

Four New, Cutting-Edge Ways To Easily Shift Your Body Into Fat-Burning Mode & Ketosis.

[Affiliate Disclosure](#)

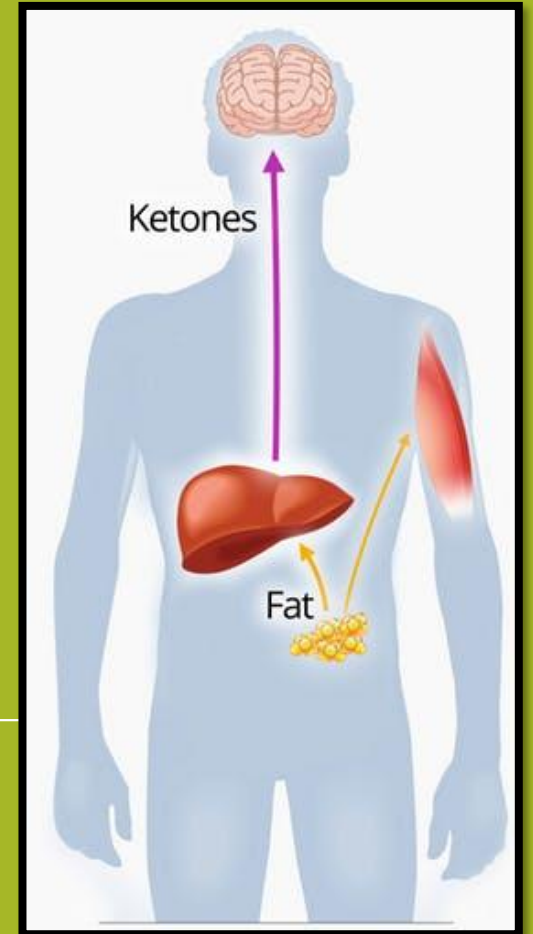


Disclaimer: While the ketogenic diet has many proven benefits, it's still controversial. The main potential danger regards medications, e.g. for diabetes, where doses may need to be adapted (see above). Discuss any changes in medication and relevant lifestyle changes with your doctor. [Full disclaimer >](#)



This guide is written for adults with health issues, including obesity, that could benefit from a ketogenic diet.

Controversial topics related to a keto diet, and our take on them, include [saturated fats](#), [cholesterol](#), [whole grains](#), [red meat](#), whether the [brain needs carbohydrates](#) and [restricting calories for weight loss](#).



2. What to eat on a keto diet

Here are typical foods to enjoy on a ketogenic diet. The numbers are net carbs, i.e. digestible carbs, per 100 grams. ☺ To remain in ketosis, lower is generally better:



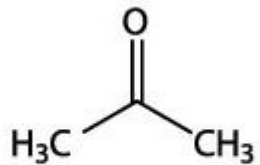
BAD SCIENCE: THE KETOGENIC DIET

Presented by: Jaclyn Curry

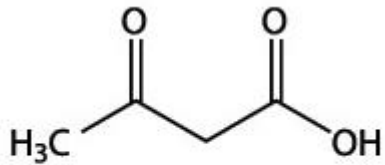
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Keto Diet Breakdown

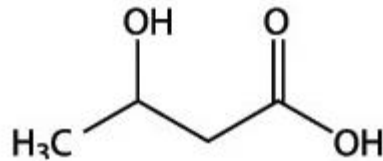
- Diet allows body to produce small fuel molecules called “ketones”
- Used as fuel when blood sugar (glucose) is in short supply
- Ketones produced when you eat few carbs and moderate amount of protein
- Liver produces ketones from fat
- Body switches fuel supply to run mostly on fat



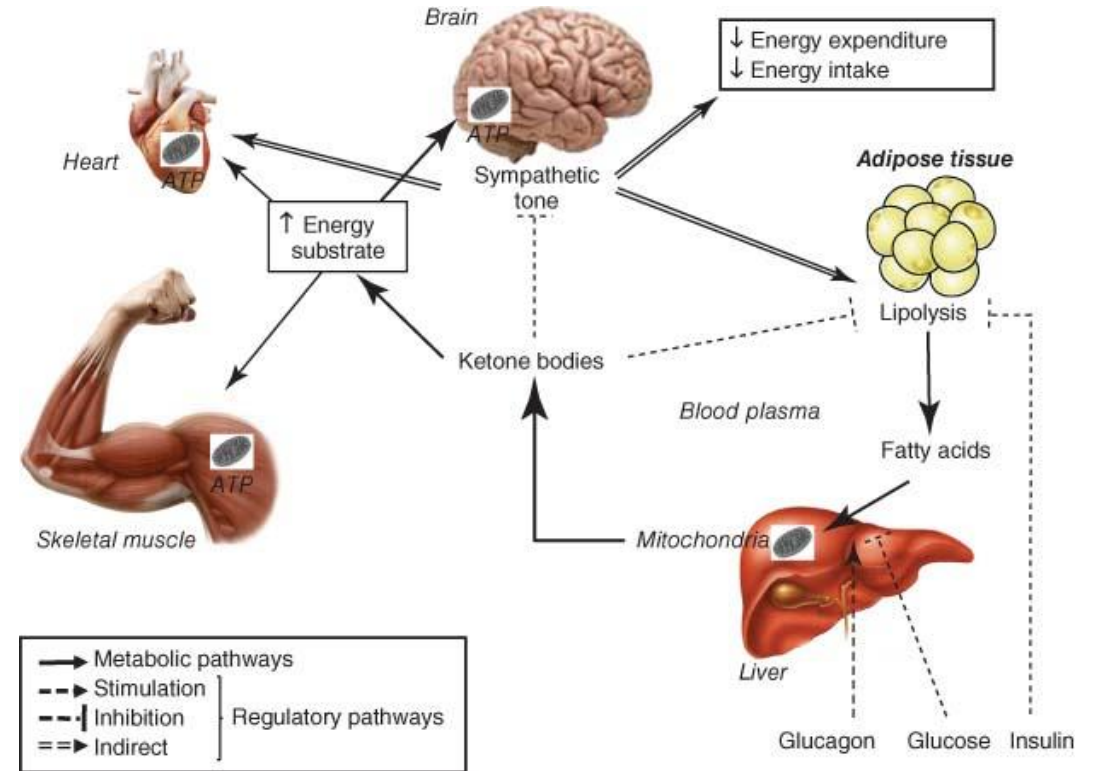
Acetone



Acetoacetate



2-Hydroxybutyric acid



Foods to eat and avoid

Try to avoid

Here's what you should *avoid* on a keto diet - carb foods containing a lot of sugar and starch. This includes starchy foods like bread, pasta, rice and potatoes. These foods are very high-carbs.



