induce immunogenicity nor inflammation

## Market Addressed

Type 2 diabetes currently affects almost 10% of the global population. Around 21 million Americans currently have diagnosed diabetes, and an estimated further 8 millions are undiagnosed. WHO projects that diabetes will be the 7$^{th}$ leading cause of death in 2030.
In 2012, sales of T2D pharmaceuticals exceeded US$28 billion. The global market for diabetes management is expected to attain a market size of around US$69 billion by 2022, following a Compound Annual Growth Rate (CAGR) of 9.2%. Non-insulin injectables currently occupy 9% of this market and their share is growing.

***Indication*** mIC7 acts to improve insulin sensitivity and inhibit re-uptake of glucose. Unlike current T2D medications, mIC7 shows potential for promoting weight loss via a direct mode of action on the liver and muscle. Due to its novel mode of action, this drug would be suitable either for frontline therapy in treatment of newly diagnosed T2D, or as an add-on therapy for patients who are poorly controlled by Metformin. mIC7 could potentially be a direct competitor in this non-insulin injectables market segment.

## IP Position

WO 2008119110 “Treatment of obesity”. Claims have been granted in Australia and Europe. Patent family covers use of a medicament for the treatment of a condition characterised by either unwanted lipid accumulation or inadequate insulin sensitivity, thus including T2D and related metabolic disorders.

## Principal Inventors

- Professor Mark Febbraio (Baker IDI)
- Professor Stefan Rose-John (University of Kiel)

## Stage of Development

- Drug optimised for potency and stability
- Efficacy using mouse and non-human primate models of insulin resistance
- Next steps:
    - Preclinical toxicology;
    - Phase I safety and PoC clinical trial


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