DESIGNER DIETS
By Geraldine Georgeou

The Balancing Act
Of Diabetes Management

Medical nutrition therapy and diabetes specific formulas

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Disclosure

Abbott have kindly sponsored this presentation.

Acknowledgement of country

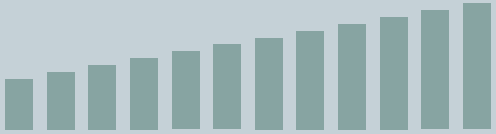
We acknowledge the Traditional Owners of the land on which we are meeting. We pay our respects to their Elders, past and present, and the Aboriginal Elders of other communities who may be here today.

Learning objectives

1. Explore what is already available in the **dietitians toolbox** when managing diabetes.
2. Understand the **food first** approach, in the management of diabetes and our role as a dietitian.
3. Discuss the role and importance of **medical nutrition therapy** (including **diabetes specific formulas**) in the management of diabetes.
4. Describe **case studies** when using medical nutrition therapy in practice.

422 million people worldwide have diabetes![1]

Diabetes is on the rise



422 million
adults have diabetes

3.7 million
deaths due to diabetes and high blood glucose

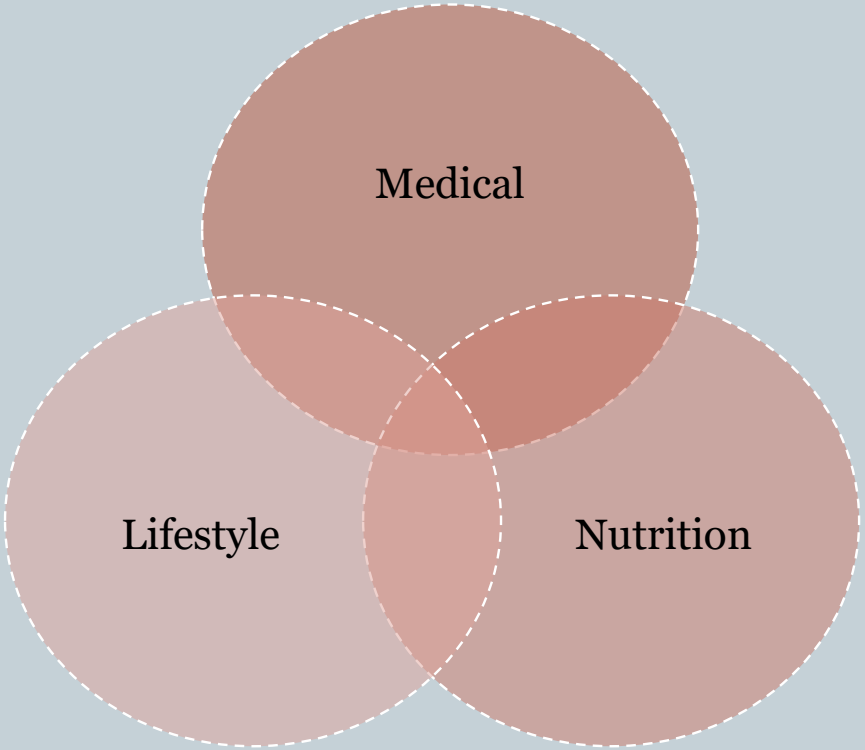
1.5 million
deaths caused by diabetes

That's 1 person in 11

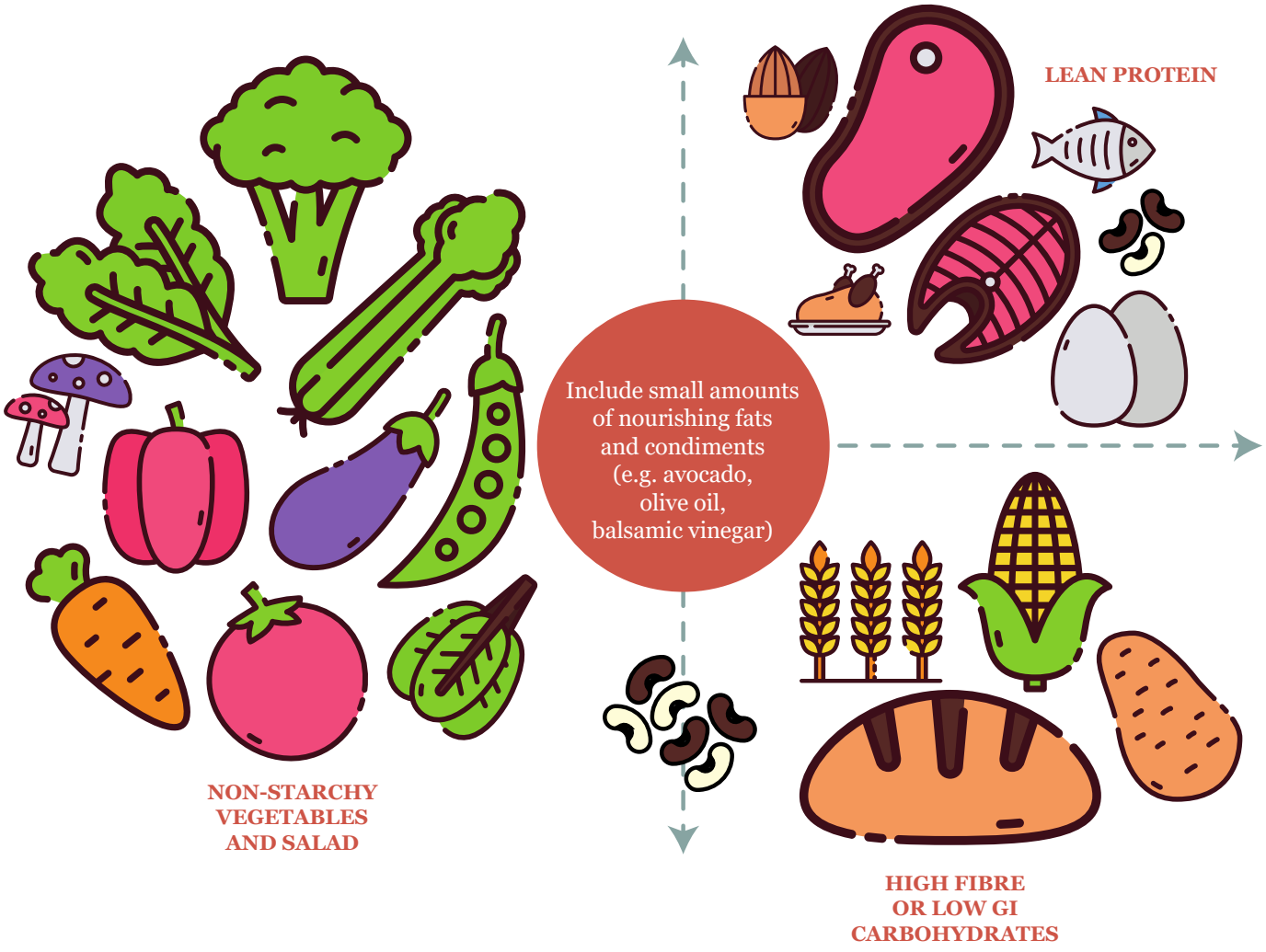
1.8 million Australian's living with diabetes (only 1.3 million are known and registered)[2]

What are the guidelines in managing diabetes? [3]

- **5-10%** weight loss for people who are overweight or obese.
- Eat **low GI** foods.
- Consistent CHO intake, portion control and regular meal consumption.
- **Australian Dietary Guidelines.** [4]
- Encouraged to seek advice of an **APD.**
- Medications
- Exercise



The *Food First* approach...