2. What to eat on a keto diet

Here are typical foods to enjoy on a ketogenic diet. The numbers are net carbs, i.e. digestible carbs, per 100 grams. ¹⁰ To remain in ketosis, lower is generally better:

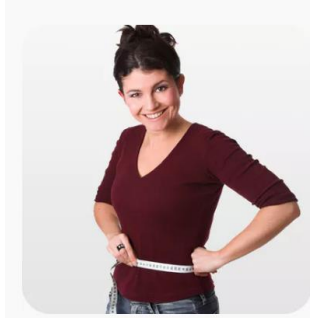


What to drink



Keto Diet Promises

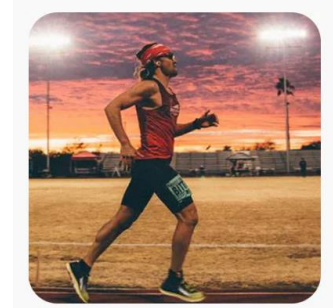
Lose Weight



Improved Health Markers



Increased Physical Endurance



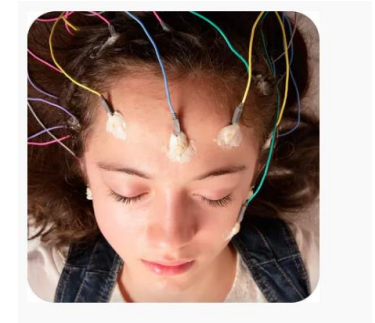
Appetite Control



Improved & Mental Performance



Treat Epilepsy



Control Blood Sugar & Reverse type 2 diabetes



Calm Stomach



Common Keto Diet Criticism

- Can lead to ketoacidosis which can cause death
- Lose muscle instead of fat
- Cause heart damage
- Cause flu like symptoms
- Initial weight loss is mostly water
- Can cause “funky” breath
- Cause brain fog
- Can be emotionally exhausting



KETOSIS

- ✓ **Low level** of ketones in the blood
- ✓ **Normal process** of the body
- ✓ **Safe function** of a low-carb, ketogenic diet

KETOACIDOSIS

- ✓ **Extremely high level** of ketones in blood
- ✓ **Can turn the blood acidic**, deadly if untreated
- ✓ **Occurs in diabetics** who don't take enough insulin or aren't well, people who are starving, or alcoholics



What does the research say?

Short and
Long term
effects of
keto diet

Comparison
of keto diet
to low
calories diet

Is keto diet
cause for
medical
concern

Keto short and long term effects: Study Design

- Objective
 - Determine effect of a 24-week ketogenic diet
- Approach
 - 83 patients
 - BMI > 35 kg/m²
 - High glucose
 - High Cholesterol
- Measuring
 - Body weight
 - Body mass index
 - Total cholesterol
 - Low density lipoprotein cholesterol
 - High density lipoprotein cholesterol
 - Triglycerides
 - Fasting blood sugar
 - Urea
 - Creatinine
- Timepoints
 - 8 weeks
 - 16 weeks
 - 24 weeks

TABLE 1
Patient data at baseline before treatment with the ketogenic diet

	n	Age (years)	Height (m)	Weight (kg)	Body mass index (kg/m ²)
Men	39	42.6±1.7	1.7±0.01	102.4±3.7	35.9±1.2
Women	44	40.6±1.6	1.6±0.01	99.8±2.9	39.4±1.0

All data are mean ± SEM

Keto short and long term effects: Patient Diet

- Initial 12 weeks
 - Carbohydrate: 20 g – 30 g
 - Green vegetables & salad
 - Protein: 80 g – 100 g
 - Meat, fish, fowl, eggs, shellfish, cheese
 - Polyunsaturated and monounsaturated fats
 - Included but low
 - Micronutrients
 - Given in capsule form once per day
- Final 12 weeks
 - Additional 20 g carbohydrates

TABLE 2
Composition of the capsule*

Para-aminobenzoic acid (PH)	30 mg
Vitamin B ₁ (thiamin mononitrate) (BP)	15 mg
Vitamin B ₂ (riboflavin) (BP)	3 mg
Vitamin B ₅ (nicotinamide) (BP)	25 mg
Vitamin B ₃ (calcium pantothenate) (PH)	3 mg
Vitamin B ₆ (pyridoxine HCl) (BP)	5 mg
Vitamin B ₁₂ (cyanocobalamin) (BP)	10 µg
Biotin (PH)	5 µg
Folic acid (BP)	100 µg
Vitamin C (ascorbic acid) BP	60 mg
Vitamin A (retinol) (USP; 2000 IU)	0.6 mg
Vitamin D (calciferol) (INN; 200 IU)	5 µg
Vitamin E (tocopherol acetate) (USNF)	10 mg
Lecithin (PH)	40 mg
Wheat germ oil	100 mg
Lysine (FP)	40 mg
Methionine (DAB)	60 mg
Rutin (DAB) (rutin) (INN)	10 mg
Iron (as fumarate; BP)	12 mg
Calcium (as dicalcium phosphate) (BP)	52 mg
Phosphorus (as dicalcium phosphate) (BP)	40 mg
Potassium (as KCl) (BP)	2 mg
Zinc (as ZnSO ₄) (BP)	8 mg
Copper (as CuSO ₄) (BP)	1 mg
Manganese (as MnSO ₄) (BP)	2 mg
Iodine (as potassium iodide) (BP)	trace
Ginseng (Siberian) (5:1 concentrated extract)	4 mg

*Net weight 45 g. BP British Pharmacopoeia; DAB German Pharmacopoeia; FP French Pharmacopoeia; INN International nonproprietary names; IU International units; PH Swiss Pharmacopoeia; USNF United States National Formulary; USP United States Pharmacopoeia

Keto short and long term effects: Results

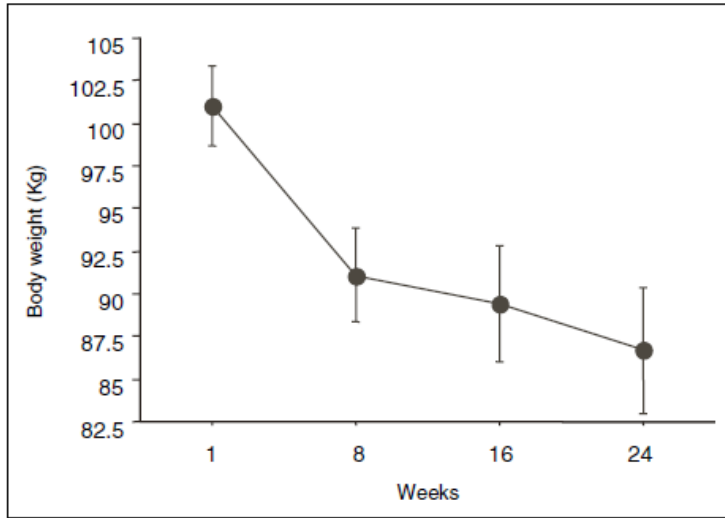


Figure 1) Reduction in body weight at eight, 16 and 24 weeks following the administration of the ketogenic diet in obese patients. The weights are expressed as mean \pm SEM

