



INULIN-PROPIONATE ESTER (IPE)—A NOVEL COLONIC DELIVERY SYSTEM

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INTRODUCTION

The past 50 years have observed a fast and continuous rise in obesity. According to the government's Foresight group, if action is not taken in tackling obesity 60% of men and 50% of women in the UK will be classified as obese within the next 30 years, costing the UK NHS £6 billion annually (Chambers et al, 2015).

Over the past years, pioneering research papers have demonstrated a link between metabolic disorders such as type 2 diabetes and obesity and a change in the gut microbiota. A low intake of dietary fibres was also associated with higher risks of these types of metabolic diseases (Cani, 2018).

This study will mainly focus on the synthesis of Inulin Propionate Ester (IPE), a novel food supplement that aims to regulate appetite preventing weight gain.

Previous studies have been conducted to determine the effectiveness of propionate in humans and results confirmed positive effects in terms of preventing weight gain (Chambers et al, 2014).

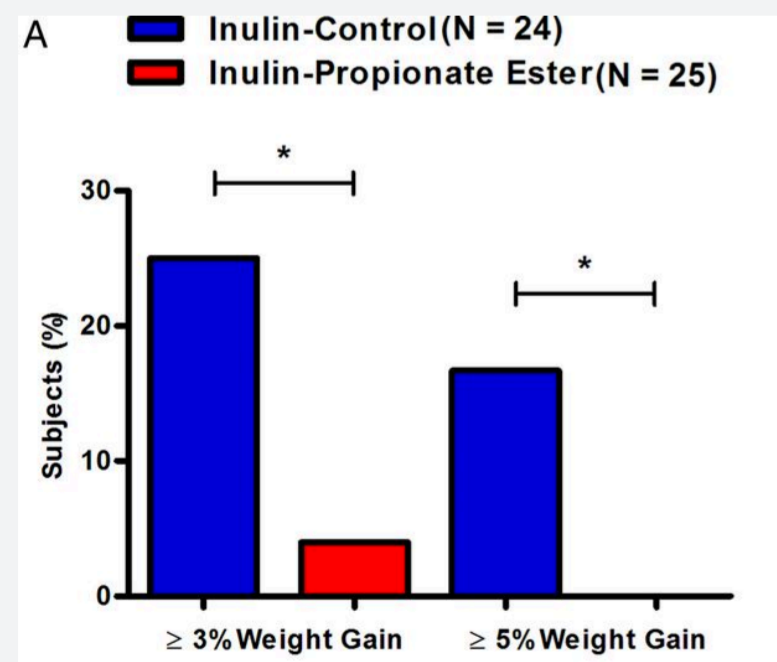


Figure 1: Effect of inulin control and IPE on weight gain (Chambers et al, 2014).

Inulin (a dietary fiber) is used as the primary carrier to deliver high concentrations of propionate into the colon without having it digested by the small intestine.

AIM/OBJECTIVES

- Finding an efficient route of analysing the product to reduce costs
- Identifying a correlation between IR and GC to maximise the potential of product development
- Rationalise quality control process
- Developing a strategy for product development by optimising cost, time, analytical techniques and materials suitable for large-scale production of IPE

