Type 1 and Type 2 diabetes exercise; challenges and benefits

Rob Andrews – University of Exeter/ Taunton hospital

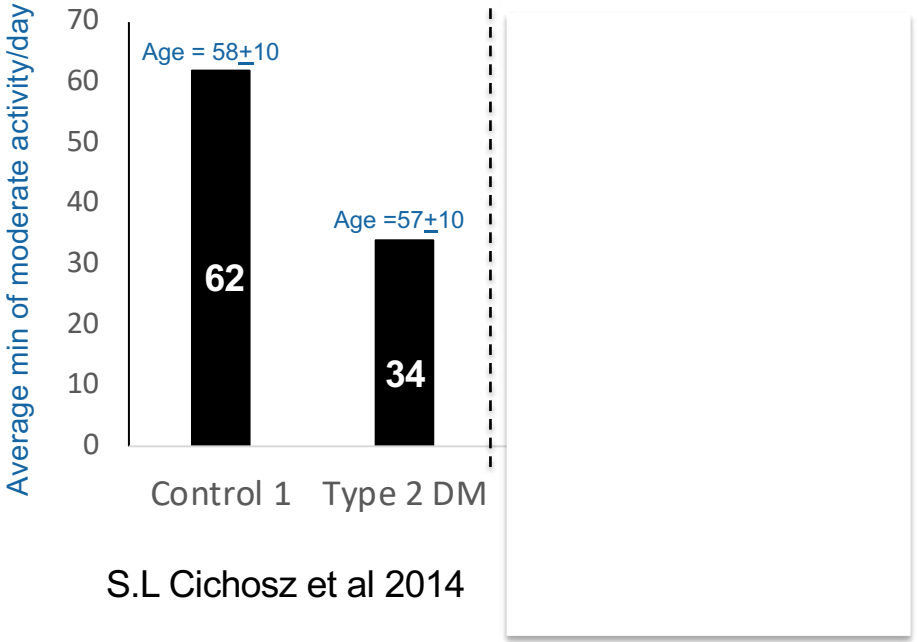
What are the recommendations?

150 minutes per week of
moderate to vigorous aerobic activity

Resistance training three times
a week

Reduce sitting time – try to get up three times per hour

Activity of patients with diabetes



S.L Cichosz et al 2014

Barriers to activity

Barriers to activity – effect of high glucose

		Total (n=7088)	NGT (n=5776)	IGT (n=1312)
Individual barrier (%)	Other priorities	63.4	65.2	52.9
	Injury/disability	29.2	28.1	34.2
	Lack of time	66.1	68.4	56.3
	Age	14.6	13.0	21.3
	Tired	58.5	59.1	55.9
Social barriers (%)	Family	35.8	38.0	26.6
	Work	46.1	47.9	38.2
Environmental barriers (%)	Footpaths	14.9	15.1	14.1
	Pollution	11.9	11.4	13.9
	Accessibility	19.3	19.3	19.4
	Safety	21.1	21.1	20.7
	Weather	39.9	39.9	39.9

Hume C et al. Diabetes Educ. 2010 May-Jun;36(3):495-50

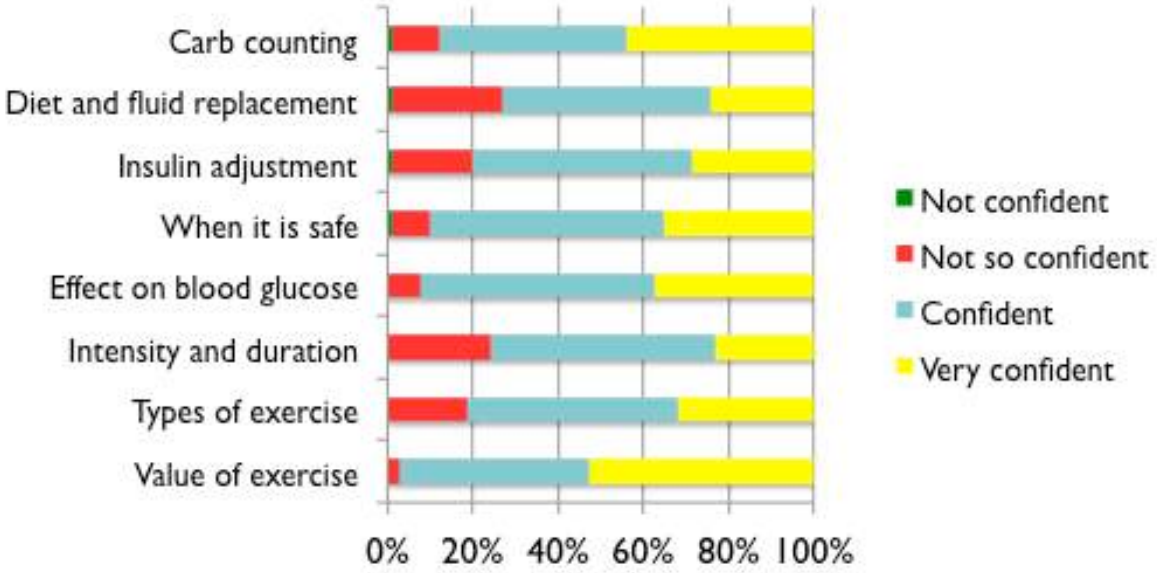
Diabetes specific barriers in adults with new-onset and established T1D

New onset T1D	Established T1D
• Hypoglycaemia (both actual and fear of) • Lack of knowledge/confidence in managing diabetes • Advice from healthcare professionals to stop exercising • Planning (e.g. checking blood glucose) • Feeling overwhelmed by diagnosis.	• Loss of control of diabetes • Lack of knowledge on the management of diabetes for exercise

Kennedy 2018, Lascar 2014

HCP confidence in giving advice

(162 responses. 44% Dieticians, 30% Drs, 25% nurses)



85% of HCPs reported they were very confident or confident at providing exercise education on all key topics

L Rich et al, Poster presentation at IDF 2015.

Knowledge levels of HCPs

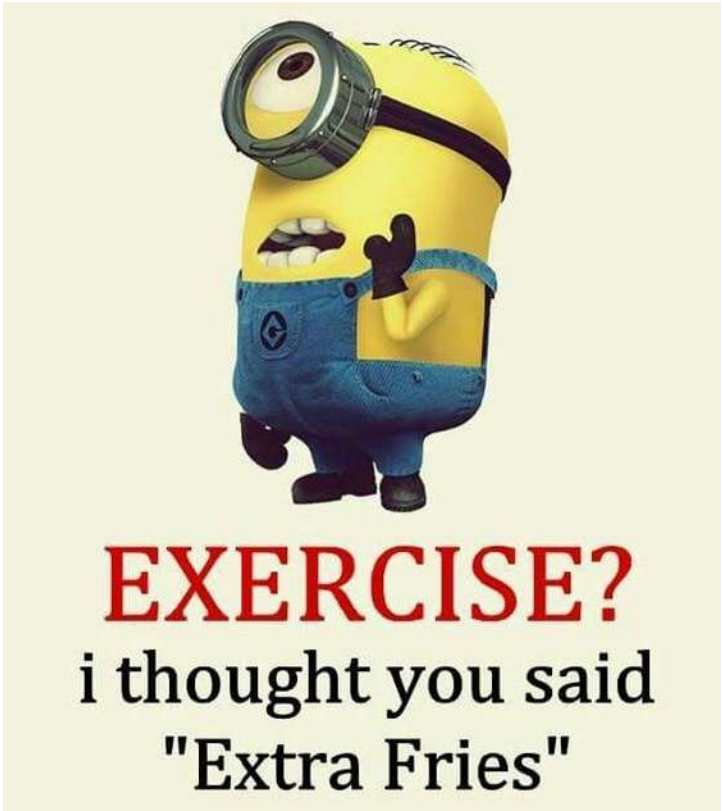
Average scores for each domain (the number of questions in each domain)	Correct responses	
	n (N)	%
General knowledge (4)	151 (648)	23
Action depending on blood glucose (8)	839 (1296)	65
Adjustment of rapid acting insulin (6)	459 (972)	47
Adjustment to basal insulin (6)	334 (972)	34
Risk of hypoglycaemia (2)	42 (324)	13
Insulin injection sites (2)	207 (324)	64
Food and drink consumption (3)	334 (486)	69
Treatment of hypoglycaemia (1)	98 (162)	60

Knowledge levels were poor
89% of respondents wanted more formal education for managing T1D for exercise. L Rich et al, Poster presentation at IDF 2015.