Glycaemic Index[5]

High GI (70 and >)

Medium GI (56 – 69)

Low GI (55 and <)

- The glycaemic index is **a ranking** of foods from 0 - 100 where glucose is ranked as 100, being the reference food
- The importance of the glycaemic index is it aids the **slow digestion** and **gradual** rise and fall in blood glucose response after a low GI food
- Helps **control the blood glucose levels** in people with diabetes.
- Carbohydrate foods that are low glycaemic and slow release can act as a **natural appetite suppressant** and help regulate blood glucose levels.

Check points of managing diabetes[6] HbA1c and beyond.

The aim is to keep blood glucose levels between:

6-8 mmol/L (fasting glucose) and **<10 mmol/L (2 hours postprandial)**, to minimise both short and long term effects of diabetes related complications.

HbA1c (Glycosylated Haemoglobin) check:

- Average of BGL over 10 – 12 weeks, measured every 3 – 6 months.
- HbA1c cannot check the highs and lows that home blood glucose monitoring systems can.
- Overall picture, like a HSC/VCE mark!
- The aim is for the **HbA1c to be ≤7%** however this may need to be higher for some people including children and the elderly.

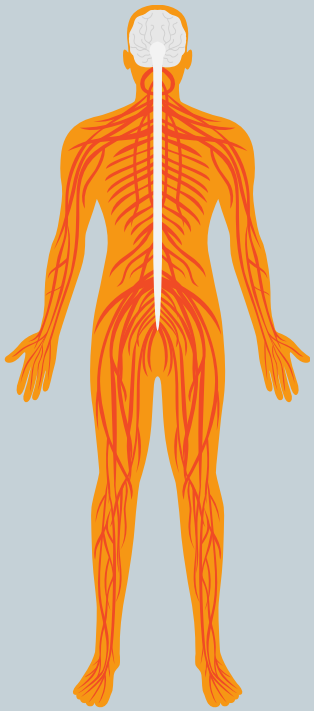
Patient perspective of diabetes management…[7,8,9]

- **Adherence to diet is less than optimal.**[8]
  - Forgetfulness
  - Concerns of weight gain
  - Unsure how to reduce calories
  - Misunderstood HCP
  - Diabetes related psychological problems and well- being.
- **Adherence to diabetes medications has been rated as more important than diet** and exercise by patients.[10]
- Individualised dietary advice is essential to encourage patient compliance.

Consequences of mismanagement...[10]

Short term

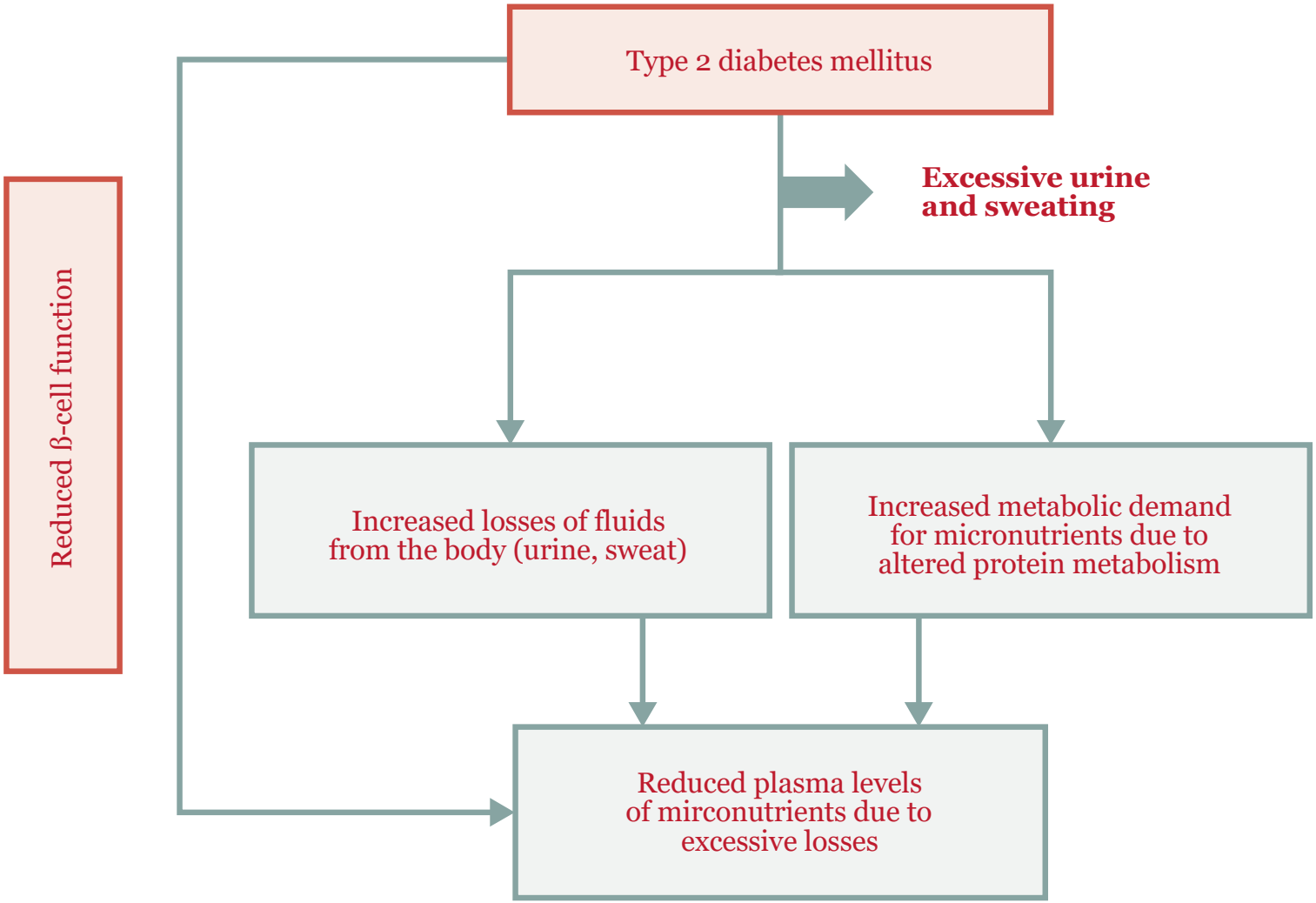
- Tiredness and lethargy
- Polydipsia
- Polyuria
- Polyphagia
- Weight loss
- Nocturia
- Hypoglycaemia
- Blurred vision
- Poor wound healing
- Headaches



Long term

- Neuropathies (Peripheral neuropathy, autonomic neuropathy)
- Skin disorders (Diabetic dermopathy, eruptive xanthomatosis, ancothosis nigricans, bacterial infections)
- Delayed wound heeling
- Recurrent infections
- Retinopathy
- ↑risk of cardiovascular diseases
- Nephropathy

Nutrient requirements are higher
in patients with diabetes...[11]



Nutritional requirements for people living with T2DM[12]

Magnesium[13]:

Deficiency results in poor glycaemic control and reduced insulin sensitivity.