REACTION SCHEME

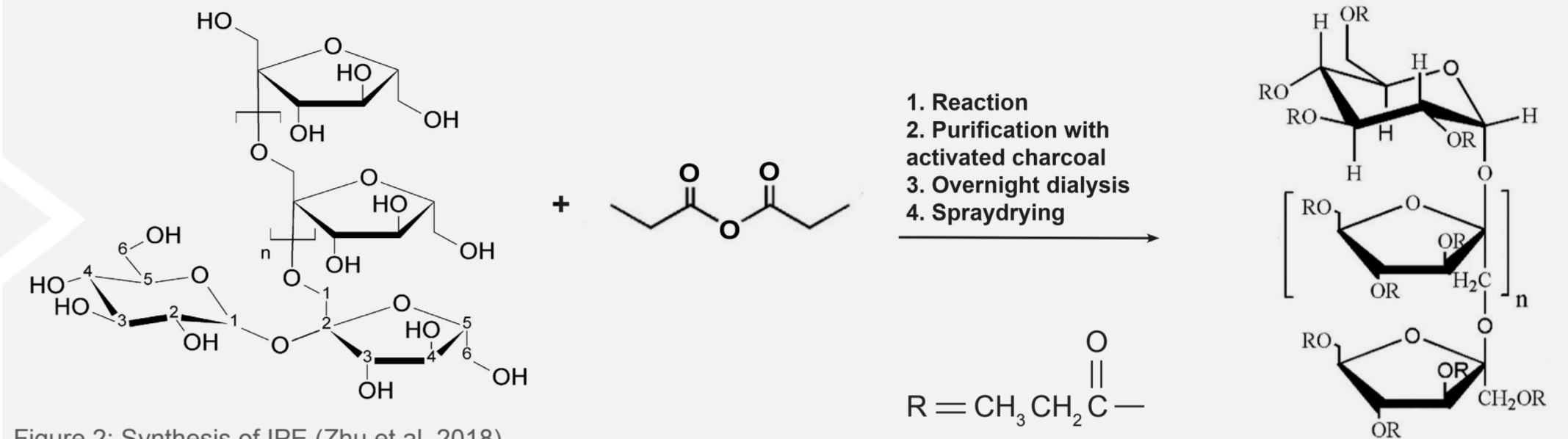


Figure 2: Synthesis of IPE (Zhu et al, 2018).

STRATEGY

Product Development

- Optimising large scale production and synthesis routes
- Research and testing
- Detecting impurities
- Improving yield
- Waste management

Quality Control

- Regulatory requirements
- Further clinical testing
- Manufacturing processes

Planning a Strategy

- Obtaining intellectual property (IP)
- Patents
- Licensing

Finance

- Private or public funding
- Loans
- Investments

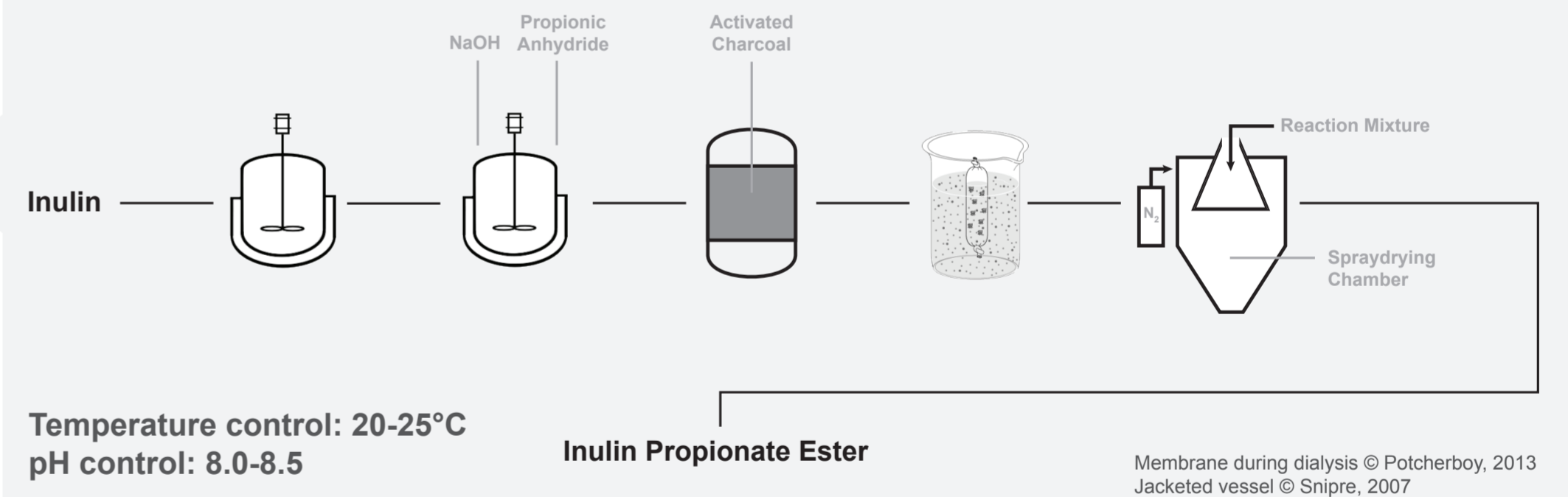
Marketing Product

- Analysis of suppliers, consumers competitors and vendors
- Analysis of profit
- Distribution chain
- Partnering
- Commercial - graphic design

Mass Production

- Cost
- Material used
- Outsourcing raw materials
- Quality
- Optimising resources
- Maximum productivity
- Minimise environmental impact

UNIT OPERATIONS



QUALITY CONTROL

In order to maintain high standards, quality control must be a top priority, along with regulated clinical trials. Stringent rules are imposed on novel food supplements in terms of regulatory requirements to seek compliance from Food Standard Agency (FSA) and The European Food Safety Authority (EFSA), while also ensuring that safe ingredients are used that do not pose a risk to the public. Checks include:

- Toxicity *in-vivo* and *in-vitro*
- Safety and hygiene in the manufacturing plant
- The purity of the supplement
- Absence of toxic chemicals/heavy metals
- Safe dosage

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