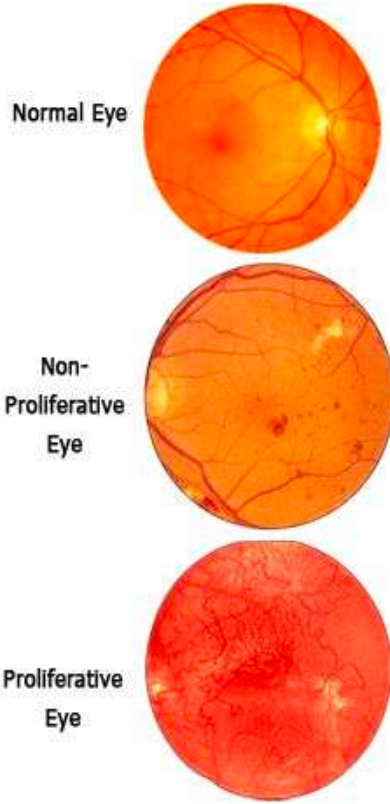
Learning objectives

- **Who** – Who is safe to exercise?
- **What** – What type of exercise should you do?
- **When** – When should you do the exercise?
- **How** – How should you exercise?
- **Why** – Why should you exercise?

Who is safe to exercise?



Eyes and Exercise



Safe to do any form of exercise

If not having injection or laser
Then you are able to do moderate intensity exercise and free weights

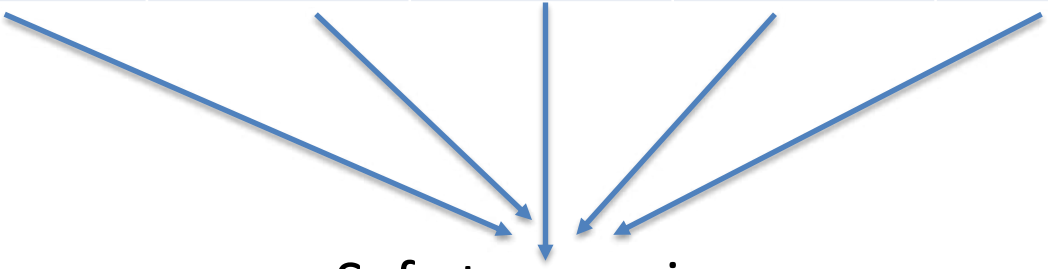
Feet and exercise

Able to do any exercise
Check feet regularly

Able to do exercise but not weight bearing exercise.
Check feet regularly

Kidneys and exercise

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Normal function	Mild kidney function	Moderate kidney function	Severe kidney function	Kidney Failure
90-100% function	60-89% function	30-59% function	15-29% function	0-14% function



Safe to exercise

Heart and exercise

Heart disease

AUTONOMIC NEUROPATHY

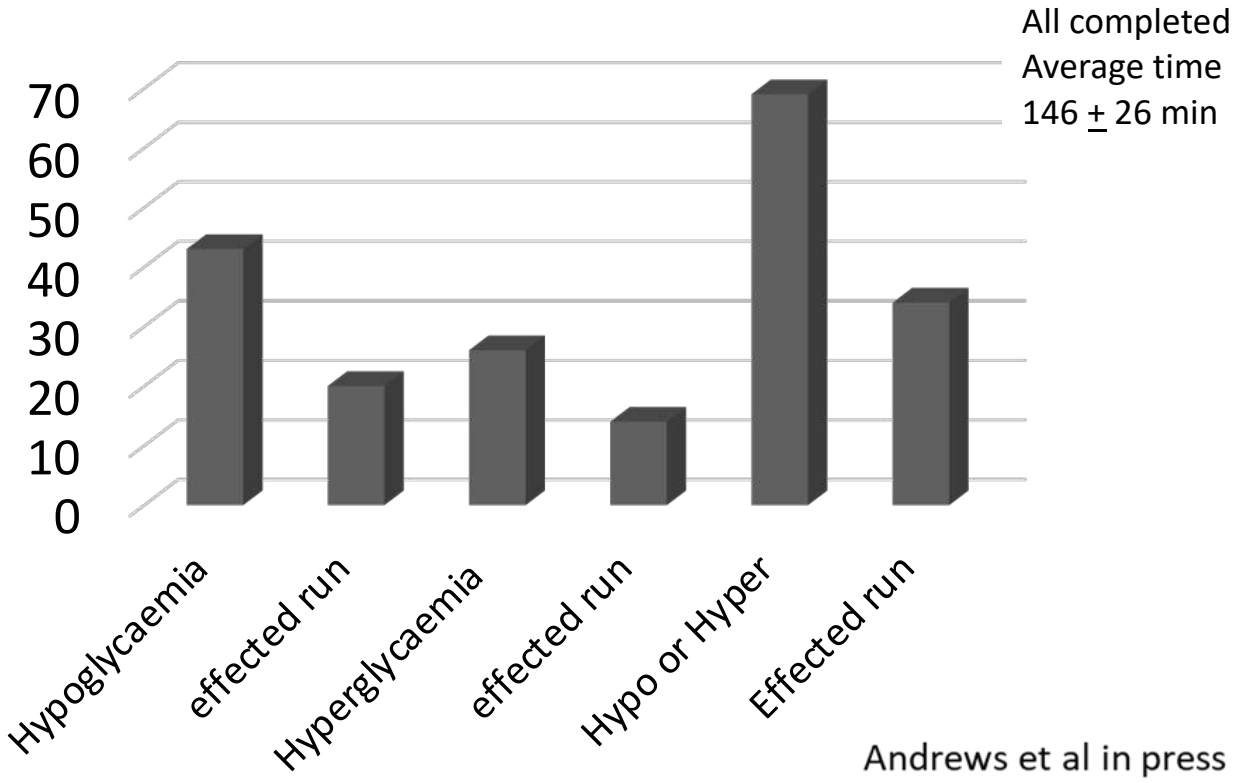
See doctor before start to exercise

Start with low intensity aerobic exercise

Diabetes treatment and exercise –type 2

Type of drug	Risk of low blood sugar
Metformin	No risk
Sulphonylureas (Eg.gliclazide)	Low
DPPIV inhibitor (eg. saxagliptin)	Very Low
Rosiglitazone	Very low
GLP-1 (eg. liraglutide, Exenatide)	Very low
SGLT-2 inhibitor (eg. empagliflozin)	Very low
Insulin (insulatard)	Low