Micronutrient deficiencies

Chromium[14]:

Cofactor which stimulates glucose uptake.

Zinc[15]:

Required in synthesis & secretion of insulin, cell protective.

The patient's perspective... An emotional rollercoaster!

Decide to restrict food by dieting, eating healthy, restricting foods.

Think I'm fat and ugly

Eat for comfort

Feel guilty

Feel out of control

Binge

Think I've broken my diet

Gorge

Rebel against food rules

Feel angry

Deprivation (physical and emotional)

Food intake

National Diabetes Week

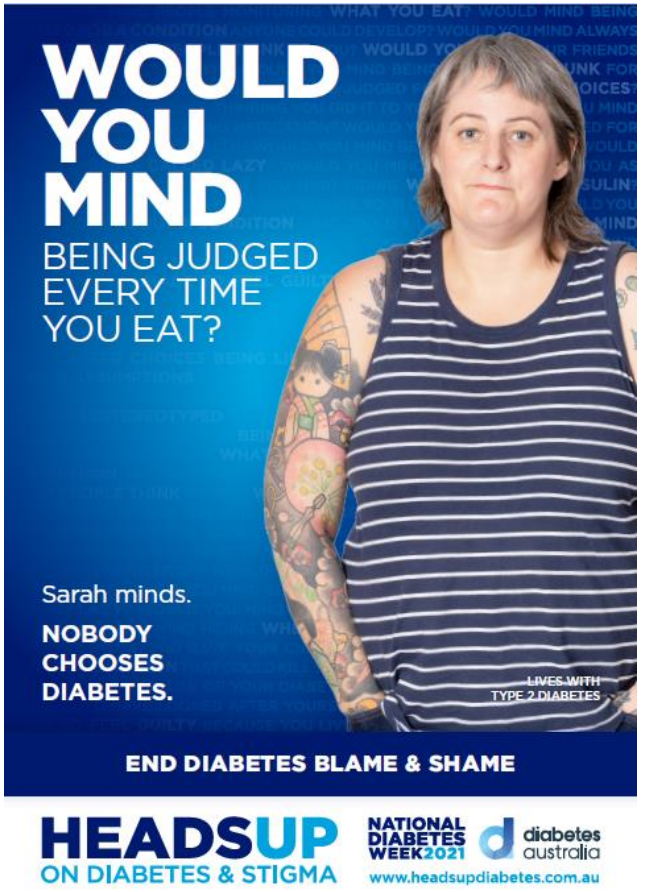
11 - 17 July, 2021

- **Mental and emotional health** of people living with diabetes.

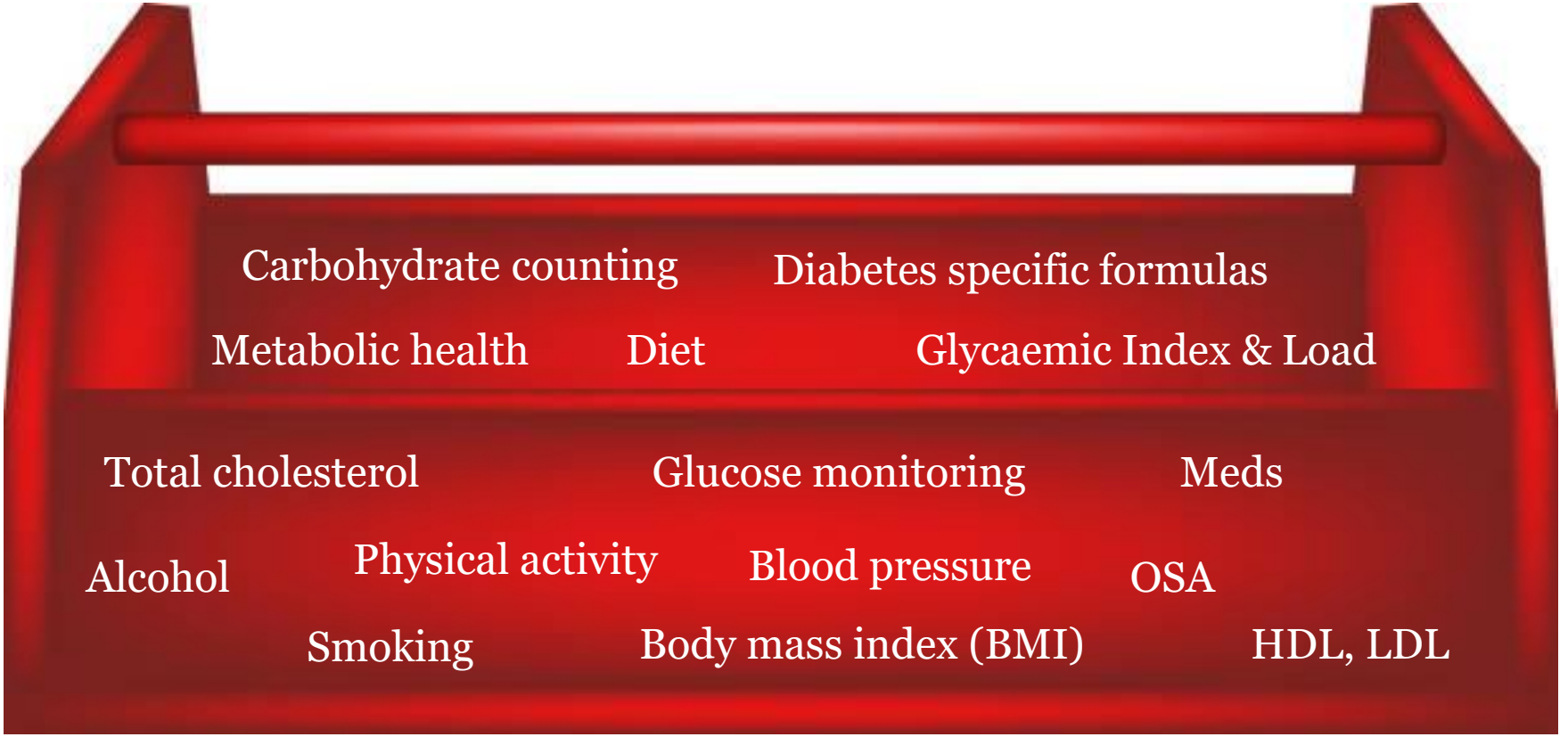
- 50% of people living with diabetes are thought to have anxiety or depression.[16]

Diabetes stigma:

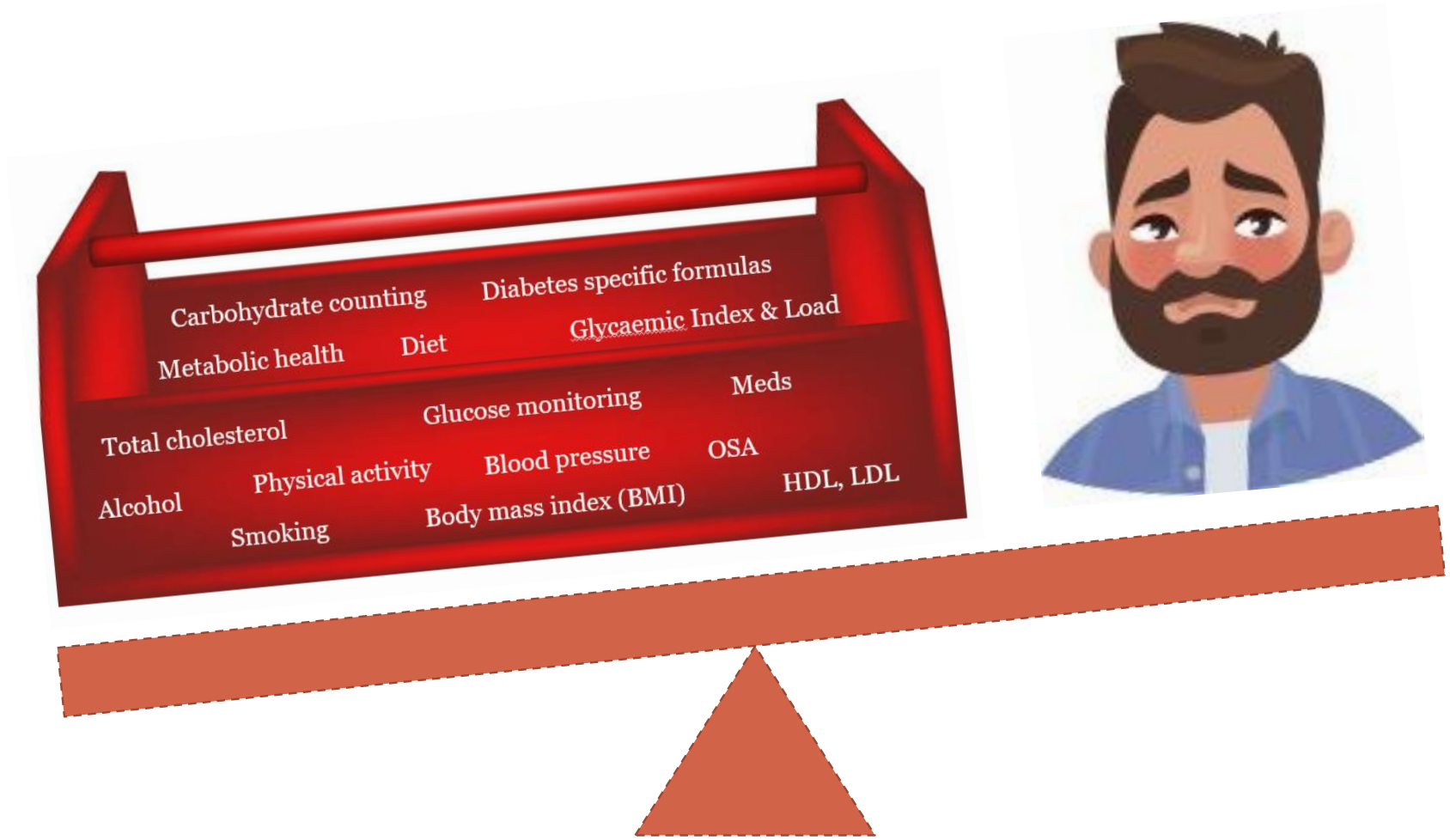
- Diagnosis
- Management
- Treatment



So what is in our toolbox?



So what is in our toolbox?



Creating a platform for medical nutrition therapy (MNT)….

International nutritional guidelines recommend an individualised MNT and carbohydrate consistent meal plan with the inclusion of Diabetes Specific Formulas (DSFs):

- **American Diabetes Association 2020 –** *"For enteral nutritional therapy, diabetes-specific formulas appear to be superior to standard formulas in controlling postprandial glucose, A1C, and the insulin response"*[17]

- **ESPEN expert group 2017 –** *"endorses the utilization of DSFs for nutritional support of people with obesity and diabetes."*[18]

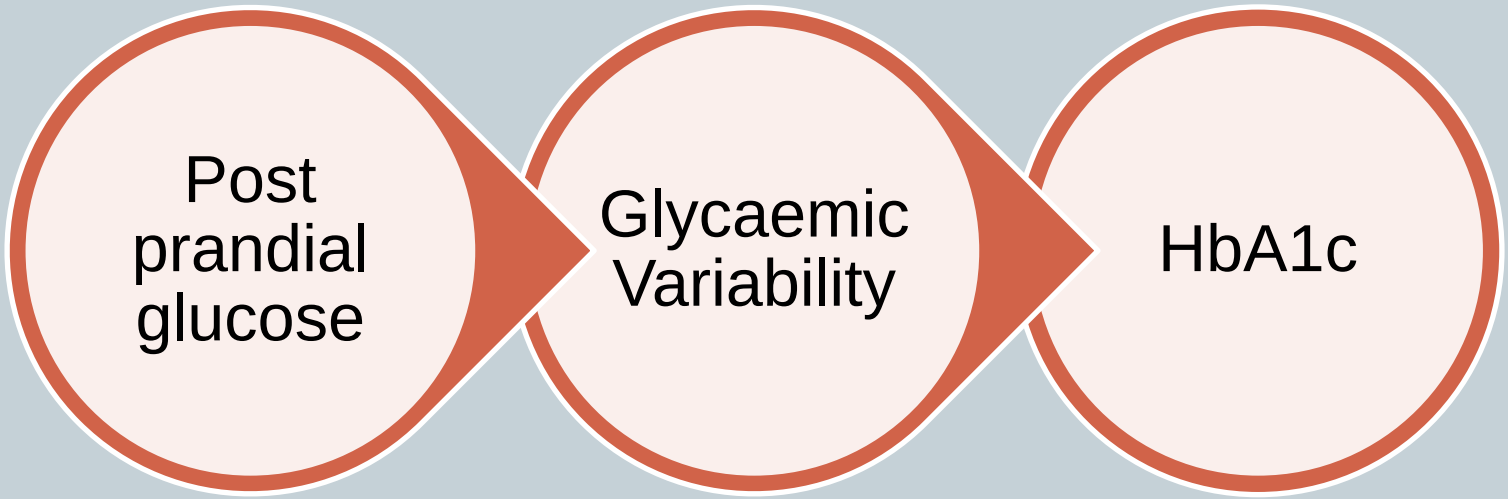
Comparing Diabetes Specific Formulas with Standard Formulas

DSF[19] assist in managing BGLs while meeting nutritional requirements:

- Less CHO than standard oral nutrition supplements.
- Higher proportion of slowly digestible CHO
- Healthy monounsaturated fat
- High fibre
- Essential vitamins and minerals
- Evidence for improved clinical outcomes in individuals with diabetes

What is the evidence base behind DSF?