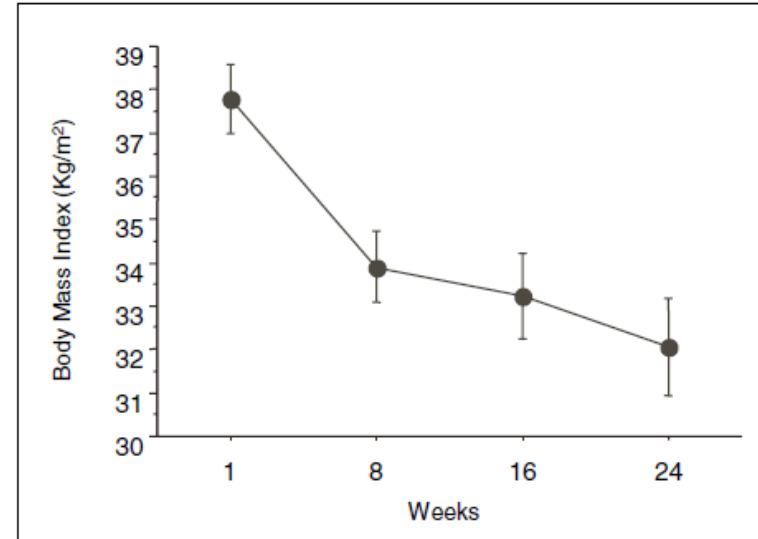


Figure 2) Decrease in body mass index at eight, 16 and 24 weeks during the administration of a ketogenic diet in obese patients. The values are expressed as mean \pm SEM

Body Weight

- Normal levels (using avg height & weight)
 - Men: 54 – 73 Kg
 - Woman: 47 – 64 Kg
- High levels may cause
 - High blood pressure
 - High cholesterol
 - High blood sugar
 - Heart disease

Body Mass Index

- Normal levels: 18.5 – 25 Kg/m²
- High levels may cause
 - High blood pressure
 - High cholesterol
 - High blood sugar
 - Heart disease

Keto short and long term effects: Results

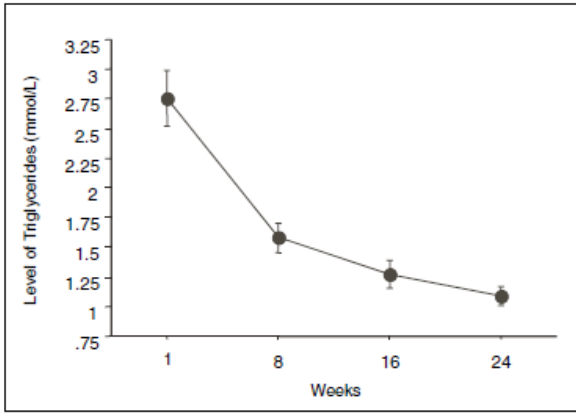


Figure 6) Changes in the level of triglycerides in obese patients during treatment with a ketogenic diet over a period of 24 weeks. The values are expressed as mean \pm SEM

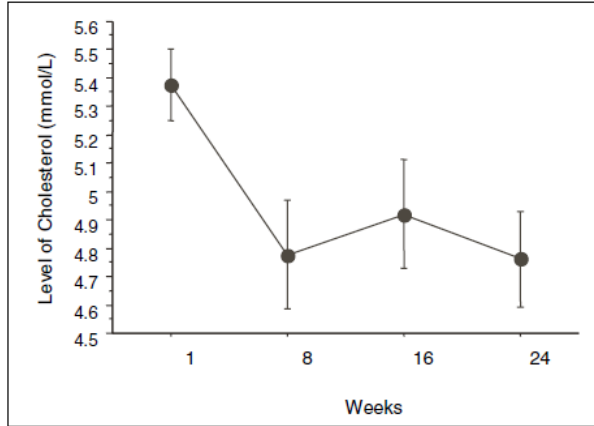


Figure 3) Decreased levels of total cholesterol (expressed as mean \pm SEM) in obese patients at eight, 16 and 24 weeks during the administration of a ketogenic diet

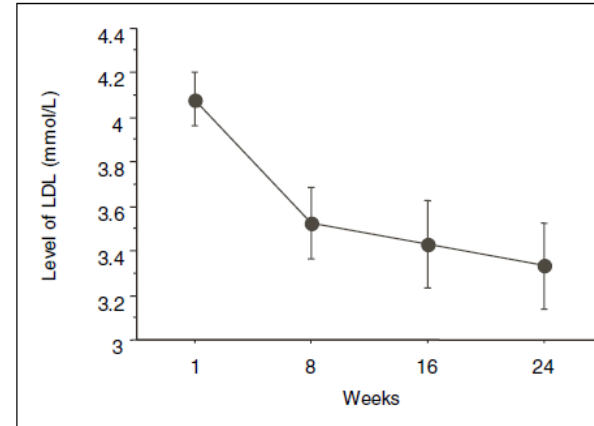


Figure 5) Changes in the level of low density lipoprotein (LDL) cholesterol during treatment with a ketogenic diet in obese patients at eight, 16 and 24 weeks. The values are expressed as mean \pm SEM

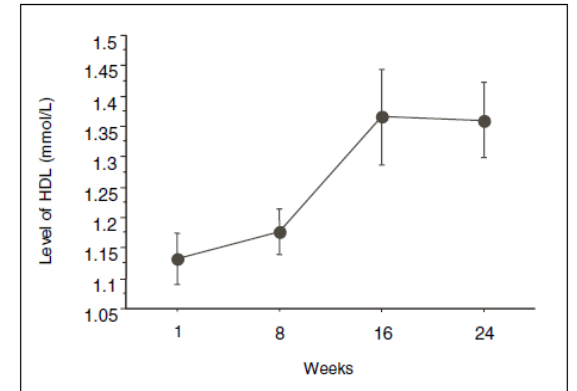


Figure 4) Changes in the level of high density lipoprotein (HDL) cholesterol in obese patients during treatment with a ketogenic diet for a period of 24 weeks. Data are expressed as mean \pm SEM

Triglycerides

- Type of fat found in blood
- Normal levels: 0.45 – 1.71 mmol/L
- High levels may cause
 - Pancreatitis
 - Stroke
 - Heart disease

Cholesterol

- Normal levels: < 5.2 mmol/L
- High levels may cause
 - Coronary heart disease
 - Heart attacks
 - Atherosclerosis

Low Density Lipoproteins

- Transports cholesterol throughout body
- Normal levels: < 3.4 mmol/L
- High levels may cause
 - Artery constriction

High Density Lipoproteins

- Picks up excess cholesterol and takes to liver
- Normal levels: > 0.91 mmol/L
- Low levels may cause
 - Artery constriction