Blood sugars during half marathon in Type 1 patients



Andrews et al in press

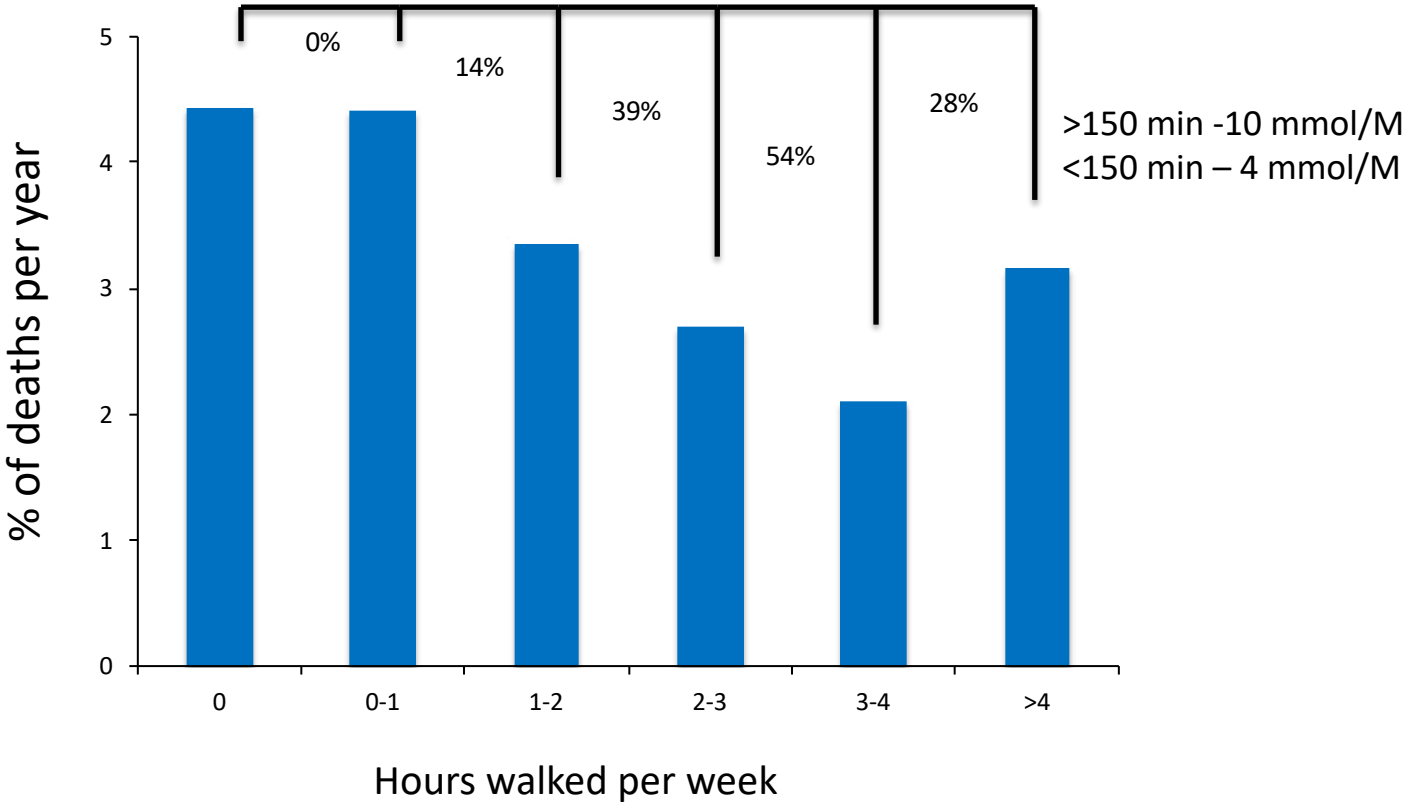
Who is safe to exercise?

Complication	Advice
Heart disease	If have heart disease (angina, heart failure) then do not exercise without confirmation from your GP or diabetes team. If you have chest pain then do not exercise without being checked out by your GP.
Loss of sensation (neuropathy)	Wear appropriate shoes and check feet regularly. Do not exercise when you have foot problem that is under review by GP or diabetes Team until problem resolved (for example have a foot ulcer).
Eye problems (retinopathy)	Avoid vigorous exercise if under review of eye team or asked to have eye photos more frequently than once a year.
Kidney problems (nephropathy)	No restrictions. There is evidence that regular exercise can protect kidneys

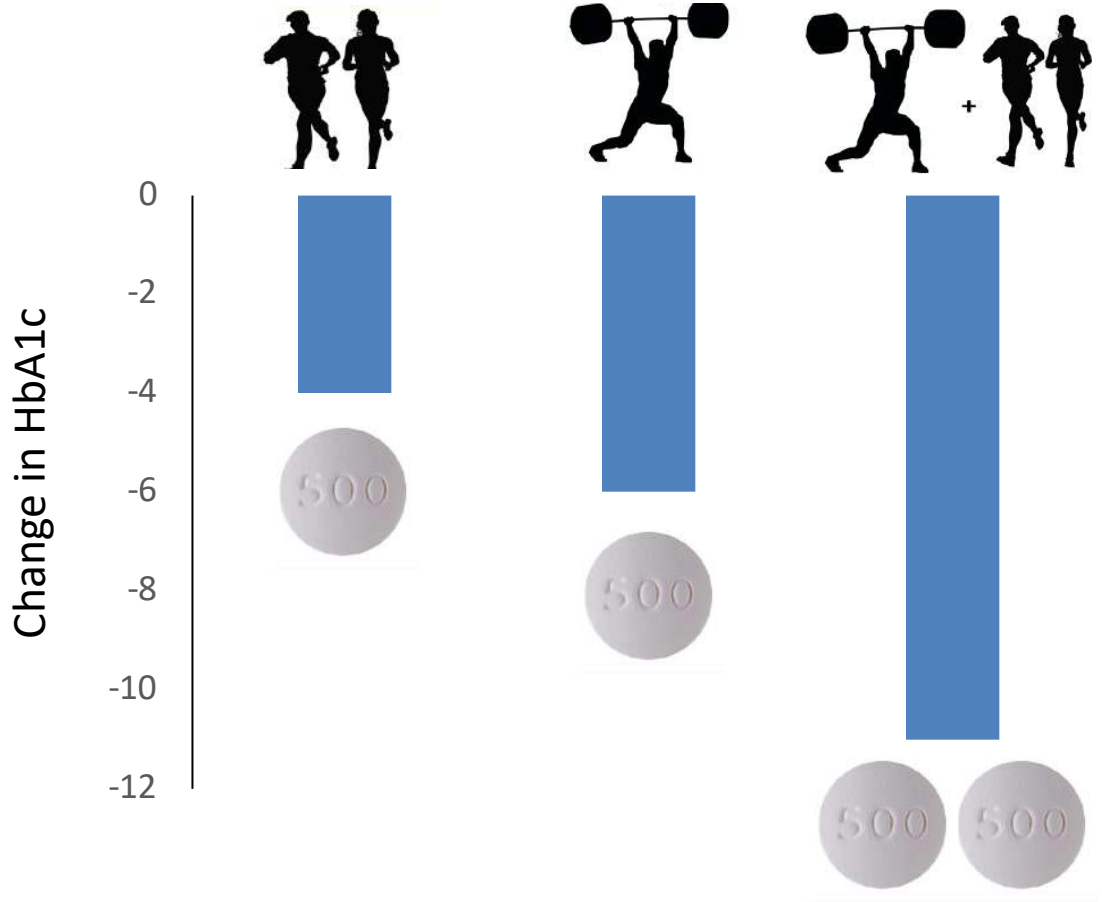
What type of exercise should you do?

Hey Dude when I said “curls might help, that is not what I meant!”