Improving clinical outcomes



Devitt, et al. 2012[20]

Peng, et al. 2019[21]

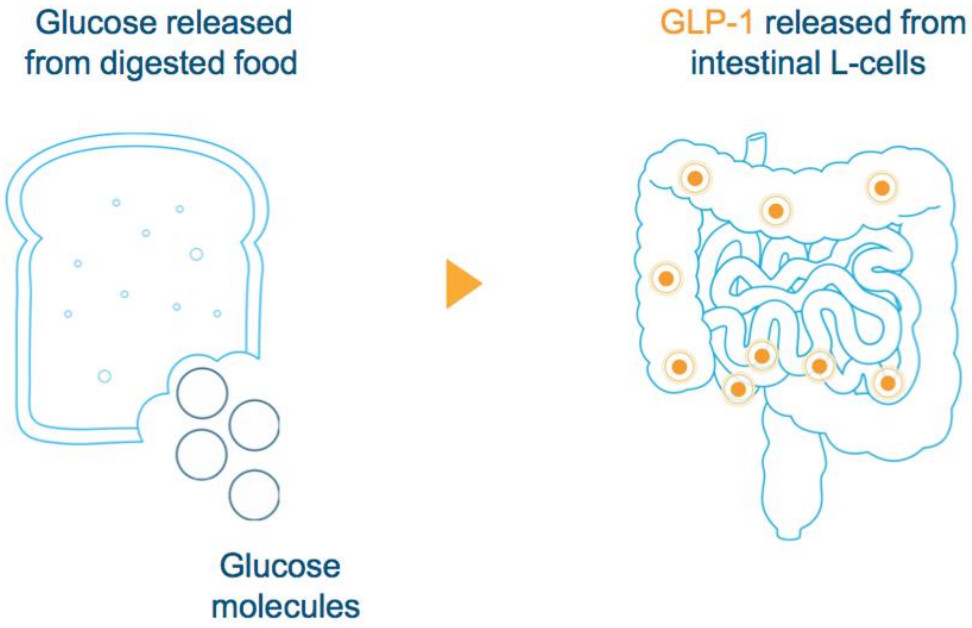
Chee, et al. 2017[22]

DSFs and postprandial glycaemia[20] (Devitt et al 2012)

Study Design	Randomised, controlled, non-blinded, three-treatment, crossover study.
Study Population	32 adult subjects (≥ 18 and ≤ 75 years of age) with Type 2 Diabetes Mellitus receiving oral hypoglycaemic medication.
Study Method	Subjects were randomised into one of the three treatment groups: – Skipped breakfast – Instant Oatmeal – DSF* Blood samples were obtained at baseline (just before meal intake) and postprandially at 30, 60, 80, 120 and 180 minutes.
Outcomes	Changes in plasma GLP-1, serum insulin and post prandial blood glucose levels.

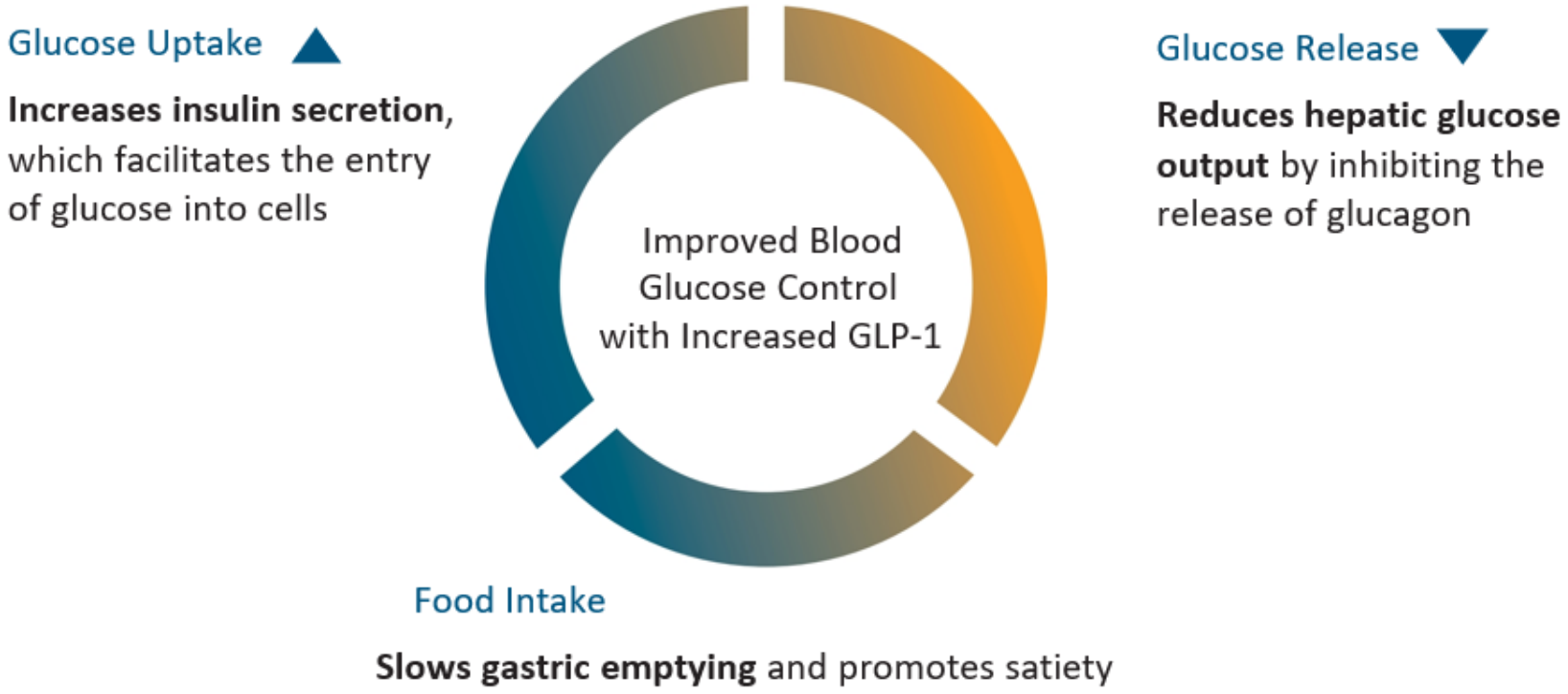
*Study formulation used: Glucerna Triple Care.