Keto short and long term effects: Results

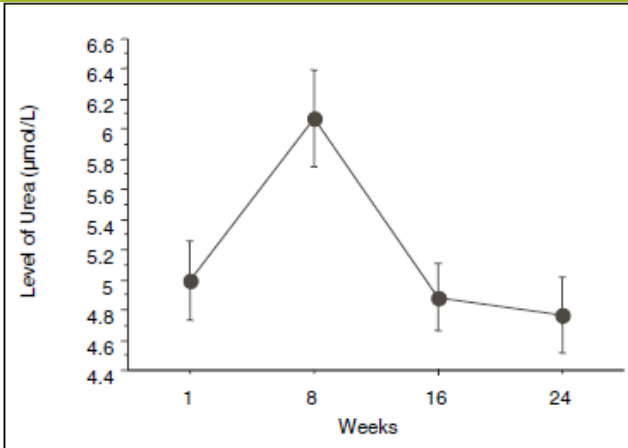


Figure 8) Changes in the level of urea in obese patients during a 24-week ketogenic diet. The level of urea is expressed as mean \pm SEM

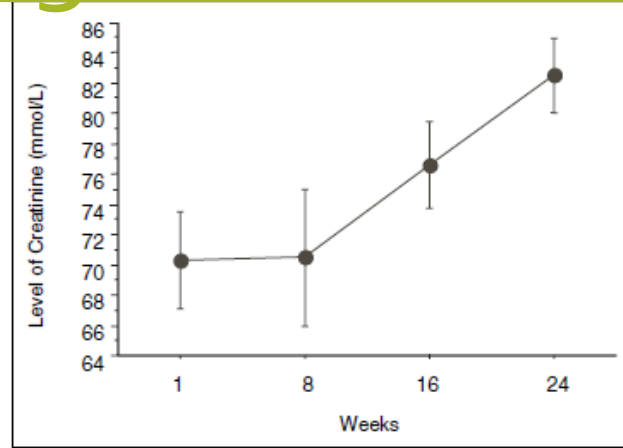


Figure 9) Changes in the level of creatinine in obese patients during a 24-week ketogenic diet. Values are expressed as mean \pm SEM

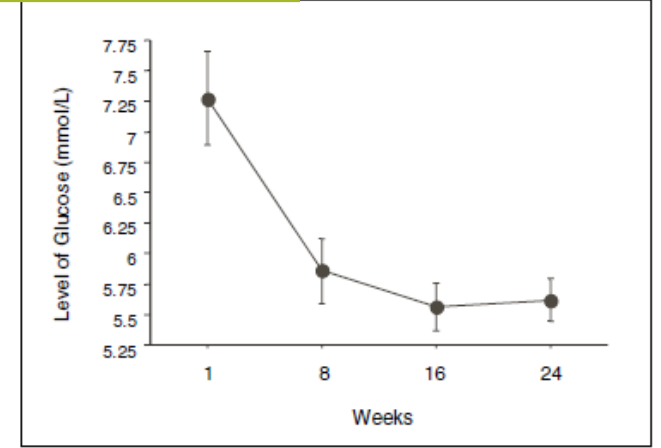


Figure 7) Decreased levels of blood glucose (expressed as mean \pm SEM) in obese patients at eight, 16 and 24 weeks during the administration of a ketogenic diet

Urea

- Product of ammonia conversion in liver
- Normal levels: 2900 – 8200 μ mol/L
- High levels may cause
 - Heart failure
 - Dehydration
- Common for high protein diet

Creatinine

- Created by kidneys and liver
- Stored in muscles
- Used for energy
- Normal levels: 0.05 – 0.10 mmol/L
- Low levels may be caused by
 - Muscle disease
 - Poor liver function

Glucose

- Sugar in bloodstream that provides energy
- Normal levels: 3.9 – 6.1 mmol/L
- High levels may cause
 - Nerve damage
 - Blood vessel damage
 - Organ damage

Keto short and long term effects: Conclusions

- Ketogenic diet is a natural therapy for weight reduction in obese patients
- Significant decrease in...
 - Triglycerides
 - Total cholesterol
 - LDL cholesterol
 - Glucose
- Significant increase in...
 - HBL cholesterol
- Common negative effects due to weight loss drugs not observed
- Ketogenic diet over long period is safe



Keto Diet vs. Low calorie diet: Study Design

- Objective
 - Determine effect of keto diet and low calorie diet in type 2 diabetic patients
- Approach
 - 363 obese patients
 - Type 2 diabetics: 102



<https://www.angelaforjones.com/benefits-of-the-ketogenic-diet/>

- Measuring
 - Body weight
 - Body mass index
 - Waist circumference change
 - Total cholesterol
 - Hemoglobin
 - Glycosylated hemoglobin
 - Low density lipoprotein cholesterol
 - High density lipoprotein cholesterol
 - Triglycerides
 - Blood sugar
 - Urea
 - Uric acid
 - Creatinine
- Timepoints
 - 4 weeks
 - 8 weeks
 - 12 weeks
 - 16 weeks
 - 20 weeks
 - 24 weeks

Keto Diet vs. Low calorie diet: Patient Diet

Keto Diet

- Carbohydrate: 20 g

Low Calorie Diet

- Calories allowed: 2200

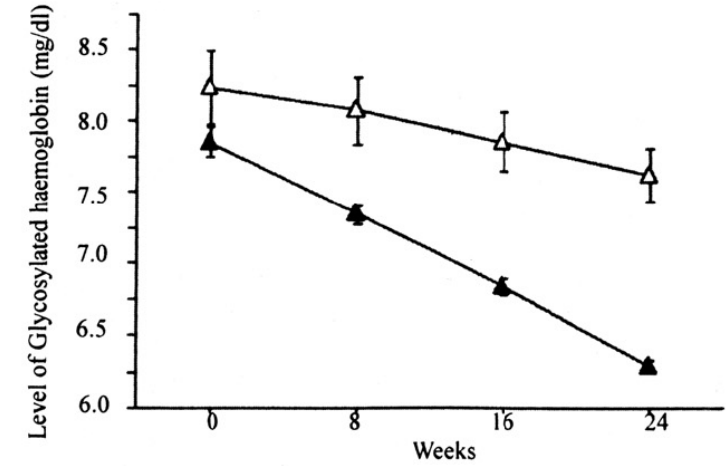
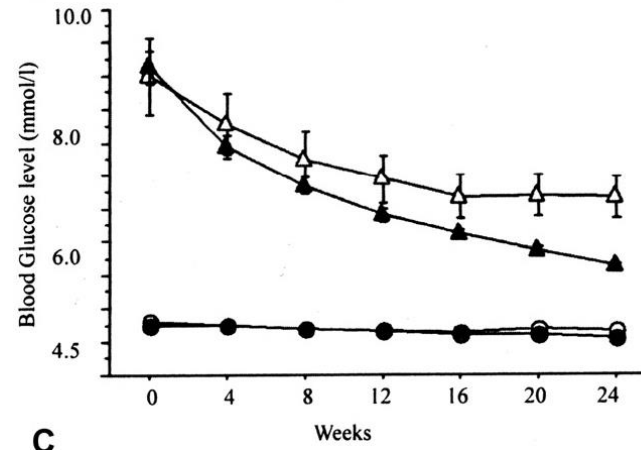
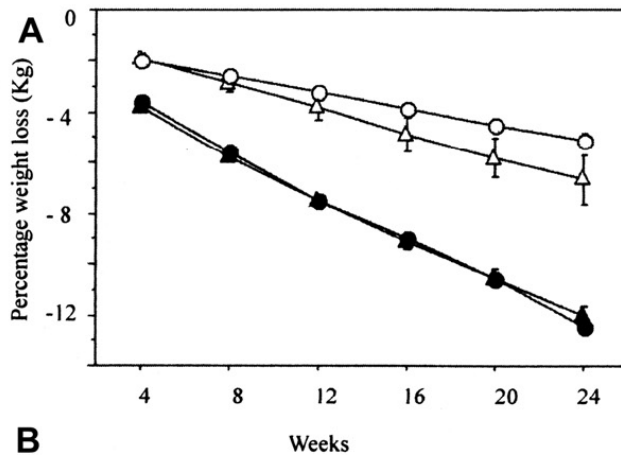
Table 1