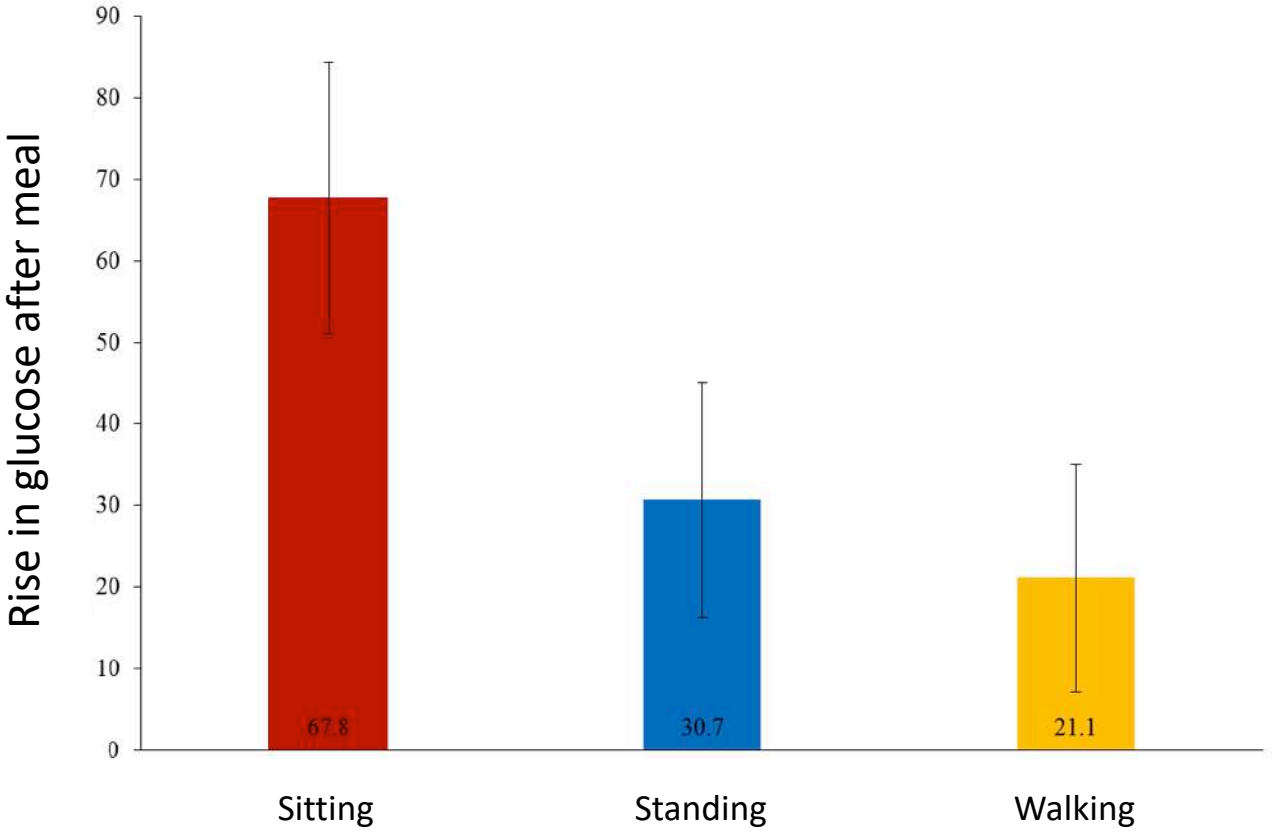
What – the more you do the better



What – combination of exercises is best



What – breaking up sitting is important



What type of exercise should you do?

150 minutes per week of moderate to vigorous aerobic activity

Resistance training three times a week

Reduce sitting time – try to get up three times per hour

When should you do the exercise?

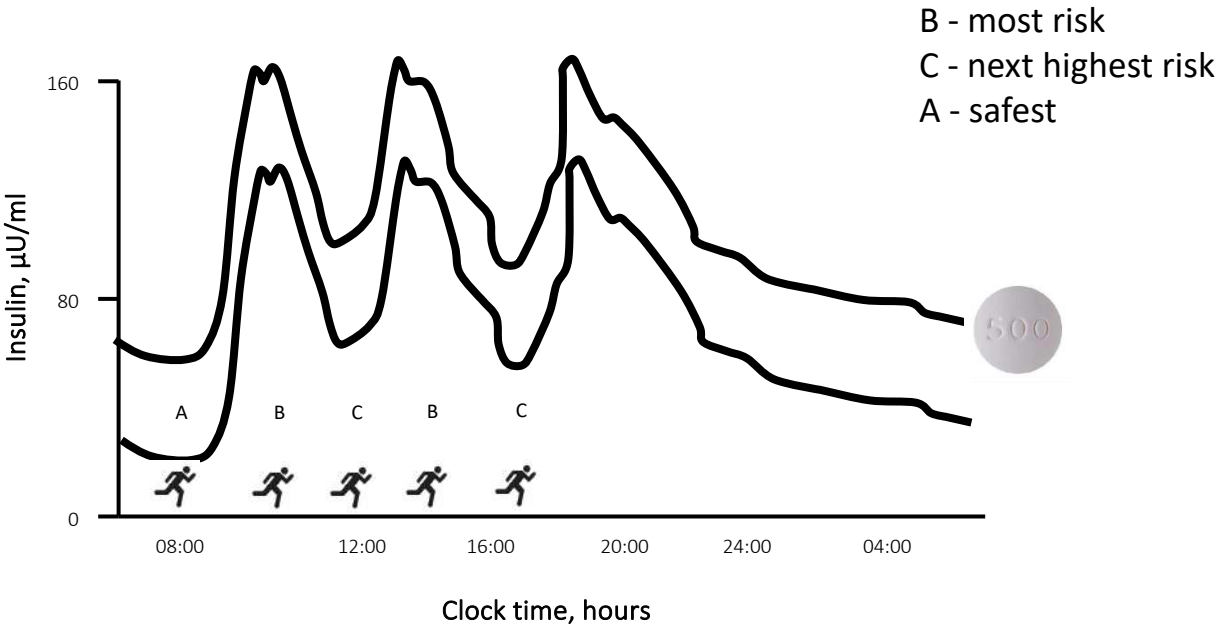
Benefits of morning exercise

- Morning exercisers have few scheduling conflicts
- Morning exercisers are more likely to stick with their regime.
- Morning exercisers have better sleep.
- Morning exercisers lose weight quicker
- Morning exercisers are more productive

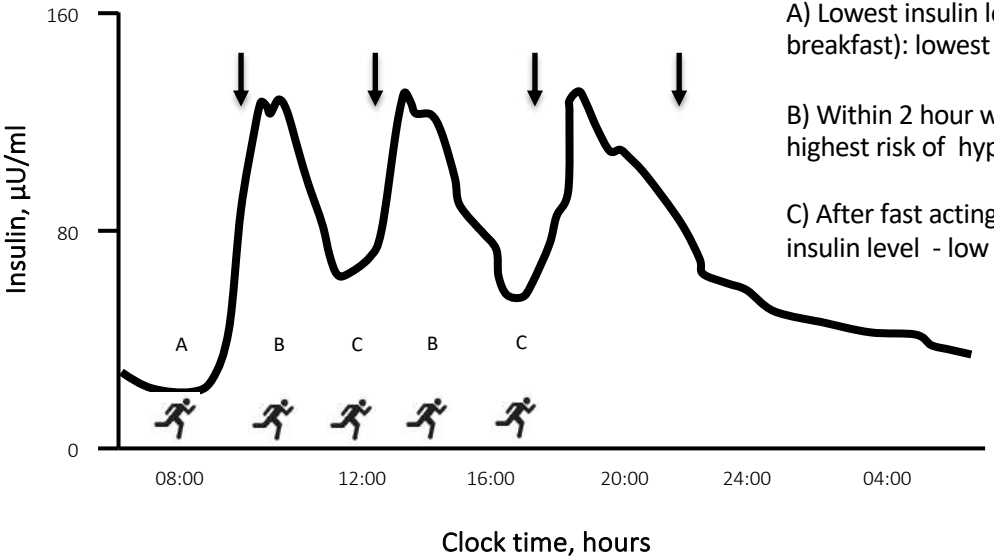
Benefits of afternoon exercise

- Greater improvement in strength if exercise in afternoon
- Greater improvement in performance if exercise here
- Help to prolong concentrations