GLP-1 is an important hormone released from intestinal L-cells in response to food[23]



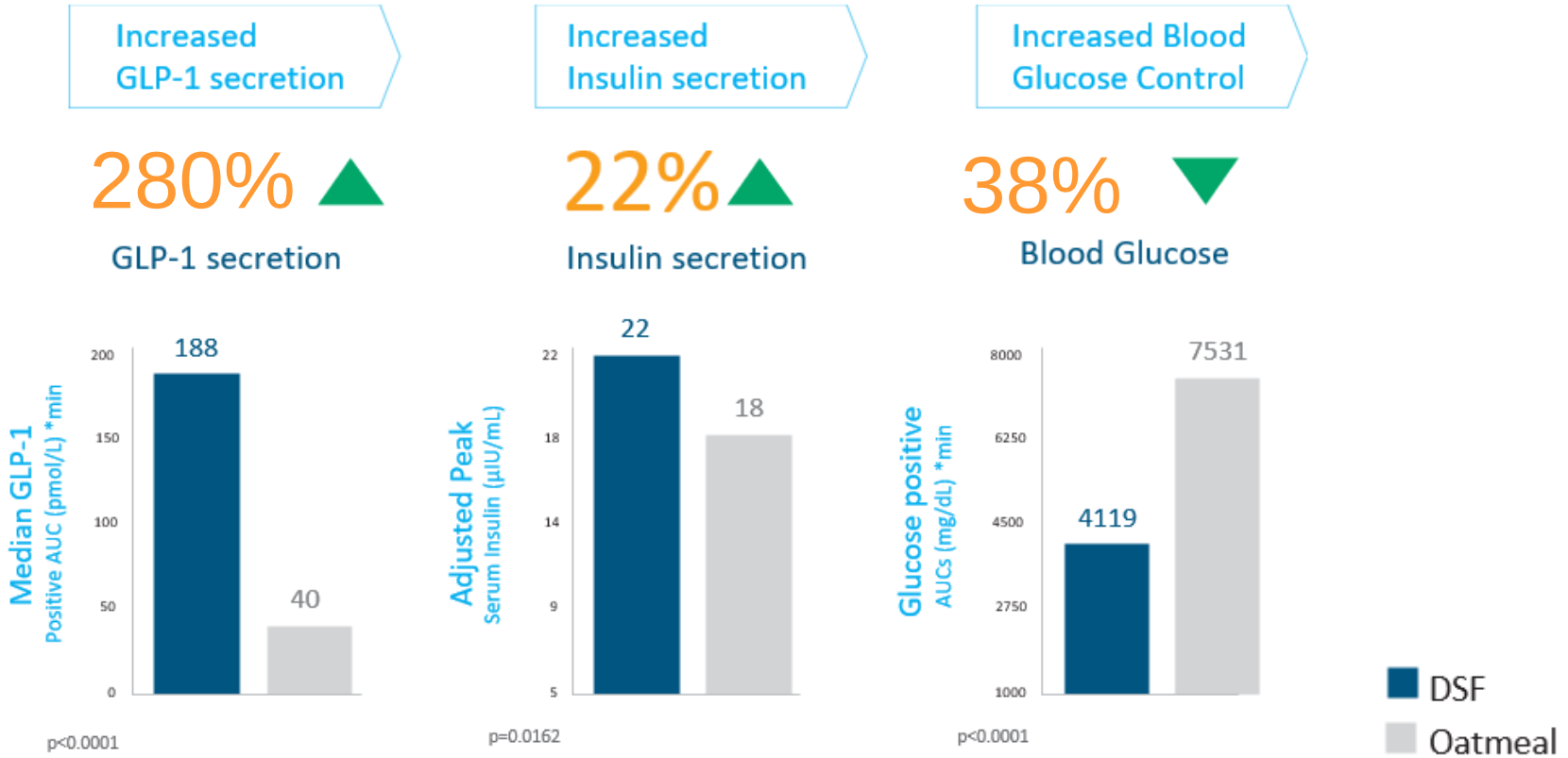
GLP-1: Glucagon-like peptide-1.

GLP-1 plays an important role in the management of blood glucose levels[23]



GLP-1: Glucagon-like peptide-1.

Devitt 2012 study showed a DSF significantly increased GLP-1 and insulin secretion, and improved blood glucose control^[20]



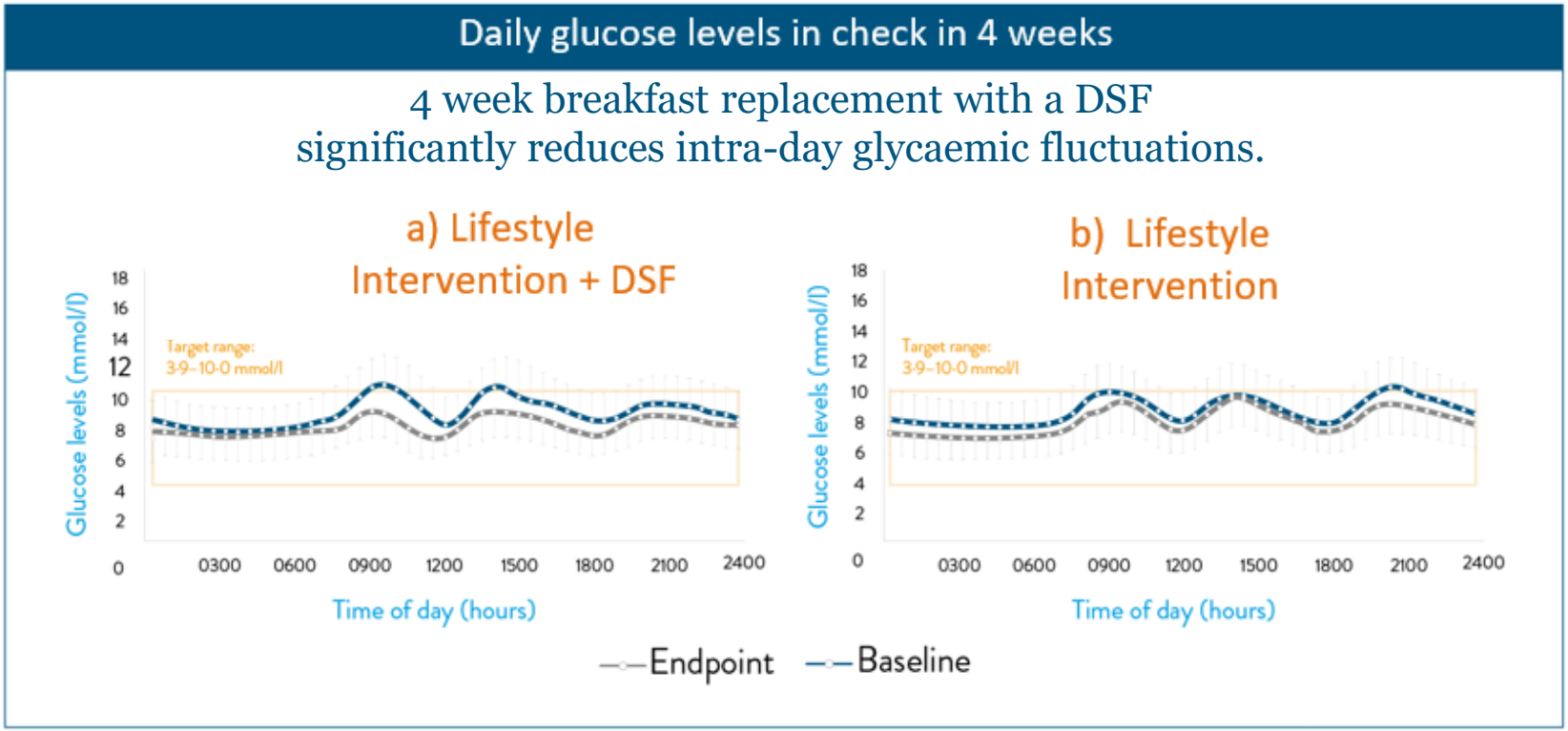
^Compared to oatmeal. Study formulation used: Glucerna Triple Care. GLP-1: Glucagon-like peptide-1.