Recommended and restricted food in a low-carbohydrate ketogenic diet and a sample low-calorie diet

Recommended food in low-carbohydrate ketogenic diet	
Proteins	fish: tuna, sardine prawns, shrimps, lobster meat; kebabs; sausages; minced poultry; chicken; eggs; cheese: full-fat cheese
Vegetables/fruits	spinach, watercress, eggplant, parsley, mulberry, coriander, mint, artichoke, okra, cabbage, mushroom, avocado, leek, carrot, radish, celery, cauliflower, green pepper, lettuce, cucumber, tomato, 10–15 olives/d, lemon, strawberry 6/d, avocado, berries 10/d
Oil	olive oil (5 tbsp, added to salad), flax seed oil
Restricted food in low-carbohydrate ketogenic diet	flour, potato, macaroni spaghetti, noodles, bread, rice, sugar, sweets, honey, cakes, all fruit juices, all soft drinks
Sample 2200-calorie low-calorie diet	
Breakfast	coffee with caffeine (12 oz); cottage cheese 1% fat (1.5 cup); cream, fluid, half and half (1 tbsp); fruit cocktail (0.5 cup)
Morning snack	medium apple with peel, medium banana (1 each)
Lunch	medium apple with peel (1 each); bread whole wheat slice (2 each); cheddar cheese (2 in. ³); mayonnaise (tuna salad, 0.15 cup); turkey breast/white meat (3 oz)
Afternoon snack	Bread slice rye 7 grain (2 each); jelly: any fruit flavor (4 tsp); peanut butter (2 tbsp)
Dinner	chicken breast/white meat (4 oz); rice: white cook steamed (1.5 cups); low-calorie thousand island dressing (salad); Kraft mayonnaise (4 tbsp); croutons (cook cuts bred into small cubes) plain (0.25 cup); 1 small garden salad with tomato, onion

Keto Diet vs. Low calorie diet: Results

- : Keto non diabetic
- ▲ : Keto diabetic
- : Low calorie non diabetic
- △ : Low calorie diabetic



Body Weight

- High levels may cause
 - High blood pressure
 - High cholesterol
 - High blood sugar
 - Heart disease

Glucose

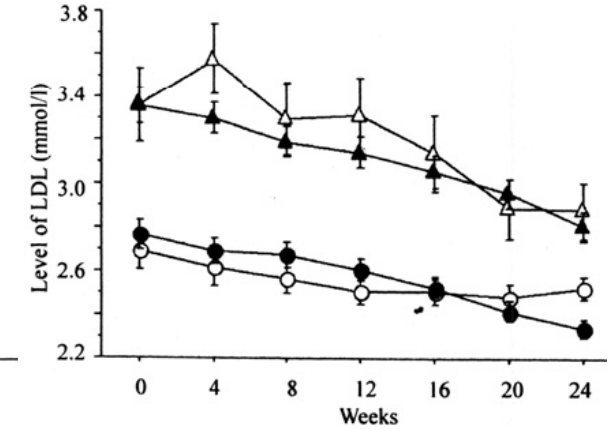
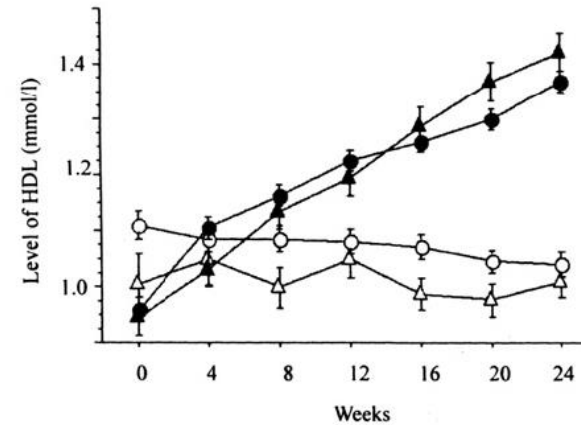
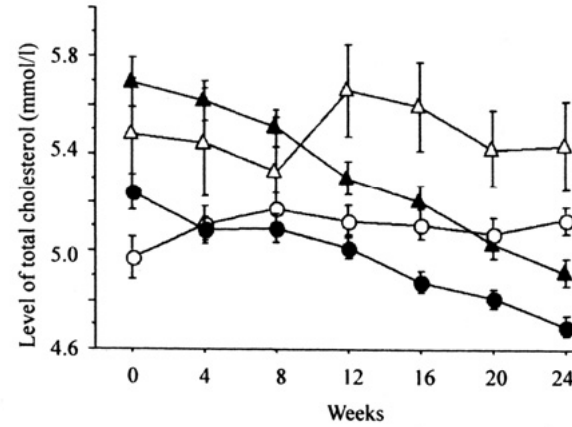
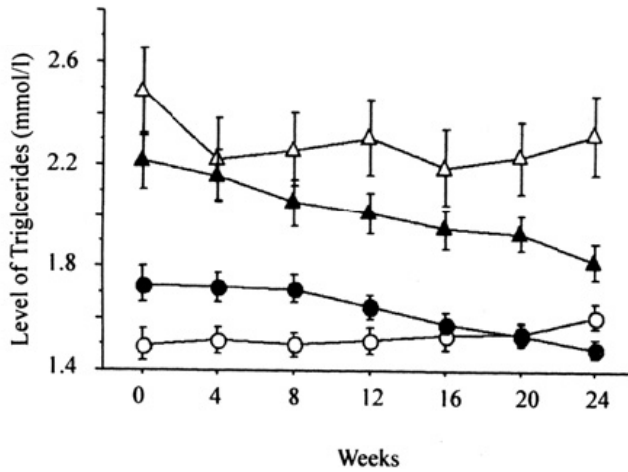
- Sugar in bloodstream that provides energy
- Normal levels: 3.9 – 6.1 mmol/L
- High levels may cause
 - Nerve damage
 - Blood vessel damage
 - Organ damage

Glycosylated Hemoglobin

- Hemoglobin bound to glucose
- Normal levels: 4 – 5.6 %
- High levels may cause
 - Low oxygen levels

Keto Diet vs. Low calorie diet: Results

- : Keto non diabetic
- ▲ : Keto diabetic
- : Low calorie non diabetic
- △ : Low calorie diabetic