Best time to exercise on sulphonylureas



Best time to exercise on insulin



A) Lowest insulin level on waking (pre-breakfast): lowest risk of hypoglycaemia here

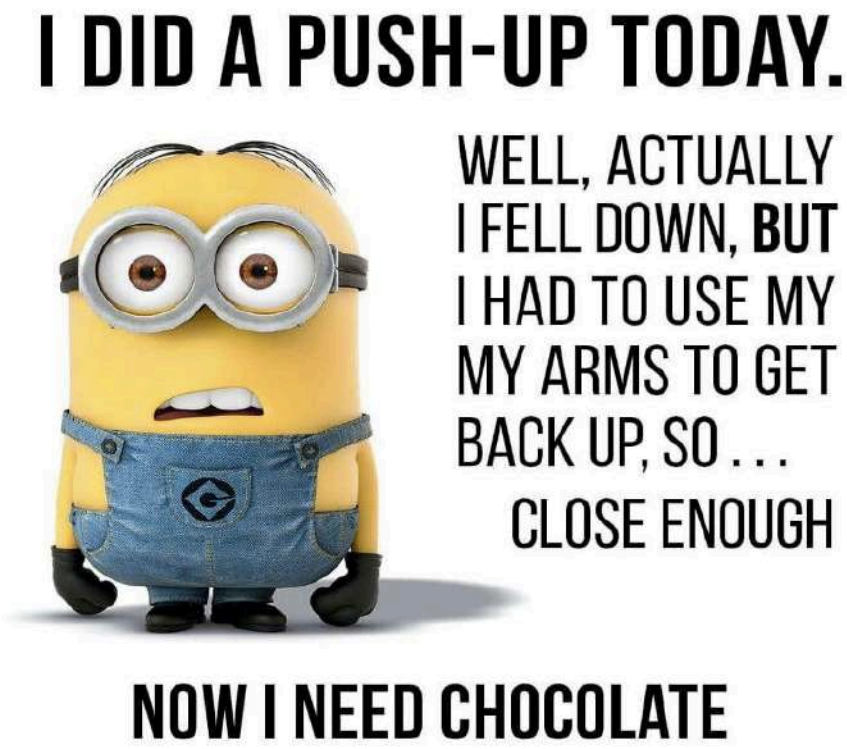
B) Within 2 hour window of fast acting insulin: highest risk of hypoglycaemia here

C) After fast acting insulin: second lowest insulin level - low risk of hypoglycamia

When you should you do the exercise?

Morning	Afternoon	Evening
		
Insulin sulphonylureas		

How should you exercise?

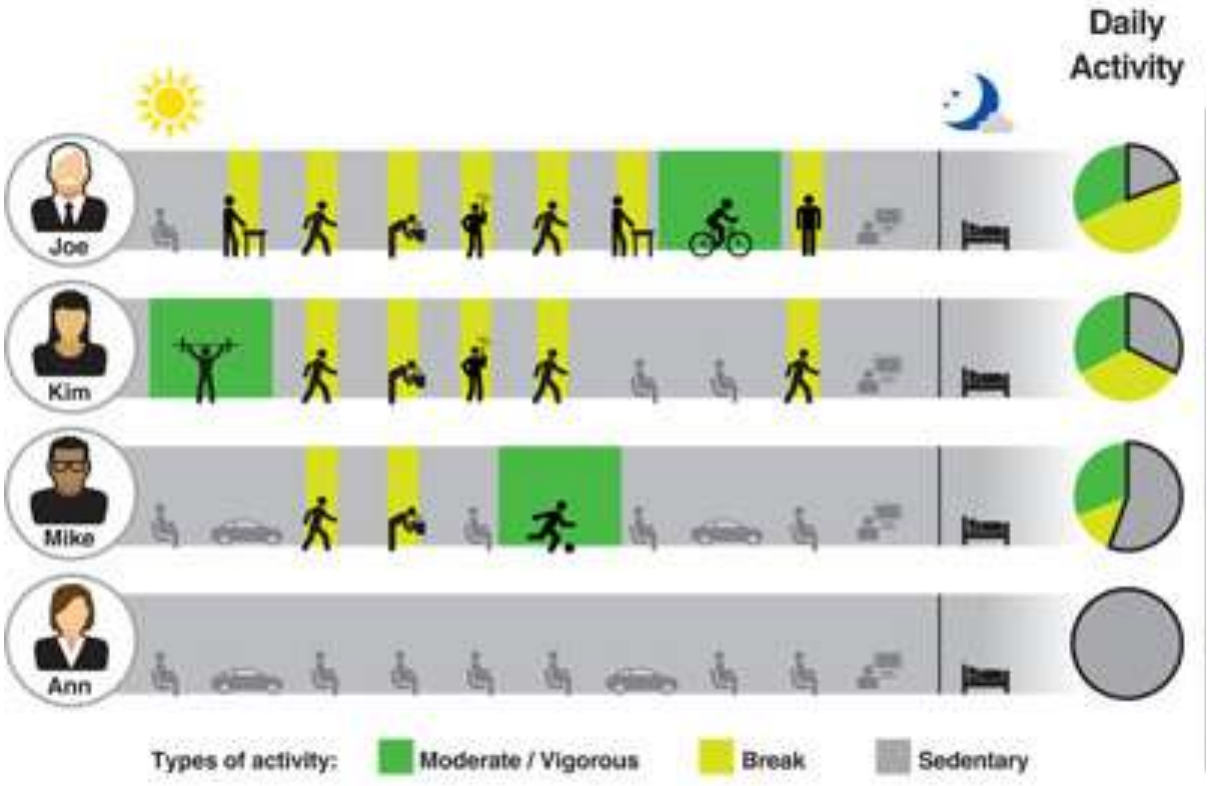


Set realistic targets

- Should set small targets that they can achieve
- Increase by 500-1000 steps per week
- 64% of targets set are too demanding