DSFs and glycaemic variability[21] (Peng et al 2019)

Study Design	Randomised control trial
Study Population	123 adult subjects with newly diagnosed untreated Type 2 Diabetes Mellitus.
Study Method	Subjects were randomised into one of the two treatment groups for 4 weeks: - Lifestyle intervention (LI) - Lifestyle intervention plus DSF* for breakfast Underwent 72-hours continuous glucose monitoring before and after intervention.
Outcomes	Changes in glycaemic variability and time in range.

*Study formulation used: Glucerna SR.

Peng 2019 study showed a DSF helps achieve glycaemic control in 4 weeks by improving intra-day glycaemic variability[21]



Reduced glycaemic variability is associated with a reduced risk of complications*[24-26]

Study formulation used: Glucerna SR. * Diabetes-related complications (like retinopathy)

DSFs and HbA1c[22] (Chee et al 2017)

Study Design	Randomised, open-label clinical trial.
Study Population	230 Type 2 diabetes subjects aged 30–65 years with glycated haemoglobin (A1c) of 7%–11% and overweight/obesity
Study Method	Subjects were randomized into one of the two interventions for 6 months:

Usual Care (n=115)	tDNA (n=115)
• Energy prescription; Education; Exercise; Behavioural components • UC: Conventional counselling	• Energy prescription; Education; Exercise; Behavioural components • Counselling for adherence randomised into 2 groups: – tDNA + MI: Motivational Interviewing (n=58) – tDNA + UC: Conventional Counselling (n=57)
Conventional low-calorie foods	**1-2 DSFs*/day + conventional food**
	

Outcomes	HbA1c levels measured after 6 months of intervention and at 6 months after intervention was stopped.

*With daily intake of Glucerna SR as part of a structured lifestyle intervention with counselling;
tDNA: Transcultural diabetes nutrition assessment

With daily intake of a DSF*, significant reductions in HbA1c can be achieved over 6 months and maintained at 1 year[22,27]

Start the use of 1-2 DSFs* — Intervention — 6 months — Follow-up — 1 year

- 1.1% HbA1c from Baseline (p<0.001)

Significant reduction seen with the use of A DSF and motivational interviewing after 6 months.

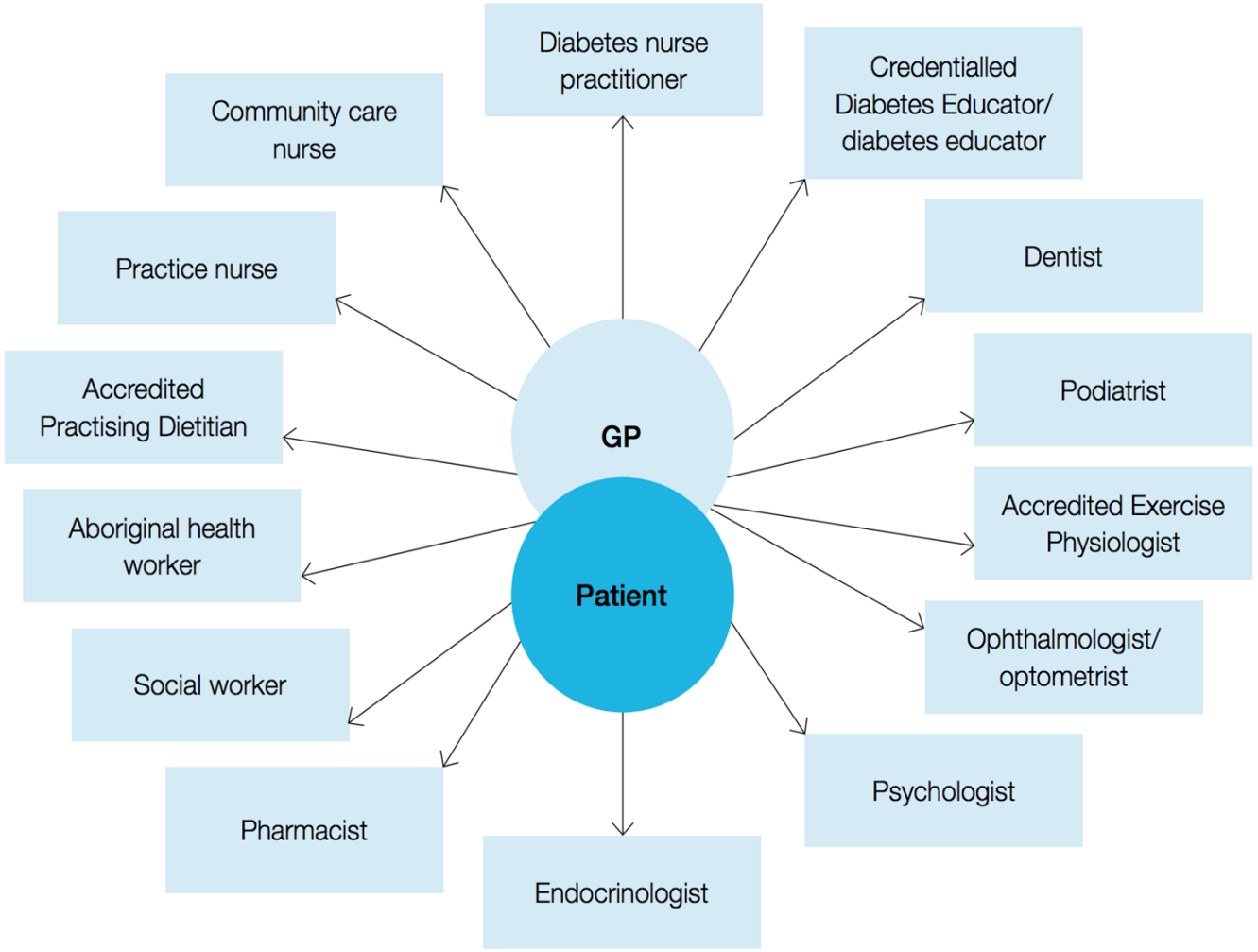
Every 1% reduction in HbA1c is associated with about 40% reduction in relative risk of microvascular complications.

- 0.5% HbA1c from Baseline (p=0.006)

Reduction maintained at 1 year.

**With daily intake of Glucerna SR as part of a structured lifestyle intervention with motivational interviewing

How to incorporate DSF into diet?



Case studies

AND CELEBRATING SUCCESS!

Case 1: Mr Malnutrition	Case 2: Mr Uber	Case 3: Mrs Socialite

Mr Malnutrition

Retired 84 year old male – h/o hyperlipidaemia, abnormal LFT, type 2 diabetes, recurrent hypoglycaemia, excess alcohol intake and alcohol related dementia.

