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crusade of telling people how they should conduct the style of their lives? Or should doctors be giving specific advice about specific matters (eg, regarding the quantity and quality of food or physical activity)? This is a relevant issue, as Taheri and colleagues<sup>8</sup> achieved weight loss using a dietary method that has already proven to be successful, but the authors also advised increased physical activity. Confusion surrounds medical advice about the role of physical activity in the process of losing weight. Physical activity is important in preventing weight regain after weight loss, but the well documented occurrence of compensatory eating on commencing an exercise programme ensures blunting of weight loss. This compensatory eating behaviour occurs particularly in people with a BMI over 25 kg/m<sup>2</sup> and in those with a biological age of over 40 years.<sup>9,10</sup> In the pathophysiological studies of reversal of type 2 diabetes, increased physical activity was discouraged, and a purely dietary approach led to around 15 kg weight loss in 8 weeks.<sup>3</sup> In the DIADEM-I study,<sup>8</sup> the recommended physical activity might have been tolerated better than it might have been in the DiRECT study<sup>6</sup> because participants in the DIADEM-I study were younger (mean age of 42 years) than in the DiRECT study (mean age 61 years). Nevertheless, the activity advice given in the DIADEM-I study did not result in an increase in overall activity, despite a modest self-reported decrease in the length of time spent being sedentary and increase in time spent walking. Clarity is required in giving specific, goal-directed advice about two very different factors: first, how to achieve weight loss, and second, how to maintain weight loss in the long term.

The DIADEM-I study<sup>8</sup> firmly establishes the feasibility of achieving dietary remission of type 2 diabetes in populations in which the disease is so prevalent and economically damaging. The key question for the future is how to prevent weight regain in the long term. The unfavourable environment of excess calorie availability and the limited need for physical exertion remains. In

addition, there is a natural tendency to increase food intake and gain weight when major life events occur. Recognising this tendency, not as a failure, but as an episode to deal with, is important. In the DiRECT trial,<sup>6</sup> pre-planned rescue plans with short-term use of formula diets were required by around a half of participants in the intervention group. Perhaps new drugs to control appetite will be useful in conjunction with behavioural support. The number one question is now clear: what is the best strategy to avoid weight regain and maintain remission of type 2 diabetes?

RT reports academic lecture fees from Eli Lilly and Janssen outside of the submitted work. RT also reports consulting on behalf of Newcastle University for Wilmington Healthcare. RT is the author of the book titled *Life Without Diabetes* (Short Books, UK; HarperOne, US; Simon & Shuster, Australia; royalties donated to Diabetes UK).

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## Telehealth in pregnancy

Telehealth lifestyle interventions are gaining increasing popularity for use in pregnancy for management of complications such as gestational diabetes<sup>1</sup> and for monitoring of blood pressure.<sup>2</sup> Telehealth has also

been used in trials in low-income and middle-income countries, particularly in rural communities where access to antenatal care is challenging.<sup>3</sup> The option of using telehealth in antenatal care has been brought sharply



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into focus with the coronavirus disease 2019 (COVID-19) pandemic. Pregnant women are considered a vulnerable group and are therefore advised to be stringent with public health measures such as social distancing and self-isolation to lower their risk of exposure to the virus. This advice has led to recommendations to limit face-to-face consultations and for rapid implementation of remote access to antenatal care throughout the UK.<sup>4</sup> The methods and outcomes of the GLOW randomised controlled trial done by Assiamira Ferrara and colleagues<sup>5</sup> and published in *The Lancet Diabetes and Endocrinology* are therefore of interest and are particularly relevant during the current COVID-19 pandemic.

GLOW was a randomised trial of a weight management intervention delivered by telephone during a pregnancy with an aim of reducing gestational weight gain in women with overweight or obesity (BMI 25.0–40.0 kg/m<sup>2</sup>). Eligible women were at 8–15 weeks' gestation and received two face-to-face consultations and 11 telephone sessions using behavioural strategies to improve weight, diet, and physical activity. Women in the intervention group had less gestational weight gain (GWG) and improved lifestyle and metabolic parameters than did those in the usual care group. 96 (48%) of 199 women in the lifestyle intervention group and 134 (69%) of 195 women in the usual care group exceeded Institute of Medicine guidelines for rate of GWG per week (relative risk 0.70, 95% CI 0.59–0.83). Compared to usual care, women in the intervention group also had reduced calorie intake, reduced proportion of calories they obtained from saturated fat, and less sedentary behaviour. Metabolic markers including insulin, homoeostatic model assessment of insulin resistance, and leptin were also lower in the intervention group than in the usual care group.