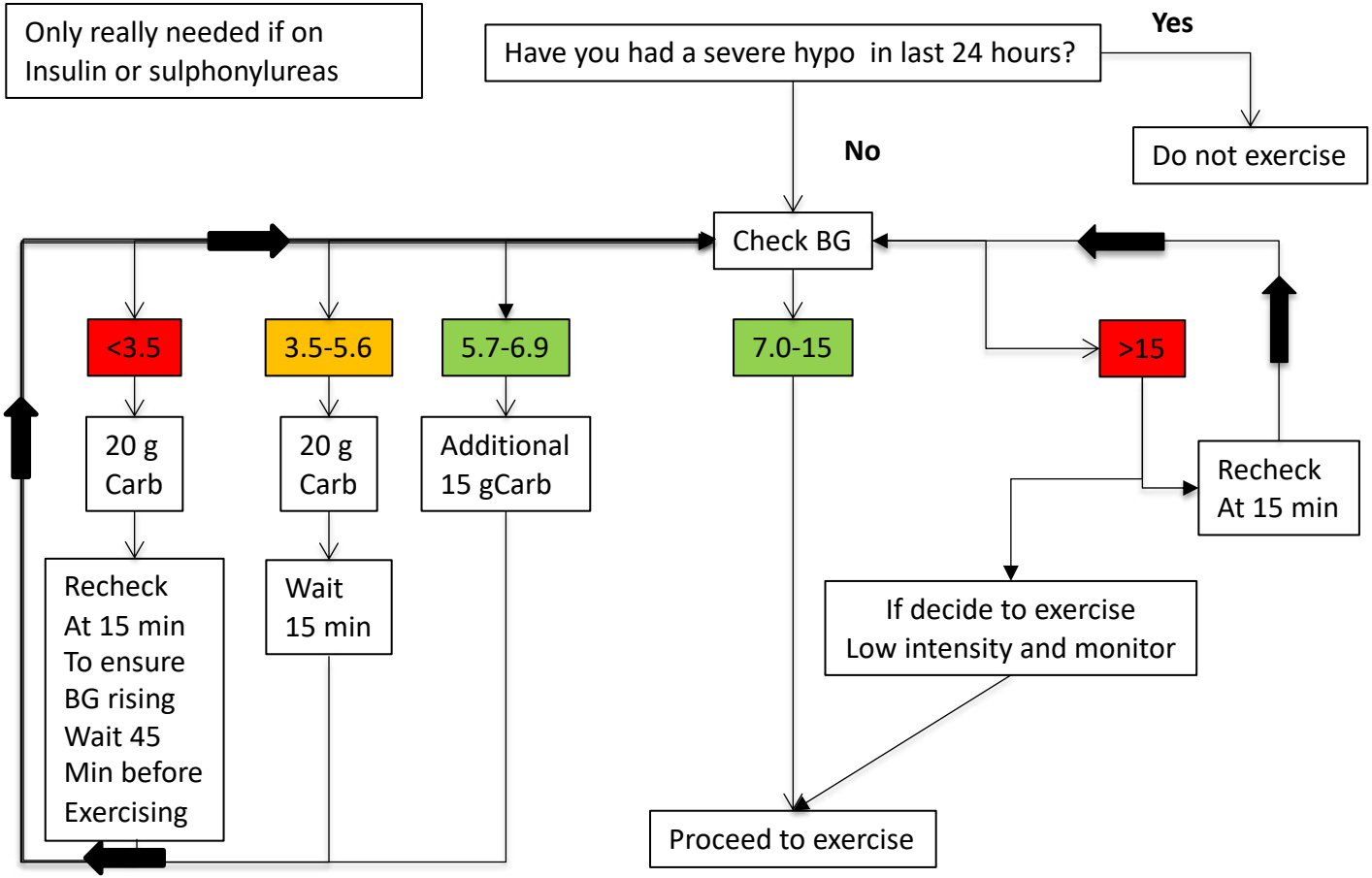
Do exercise that you enjoy

30 minutes moderate activity and try to reduce sedentary time

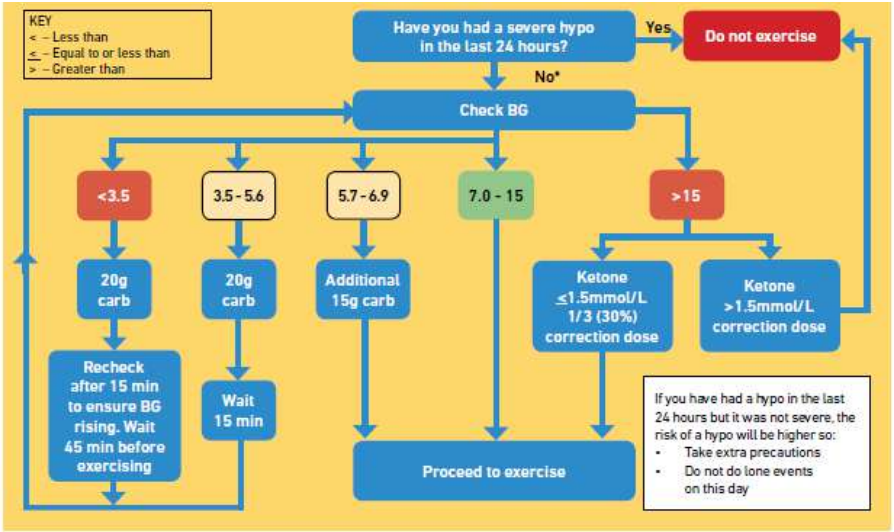


Technology and exercise in groups helps

Blood sugars and exercise – Type 2



Simple flowchart for glucose and exercise Type 1 diabetes



If know direction of glucose from >two blood glucose readings, flash monitor, or continuous glucose monitor.

If ↑ and glucose 5.7-6.9: no need for extra carbs, proceed to exercise. Stick to advice if in any other range.

If ↓ and glucose 5.7-6.9: take twice as much carbs at 20 and 40 minutes into exercise