Weight: 49kg, BMI 19kg/m2 (underweight)

Diet History:

Breakfast	Weetbix with skim milk & 1 piece fruit	Pre: 3.7mmol/L Post: 8.8mmol/L
Morning Tea	Tea & biscuits	
Lunch	Main meal; chicken breast/ lamb cutlets/ crumbed fish & mash potato & vegetables	
Afternoon Tea	2 - 4 beers	
Dinner	Small bowl vegetable soup, if hungry! 1 glass red wine	

Dietary intervention:

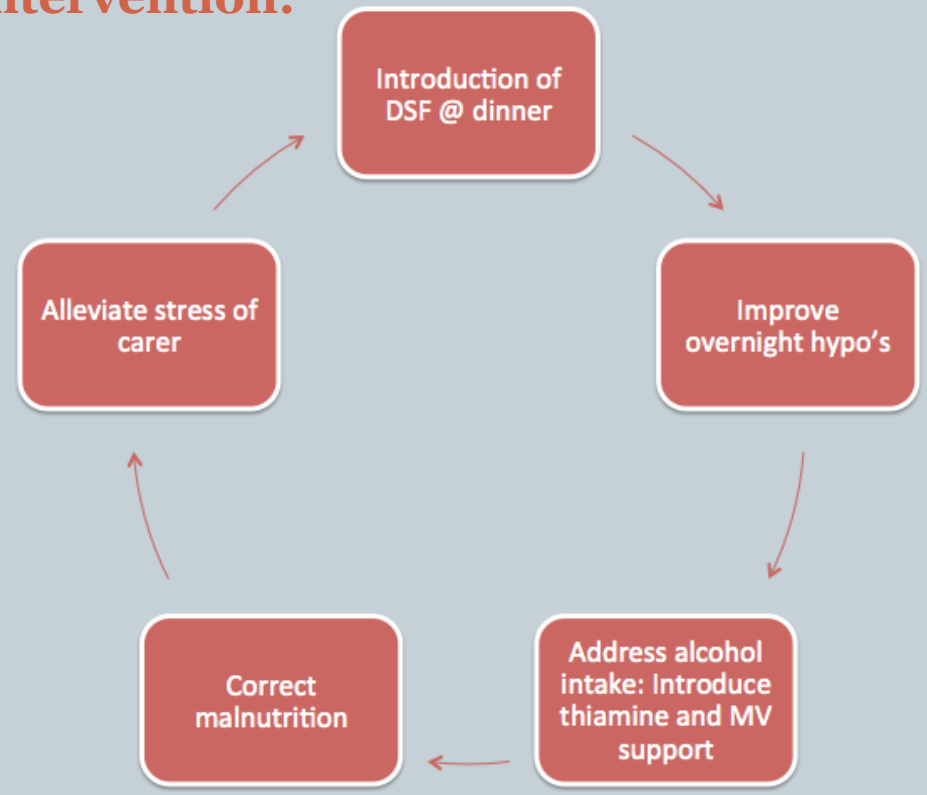
- Education on low GI, balanced carbohydrate and lean protein meal plan.
- Introduced DSF at dinner and positive caloric intake.

Mr Malnutrition

Issue:

- Morning pre meal BGL ranged from: **3.4 - 4.3mmol/L**

Intervention:



Post intervention:

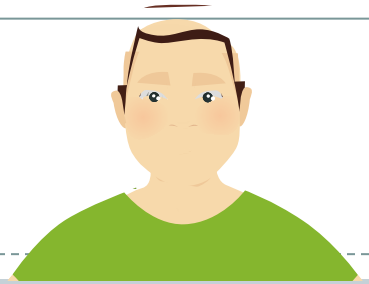
- Morning pre meal BGL ranged 4.6 - 6.2mmol/L
- Weight increased by 6kg in 6 months
- LFT improving

Mr Malnutrition

Role of DSF:

- Positive nutrition
- Easy food swap
- Helps keep BGLs stable during the night and in the morning
- Peace of mind for carer

Mr Uber



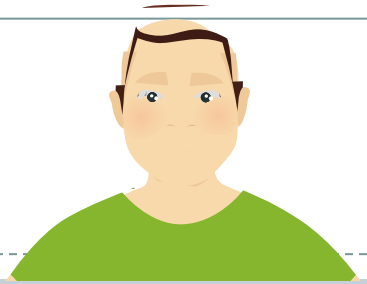
48 year old man - h/ o diabetes (HbA1c 7.2%), metformin BD, inactive and obese. Drives for 16 hours/ day, buys food on the go.

Weight: 90kg (BMI 34kg/m2)

Diet History:

Breakfast	Skips	9.5mmol/L
Morning Tea	Large coffee	
Lunch	Service station sandwich or wrap with frozen coke	Post: 12.4mmol/L
Afternoon Tea	Chocolate bar	
Dinner	Meat pie and redbull	
Late night	Snacks on crisps if hungry	

Mr Uber



Issue:

- Irregular eating pattern, CHO loading

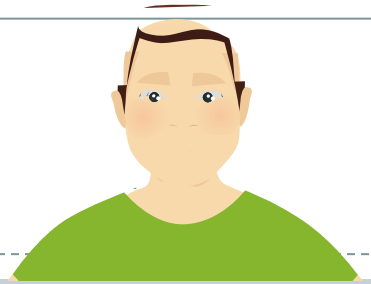
Intervention:

- DSF for breakfast & dinner
- Encouraged regular physical activity
- Education on low GI, balanced carbohydrate and lean protein meal plan

Post intervention:

- BGL day ranges: 6.2 - 9.4mmol/L post prandial
- HbA1c: 6.7%
- Weight decreased by 10kg in 6 months
- Exercising 45 minutes/ day

Mr Uber



Role of DSF:

- Convenience
- Easy breakfast option or snack choice
- Helps promote a slow and steady post prandial glucose response
- Helps provide sustainable energy throughout the day

Mrs Socialite

26 year old female - graphic designer, works long hours, misses meals and some binge eating behaviour on weekends. Diagnosed with insulin resistance and pre- diabetes at 19 years of age.

Dietary intervention:

- Education on low GI, balanced carbohydrate and lean protein meal plan.
- Introduced DSF as mid morning or afternoon snack.

Before change of diet	**Implementation of diet (6 months)**
Waist: 91cm Lower hips: 118cm	Waist: 74cm Lower hips: 91cm
Weight: 80kg BMI= 30	Weight: 62kg BMI= 24
Postprandial BGL: 10mmol/L HbA1c: 6.6%	Postprandial BGL: 7mmol/L HbA1c: 5.7%

Mrs Socialite

Role of DSF:

- Better food choice for mid morning or afternoon snack
- Help promote satiety to help avoid binge eating behaviour
- Easy and convenient

Take home messages…

- **"Food First"** mantra focuses on **personalised nutrition** that follows an evenly distributed low GI, balanced lean protein, healthy fat and high fibre meal plan, but in some patients, adherence is a problem.

- The **consequences** of poor glycaemic control can be **very damaging** for patients with diabetes.

- **Diabetic Specific Formulas**, can have a role in managing glycaemic control, helping to meet nutritional needs and improving clinical outcomes including postprandial glucose, glycaemic variability and HbA1c which can help to reduce long-term complications.

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