Triglycerides

- Normal levels: 0.45 – 1.71 mmol/L
- Type of fat found in blood
- High levels may cause
 - Pancreatitis
 - Stroke
 - Heart disease

Cholesterol

- Normal levels: < 5.2 mmol/L
- High levels may cause
 - Coronary heart disease
 - Heart attacks
 - Atherosclerosis

High Density Lipoproteins

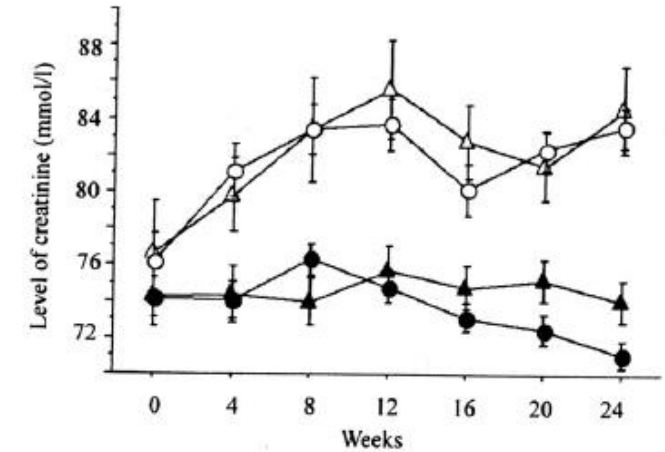
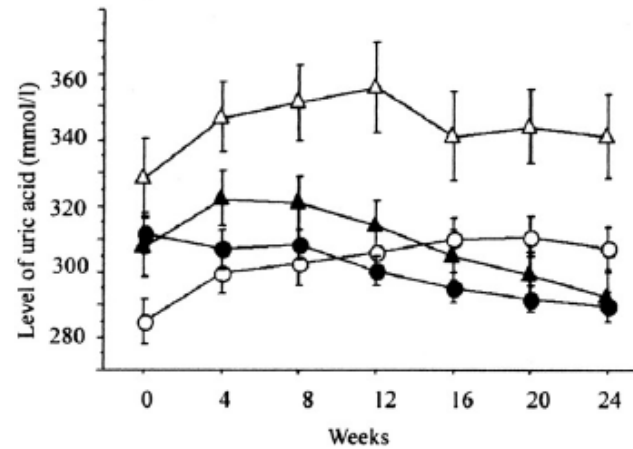
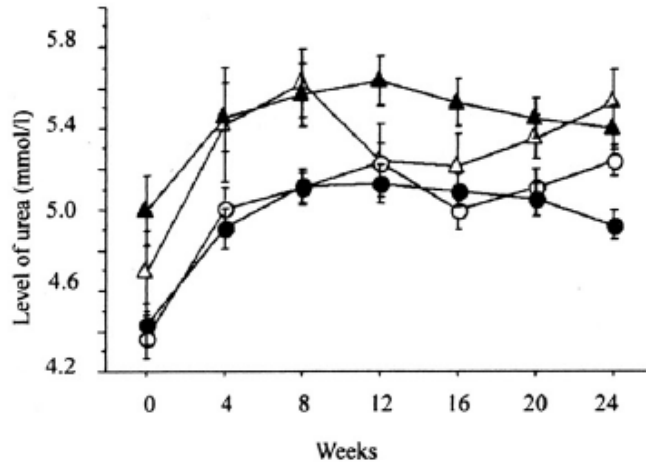
- Normal levels: > 0.91 mmol/L
- Picks up excess cholesterol and takes to liver
- Low levels may cause
 - Artery constriction

Low Density Lipoproteins

- Normal levels: < 3.4 mmol/L
- Transports cholesterol throughout body
- High levels may cause
 - Artery constriction

Keto Diet vs. Low calorie diet: Results

- : Keto non diabetic
- ▲ : Keto diabetic
- : Low calorie non diabetic
- △ : Low calorie diabetic



Urea

- Product of ammonia conversion in liver
- Common issues for high protein diet
- Normal levels: 2.9 – 8.2 mmol/L
- High levels may cause
 - Heart failure
 - Dehydration
- Common for high protein diet

Uric acid

- Natural waste product filtered by kidneys
- Normal levels: 0.12 – 0.42 mmol/L
- High levels may cause
 - Gout
 - Acid blood or urine

Creatinine

- Created by kidneys and liver
- Stored in muscles
- Used for energy
- Normal levels: 0.05 – 0.10 mmol/L
- Low levels may be caused by
 - Muscle disease
 - Poor liver function

Keto Diet vs. Low calorie diet: Conclusions

- Keto diet effective in lowering type 2 diabetic...
 - Body weight
 - Waist measurement
 - Triacylglycerols
- Keto diet more effective than low calorie diet in reducing...
 - Body weight
 - Glycosylated Haemoglobin
 - Triacylglycerols
 - Total cholesterol
 - Uric Acid



Medical Concerns with Keto diet: Study Design

Objective

- Determine changes in metabolic variables in patient undergoing single inhalation anaesthetics

Approach

- Patients: 3 epileptic children on keto diet
1 child on normal diet

Measuring

- Ketone bodies
- Glucose levels
- Blood gases

Timepoints

- Premedication
- Immediately after anesthesia
- End of anesthesia
- 1 hour postoperatively

Table 1

Case	Age		Operation	Pre-operative starvation period (h)	Premedication	Induction	Maintenance	Anaesthetic time (min)
	Years	Months						
1, P.N.	5	8	Tonsillectomy	10	IM Pethidine, 50 mg Chlorpromazine, 12.5 mg Promethazine, 12.5 mg	N ₂ O O ₂ Halothane	N ₂ O O ₂ Halothane	35
2, A.F.	2	2	Adenoidectomy and antral washout	10	IM Papaveretum, 5 mg Hyoscine, 0.1 mg	Thiopentone, 5 mg/kg Suxamethonium, 1.5 mg/kg	N ₂ O O ₂ Halothane	30
3, A.W.	8	2	CT scan	10	IM Atropine, 0.4 mg	Thiopentone, 5 mg/kg Suxamethonium, 1.5 mg/kg	N ₂ O O ₂ Halothane	35
4, S.S.	5	1	CT scan	10	Oral Atropine, 0.4 mg	Thiopentone, 5 mg/kg Suxamethonium, 1.5 mg/kg	N ₂ O O ₂ Halothane	25