If ↓ and glucose 7.0-9.0: take 15 grams of carbs at start of exercise

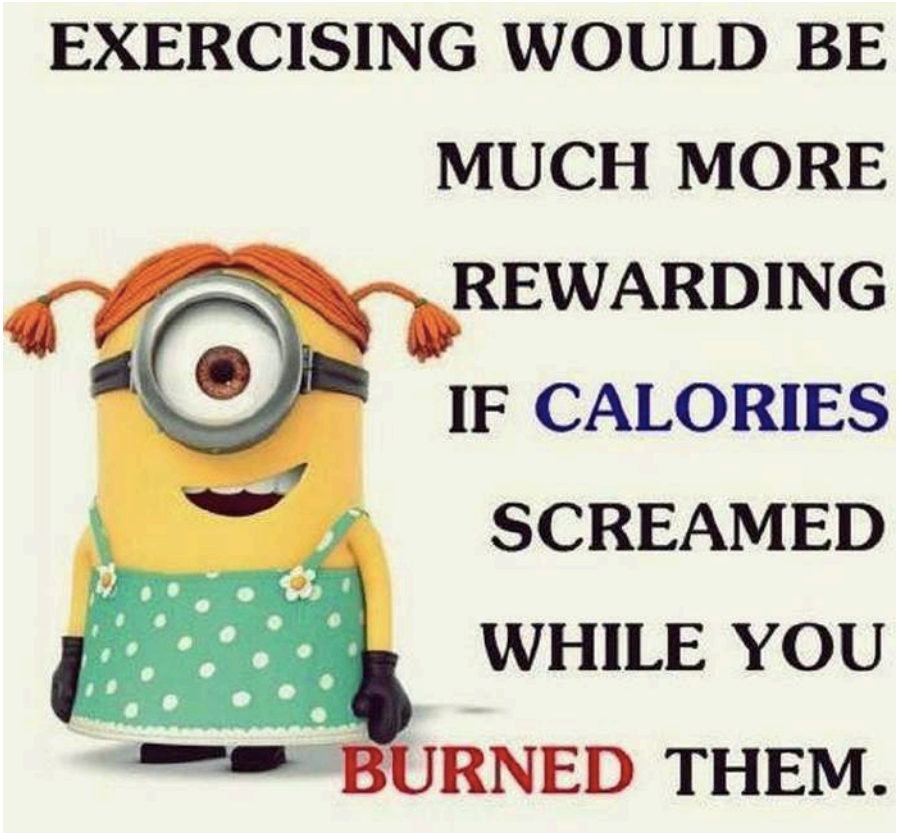
↓ = ↓ or ↘

↑ = ↑ or ↗

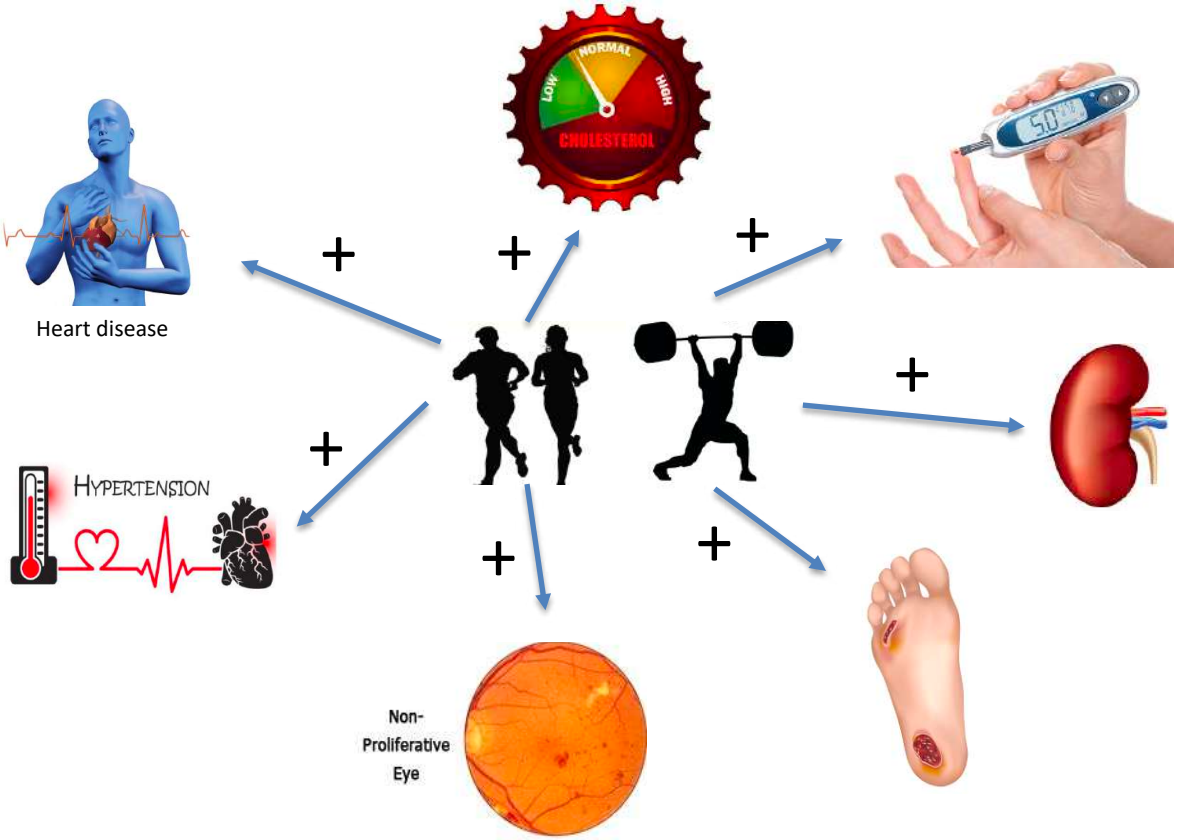
Top 7 tips for exercise

Tips	Reason why
1. Do some thing you enjoy doing	You are more likely to stick with an activity if you enjoy it.
2. Start slow	Starting slowly will prevent injury. If you have any medical conditions, speak to your healthcare team before starting any new activity.
3. Warm up and warm down	This will reduce the chances of injuring yourself.
4. Make small changes	Walking is free, and a simple way to improve your fitness. Try walking or cycling to work or going out to do chores. If too far get off a few bus stops or trains stop earlier and walk.
5. Set yourself goals	If you set goals you are more likely to keep doing your activity. Ensure these are realistic and that you set short-term and long-term goals. Monitor what you do and treat yourself when you achieve a goal.
6. Variety is the spice of life	Try swapping cycling on an exercise bike for cycling outdoors, or try a new activity. If you are starting a new activity think about how this might affect your diabetes and plan accordingly.
7. Make it social	Instead of meeting friends for a coffee or in the pub, why not suggest doing something active? You could join a club or play sports with your friends – golf or tennis.

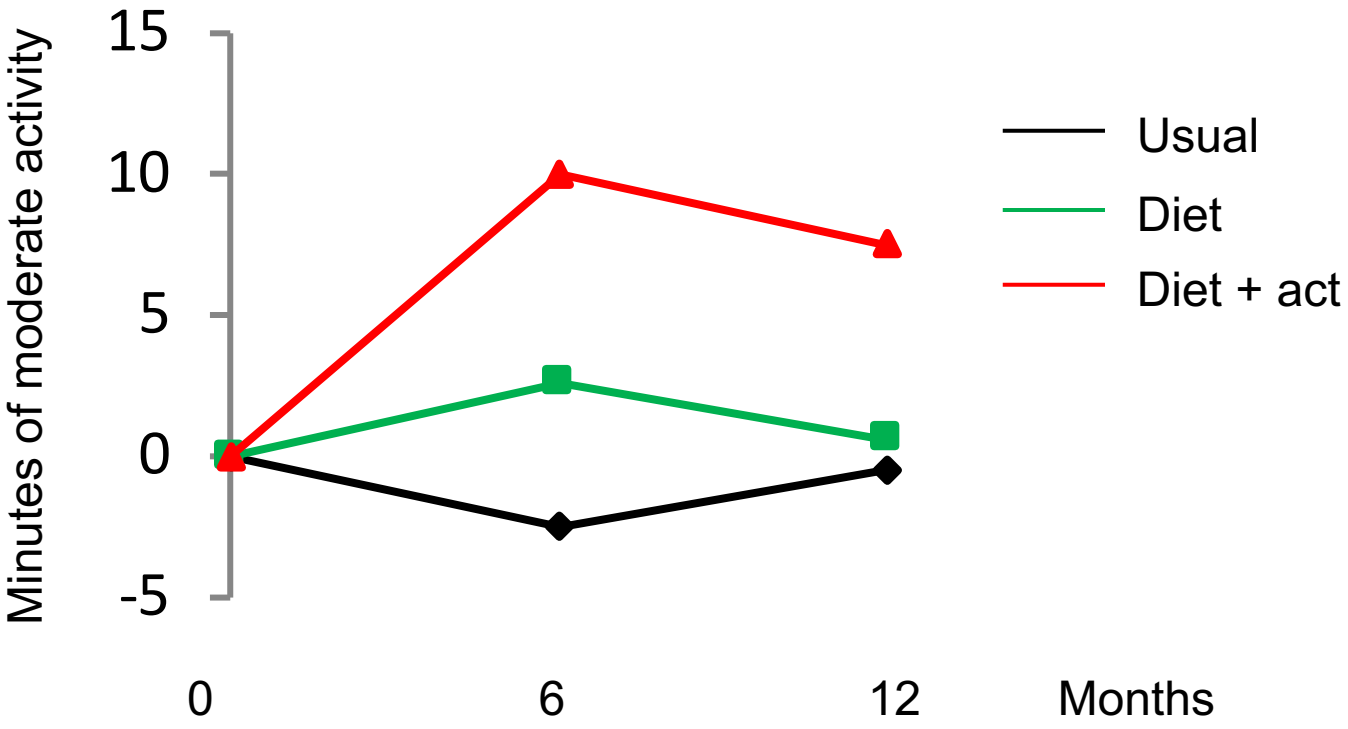
Why should you exercise?



Why should you exercise?