Lifestyle interventions in pregnancy are difficult to undertake and often labour intensive.<sup>6</sup> Use of telehealth has been increasingly adopted in management of obesity in the general population.<sup>7</sup> The GLOW trial reports a robust approach of delivering a telehealth weight management intervention in pregnancy with success at reducing GWG. Detailed descriptions of the intervention, including the lengths of consultations and an estimate of the costs are included, which are helpful for considering implementation of the intervention in health services. Of note, the trial was not powered to look at perinatal outcomes and no differences in perinatal complications

were observed. Indeed, a previous individual patient data meta-analysis, including data from 36 randomised trials (12 526 women), showed that interventions that reduce GWG do not have an effect on key maternal and fetal outcomes, except caesarean section rates.<sup>8</sup> Much debate remains about why these lifestyle interventions have had no effect on clinical outcomes and whether there are wider implications for the long-term health of the mother and her family.

In the rapid implementation of delivery of remote antenatal care in response to COVID-19 there remain many uncertainties. There is limited knowledge about women's views of use of telehealth for monitoring pregnancy complications although available data suggests that women find this to be a positive experience.<sup>9</sup> There is concern that most of the trials of telehealth technologies have been done in highly selected groups and so the findings might not be applicable to the wider population. Notably, the GLOW trial also had very strict eligibility criteria, and in particular excluded women with mental health problems and other medical comorbidities, which will likely limit its generalisability. Concerns about usability of technology, reliability of data, and ability to inform clinical decision making have also been raised<sup>10</sup> and critical evaluation of the changes in practice will be needed. The GLOW trial suggests that an appropriate and effective telehealth intervention, when delivered by skilled researchers, offers promise to reduce excess GWG in overweight and obese pregnancy. With continuing development and refinement of technologies, such studies provide important lessons that can be applied and used more widely.

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## Maternal thyroid function, levothyroxine, and birthweight—a balancing act



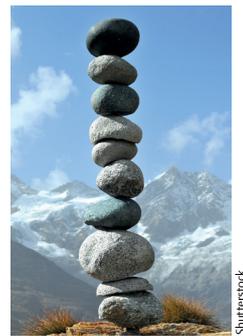
Thyroid dysfunction is common in women of reproductive age.<sup>1</sup> Normal functioning of the thyroid gland is essential for successful conception and pregnancy. The association between overt thyroid disease and adverse obstetric and fetal outcomes is well recognised,<sup>2</sup> but this is less clear for subclinical thyroid dysfunction. This lack of clarity is compounded by the inconsistent definitions used to define subclinical thyroid disease, specifically the debate over applying a stricter upper threshold of a thyroid stimulating hormone (TSH) concentration of 2.5 mIU/L versus the traditional cutoff of 4.0 mIU/L. In *The Lancet Diabetes & Endocrinology*, Arash Derakhshan and colleagues<sup>3</sup> report an individual-participant data meta-analysis to examine the associations of maternal thyroid function and newborn baby birthweight, focusing on subclinical disease.

Birthweight is a well recognised predictor for perinatal morbidity and mortality, and observational cohort studies have previously suggested that high-normal free thyroxine (FT<sub>4</sub>) concentrations are associated with impaired fetal growth and reduced birthweight.<sup>4–6</sup> In addition, a systematic review and meta-analysis by Tong and colleagues<sup>7</sup> reported that subclinical hypothyroidism was associated with intra-uterine growth restriction, whereas isolated hypothyroxinaemia was not. However, intra-uterine growth restriction is not synonymous with small for gestational age (SGA) neonates. The main strengths of this new study are the large dataset, the ability to define SGA accurately, and the use of TSH and FT<sub>4</sub> data in their continuous forms allowing for detailed exploratory analyses.

The identification of the correlation between maternal FT<sub>4</sub> levels at the higher end of normal with

low birthweight is an important finding. Babies born with low birthweight are more likely to have difficulties feeding, maintaining thermoregulation, and combatting infection. The finding that the association of FT<sub>4</sub> and low birthweight is most apparent during later pregnancy is another key message, which highlights the need for clinicians to continue monitoring thyroid function throughout pregnancy. Additionally, the finding of an increased birthweight in babies born to mothers with isolated hypothyroxinaemia further supports the notion that FT<sub>4</sub> levels have a key role in determining fetal growth. Future studies should explore the underlying mechanisms of the relationship between FT<sub>4</sub> and birthweight, and the importance of gestational thyroid function changes and the interplay of dysfunction of the uteroplacental unit.

Treatment of subclinical hypothyroidism in pregnancy has become a widespread practice worldwide, as advocated by the American Thyroid Association guidelines.<sup>8</sup> This approach is based on the concept that any possible benefits of treatment with levothyroxine are thought to outweigh any potential risks. It is not uncommon for obstetric clinicians to titrate levothyroxine therapy according to the TSH trimester-specific reference ranges, but less importance is placed on FT<sub>4</sub> concentrations. The finding that maternal FT<sub>4</sub> levels at the higher end of normal are associated with low birthweight emphasises the importance of interpreting the paired thyroid function test result. This finding also highlights the potential risk of overtreatment when titrating levothyroxine doses to achieve high-normal FT<sub>4</sub> levels. The suggestion that other adverse pregnancy outcomes, such as gestational diabetes, pre-eclampsia,



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