Medical Concerns with Keto diet: Results

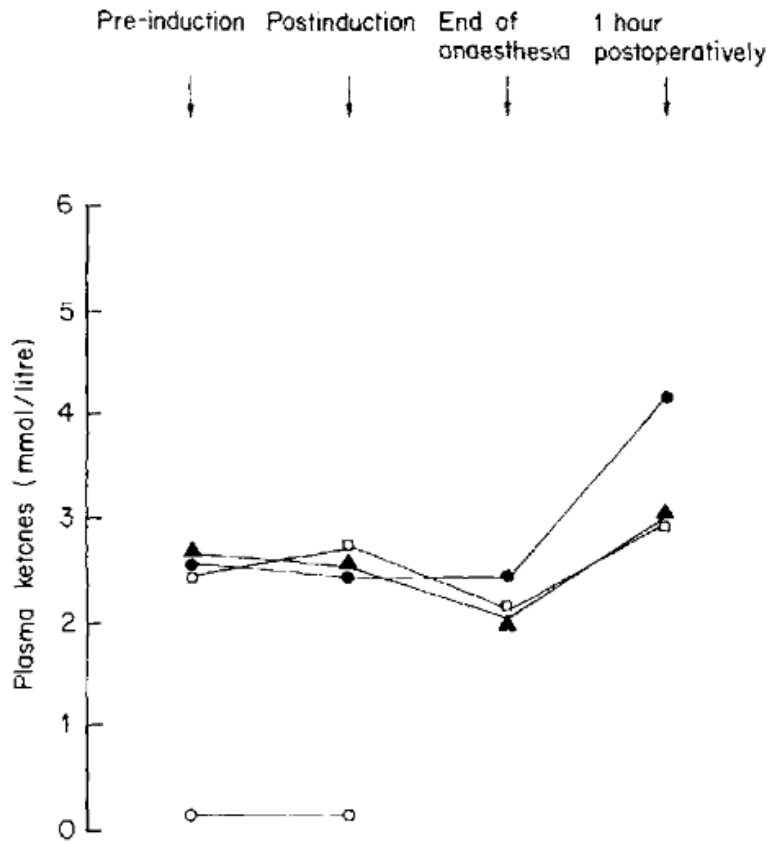


Fig. 1. ● Case 1; ▲ case 2; □ case 3; ○ case 4.

Table 2. Plasma total ketone bodies (mmol/litre), glucose (mmol/litre)

	Pre-induction		Post-induction		End of anaesthesia		1 h postoperative	
	Ketones	Glucose	Ketones	Glucose	Ketones	Glucose	Ketones	Glucose
Case 1	2.55	4.1	2.46	3.99	2.44	6.24	4.14	7.17
Case 2	2.48	4.98	2.72	4.37	2.15	5.06	2.98	4.08
Case 3	2.68	4.86	2.52	4.68	2.06	4.54	3.01	4.30
Case 4 (control)	0.14	5.28	0.16	5.77				

Table 3. Perioperative blood gases (kPa)

	PO_2	PCO_2	pH
Case 1	26.9	6.9	7.28
Case 2	21.7	5.3	7.35
Case 3	30.4	6.1	7.33
Case 4	19.2	5.2	7.37

Plasma Ketones

- Moderate level of ketosis
- Normal levels: < 0.6 mmol/L
- Keto diet levels: 0.6 – 1.5 mmol/L
- Acceptably high levels: 1.6 – 3.0 mmol/L
- High levels may cause
 - Nerve damage
 - Blood vessel damage
 - Organ damage

Medical Concerns with Keto diet: Results

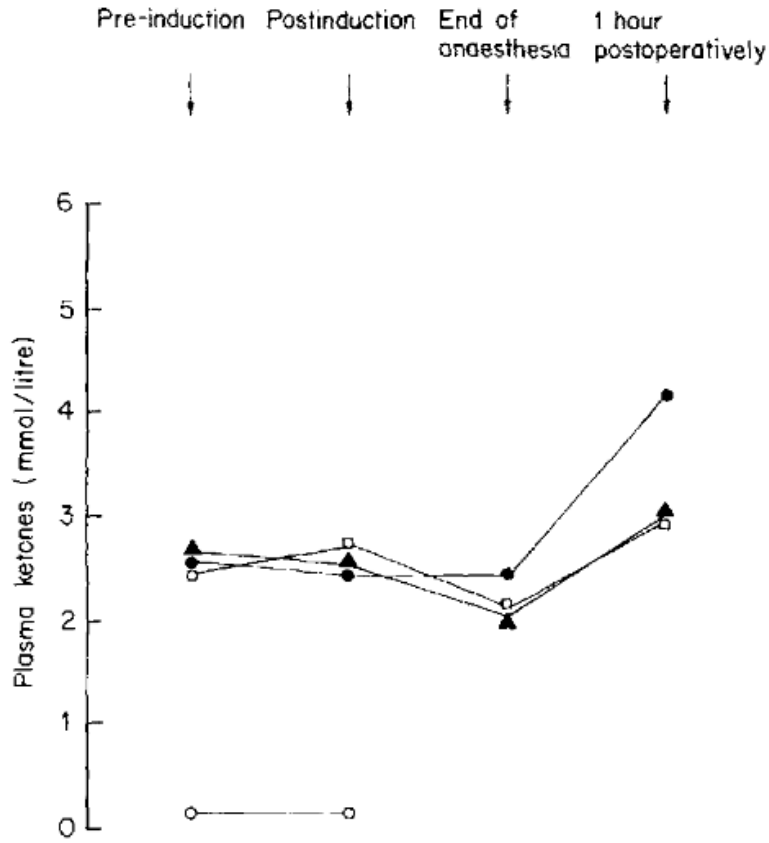


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Case 2	2.48	4.98	2.72	4.37 —	2.15	5.06 —	2.98	4.08 ↓
Case 3	2.68	4.86	2.52	4.68 —	2.06	4.54 —	3.01	4.30 —
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Case 4	19.2	5.2	7.37

Glucose

- Sugar in bloodstream that provides energy
- Normal levels: 3.9 – 6.1 mmol/L
- High levels may cause
 - Nerve damage
 - Blood vessel damage
 - Organ damage

Case 1 Glucose rise

- Due to stress of tonsillectomy or hypercarbia

Medical Concerns with Keto diet: Results

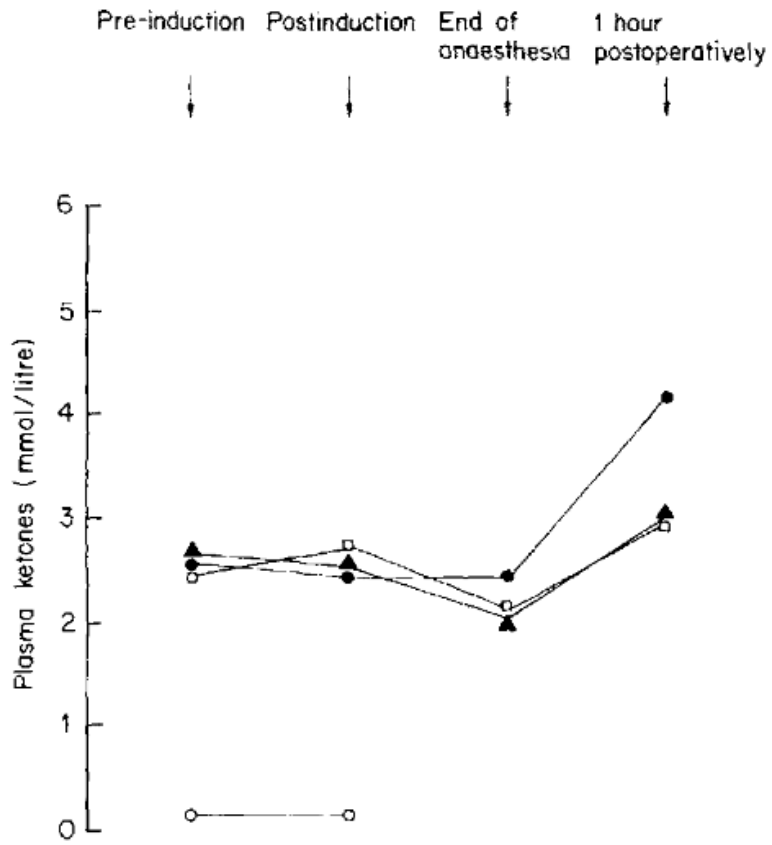


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Case 2	2.48	4.98	2.72	4.37 —	2.15	5.06 —	2.98	4.08 ↓
Case 3	2.68	4.86	2.52	4.68 —	2.06	4.54 —	3.01	4.30 —
Case 4 (control)	0.14	5.28	0.16	5.77				