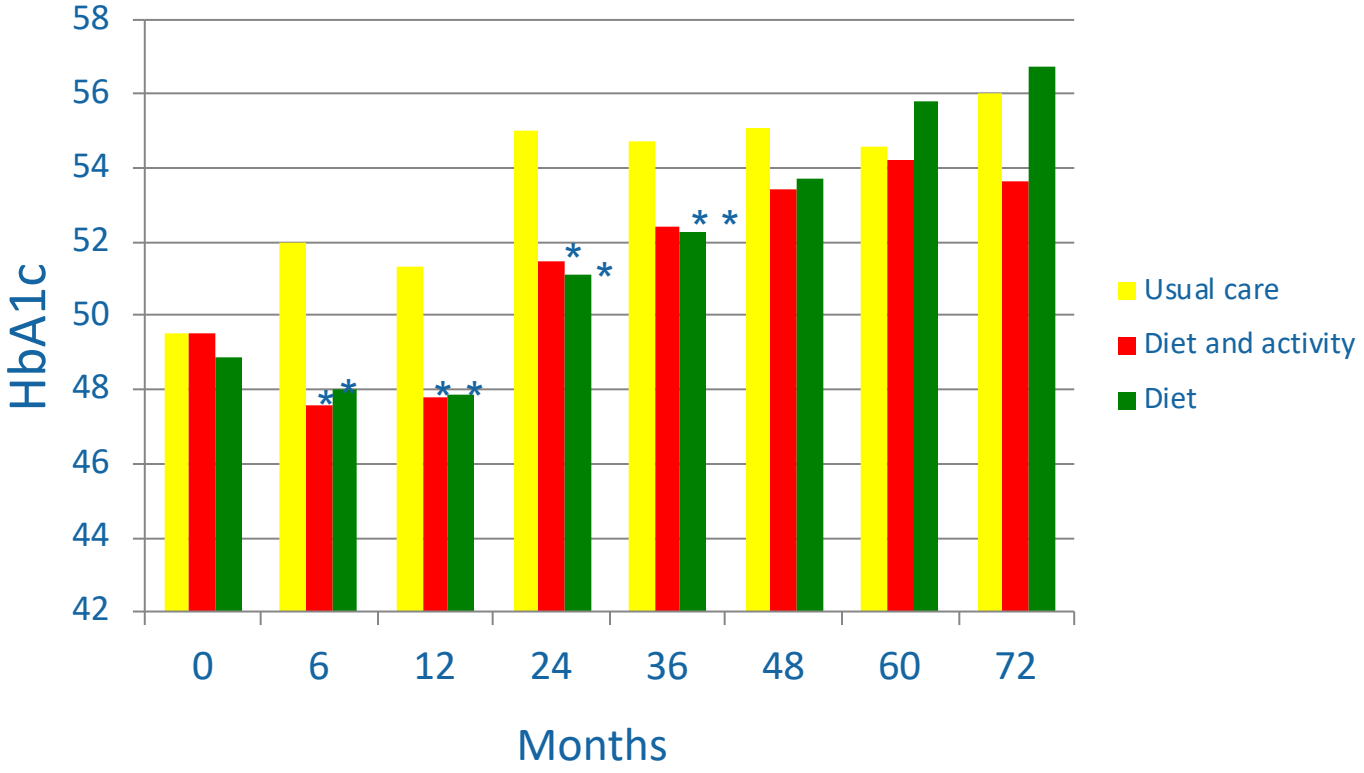


Does it work in the real world?



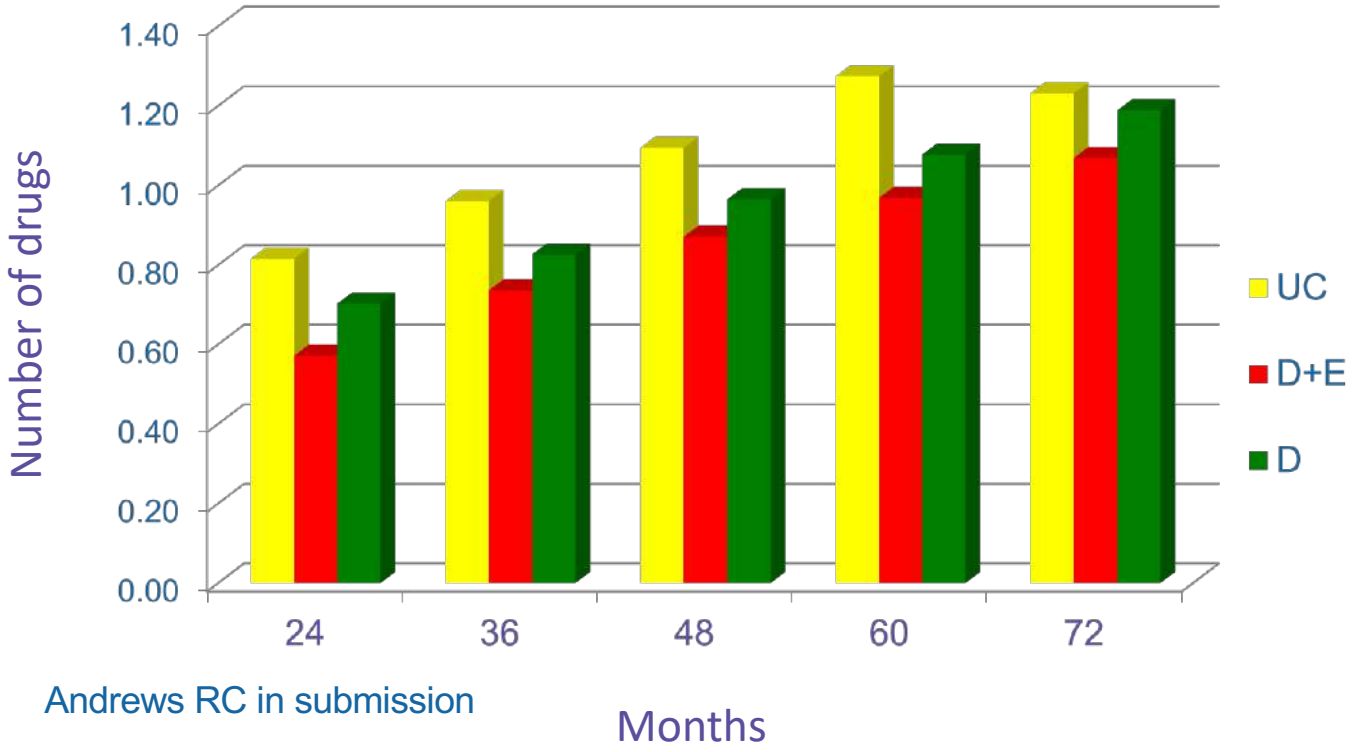
Andrews , Lancet. 2011 Jul 9;378(9786):129-39

Long term glucose control



Andrews RC in submission

Number of tablets



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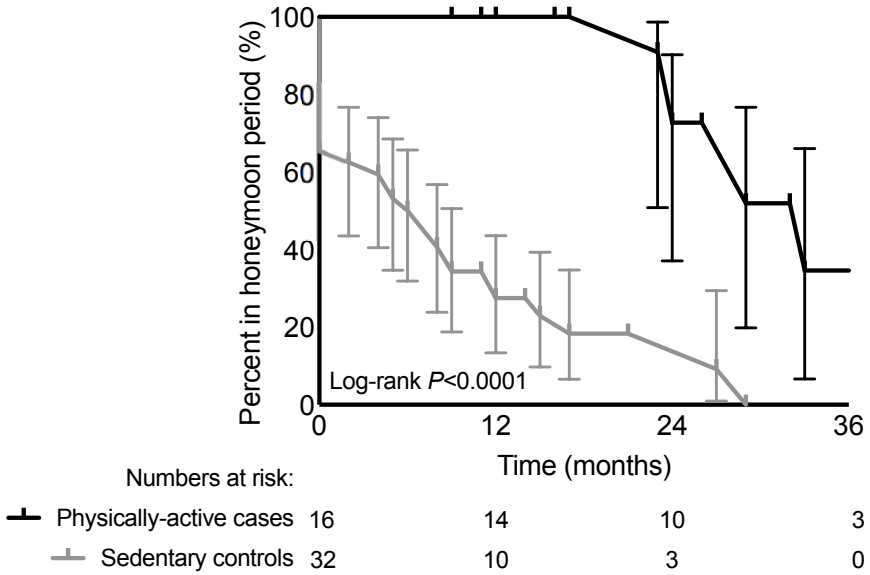
Duration of honeymoon in T1D patients who exercise



Matched for age, sex, BMI

Honeymoon was defined as IDAA1C ≤9
IDAA1C = HbA1C (%) + [4 x insulin dose (units/kg/day)]
Mortenson, et al 2009)

Chetan et al 2018

Learning objectives

- **Who** – Almost everyone is safe to exercise
- **What** – Combination exercise + reduce sitting
- **When** – Depends on benefits looking for
- **How** – start slow and build up using targets
- **Why** – huge health and mental benefits

Contact details

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