Table 3. Perioperative blood gases (kPa)

	PO ₂	PCO ₂	pH
Case 1	26.9	6.9	7.28
Case 2	21.7	5.3	7.35
Case 3	30.4	6.1	7.33
Case 4	19.2	5.2	7.37

Perioperative blood gases

- O₂ Normal levels: 10.5 – 13.5 kPa
- CO₂ Normal Levels: 5.1 – 5.6 kPa
- pH Normal Levels: 7.35 -7.45
- All children acidotic
- Case 1 hypercarbic (CO₂ retention)

Medical Concerns with Keto diet: Conclusions

- Ketosis during anesthesia in epileptic/non epileptic children aids in prevention of operative and postoperative seizures
- Study is old and has small sample size



Keto Diet Conclusions



Short and Long term effects of keto diet

- No observable negative long term effects of keto diet

Comparison of keto diet to low calories diet

- Keto diet more effective in weight loss
- Keto diet safe fore type 2 diabetics

Is keto diet cause for medical concern

- Additional medical attention is required
- Not necessarily bad to be on diet while undergoing procedures

Extra slides

Keto short and long term effects: conclusions

- Ketogenic diet acted as a natural therapy for weight reduction in obese patients
- No side effects of prolonged diet

Keto short and long term effects in fit patients: study design

Objective

- Characterize effects of a 12-week keto diet on participants you trained in CrossFit

Approach

- Participants: 12
 - Keto Dieters: 7
 - Continued normal diet: 5
- Measure
 - Body composition
 - Metabolism
 - Fitness performance

Keto Diet

- Given guidelines and handouts
- Asked to keep food logs

Table 1. Baseline characteristics between groups.

Variable	KD (<i>n</i> = 7)	CTL (<i>n</i> = 5)	<i>p</i> -Value
Males/Females (<i>n</i>)	5/2	4/1	-
Age (years)	32 ± 3	29 ± 3	0.592
Height (m)	1.71 ± 0.08	1.70 ± 0.03	0.954
Body mass (kg)	82.7 ± 8.2	76.9 ± 5.5	0.601
DXA body fat (%)	24.6 ± 2.2	20.6 ± 4.7	0.420
Strength: mass	1.35 ± 0.13	1.42 ± 0.18	0.736

Notes: Data are presented as means ± SE values. Strength: mass ratio was determined by dividing the one repetition maximum back squat (kg) by baseline body mass (kg). Abbreviations: KD, ketogenic diet group; CTL, control diet group; *n*, number of participants; *m*, meters; *kg*, kilograms.

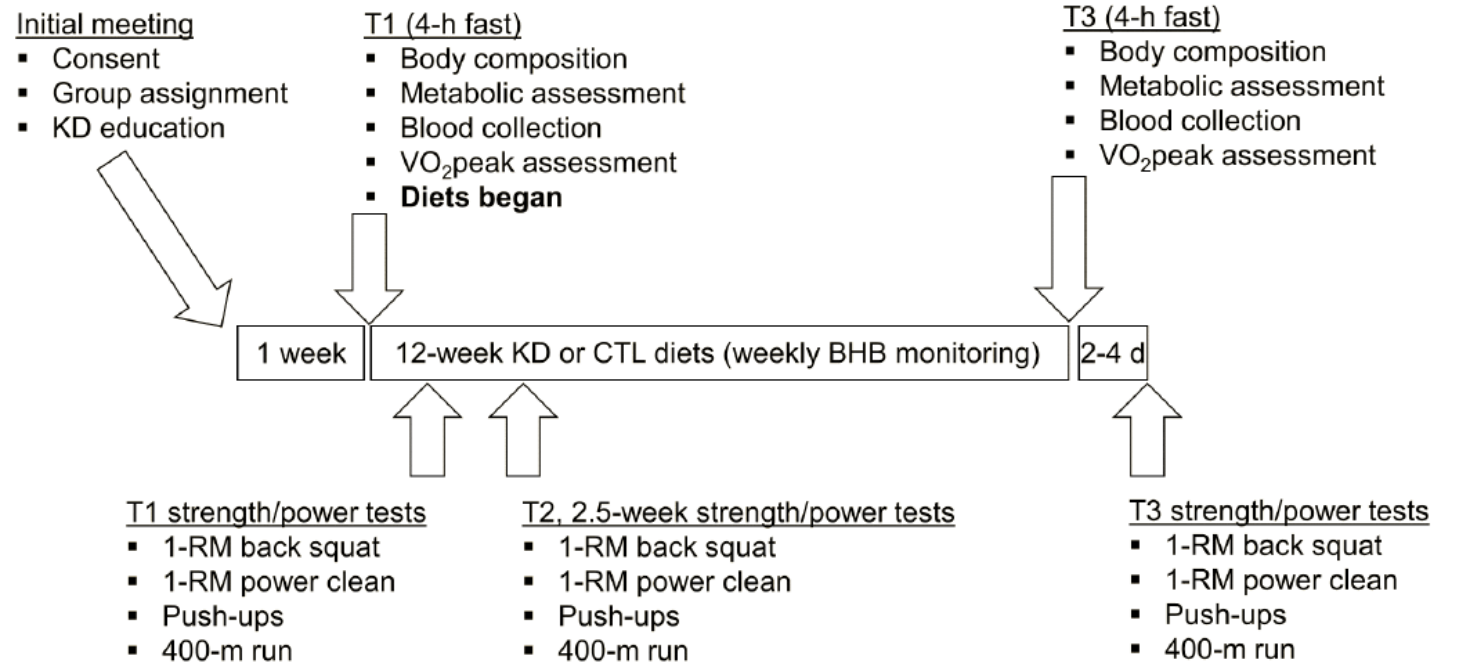


Figure 1. Study design. This figure depicts the 12-week dietary intervention. Notably, all participants continued their normal workout routine at the local CrossFit training facility during the study. Abbreviations: KD, ketogenic diet; CTL, control diet; 1-RM, one repetition maximum.

Keto short and long term effects in fit patients: results

