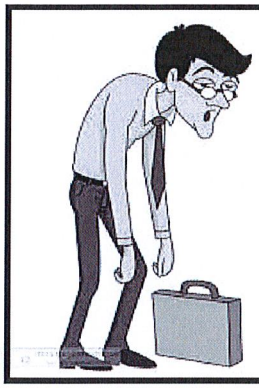
How to successfully take Carnitine to increase energy and endurance



How is your get-up-and-go?

Are you accused of being lazy? A wet blanket!

Fatigue is the most common complaint for post polio.

Running out of energy is what stops us and pulls us down - lack of endurance.

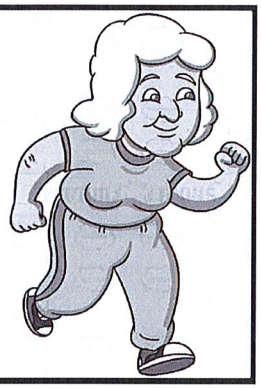
Would you like to feel like this?

Full of energy again.

Able to do things!

Carnitine can give you back your energy.

Feel the difference when you get the levels right.



3 Options to taking Carnitine (as discovered by our study)

All of the options resulted in the polio person gaining more energy and endurance.

Option 1. (most people)
Take once a day, carnitine capsules or powder by scoopful in a little water, before breakfast or soon after getting out of bed. (use ¼ teasp if no scoop)

Option 2. (if tired later in day)
Take twice a day. Take main dose as above then another 1-2 scoops after lunch, around 2pm-4pm.

Option 3. (if other 2 don't work)
Put dose into a 500ml bottle of water or juice and **drink a few mouthfuls periodically** over the morning or day as you feel you need more energy. Useful if early full dose gives diarrhoea but you are still tired and need extra carnitine for energy.

Make Carnitine work for you!

We need to reach a certain level of carnitine in the blood that **makes us feel "alive",** back to normal. For polio people this may need to be higher than for others because the muscles we have left are working harder just to do normal things.

So that first morning dose needs to get us up to that point. **Protein foods for lunch and tea,** particularly **red meats or avocado**, help to raise those levels again as the activities of the day deplete and use, available carnitine in our blood.

It is sensible to **take a bit more carnitine** immediately **before an activity** that we know will make us tired; like shopping, going out, pool or gym exercising (or walking), playing golf etc.

A bit more enables **occasional nights-out** or to deal with an emergency. But don't overdo it.

TO FIND OPTIMAL CARNITINE DOSE (trial-and-error method)

1. Start with 500mg (1 flat 1ml scoop) in an inch or so of water before breakfast ie when you first get up.

2. Increase dose by 500mg every 2-3 days so that you realise when your bowels are getting a bit loose, before you get diarrhoea.

3. Then go back by the last increase that makes you loose, to get your optimal dose. ie feel good but not loose. You may need half scoops to get it right.

4. Any diarrhoea from carnitine overload is usually gone by afternoon, whereas if from magnesium or Vit C will be on and off all day.

5. If still tired, try a bit more after lunch to top-up.

6. Most polios need between 2 to 6 scoops/day to feel more energised. May need more. Can work in 20 minutes when you are up to your optimal dose.

QUALITY of CARNITINE

There is a lot more carnitine available in shops and on-line these days but the cheaper versions and taking acetyl-carnitine, are not going to give the best results for our muscles. Fine for healthy sportsmen, but we are taking it for medical purposes.

The carnitine available from Poliowa, sourced for us at Mt Evelyn Compounding Pharmacy in Victoria, is **pure L-carnitine** that has had an extra grinding under vacuum process they do to improve the quality so that it works better and so we don't need to take as much.

Carnitine 50G powder	**$62**
Carnitine 100G powder	**$110**
Carnitine 200G powder	**$200**
Carnitine 250mg capsules (100)	**$65**

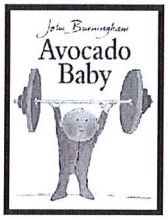
by Tessa Jupp RN OAM Polio Clinic West Australia

Carnitine and diet for Polios

by Tessa Jupp RN

What is carnitine? - It is part of the proteins of our foods. Protein is made up of amino acids and carnitine is one of them. The role of carnitine is to transport the long-chain fatty acids in our foods, across the inside of our body cells, the mitochondria, to produce energy, thru the Krebs cycle, for our muscles (and brain) to work.

Some parent must have known how important this is for muscles because there is actually a children's book written about a **"weak, floppy" baby who got strong, after being fed avocado!** In fact there is a condition called **"floppy baby syndrome"** and the **treatment is to give carnitine**.



Carnitine is so safe to take that it has been added to soy baby formula since 1985 because it is absent in soya and babies allergic to milk, using soya milk became floppy. Carnitine occurs naturally in breastmilk and other milks as well as many other protein foods in varying quantities.

Carnitine Content in Foods Chart (mg/100g)

kangaroo	**170**		**chicken**	**8.0**
lamb	**160**		**milk, cottage cheese**	**4.0**
roast beef	**140**		**yoghurt**	**4.0**
veal steak	**105**		**fish**	**3.7**
avocado	**100**		**ice-cream, cream**	**3.5**
mince beef	**50**		**mushroom**	**2.6**
sausages	**39**		**butter**	**1.1**
corned beef	**32**		**eggs**	**0.8**
pork	**24**		**nuts**	**0.5**
rabbit	**24**		**bread, rice, corn**	**0.4**
ham	**12**		**potato**	**0.2**

ref: Carnipure website

There are other sites with slight variations on these figures. A 2013 Polish study gives **kangaroo** as **637mg,** which I would believe, because kangaroo **is a much richer meat** and I find I don't need to eat as much of it to feel satisfied.

Another factor that needs to be taken into consideration is **how the food is cooked.** Roast beef gives more carnitine than veal steak (younger meat has less also) and mince exposes more surfaces to leach carnitine so use the fluid it is cooked in. **Boiling in water** would also leach some of the carnitine protein out into the water. Fine if the water is part of the meal, as in stews and casseroles or soups but not if thrown away. The same for the water we boil our vegetables in. It is full of liquified minerals, so is good to drink or for soup, gravy, sauces. Processing affects corned beef or ham content.

The **plates of food** opposite represent a visual interpretation I have done, on graphs from other research on the **amount of protein, fats** and carbohydrates needed per meal depending on the **blood group.** We do this instinctively as well if we disregard the health data we are loaded with these days. However polio people will need a bit more meat to get needed extra carnitine.

If you look at the food chart again, you will see that the second column does not give us much carnitine in our diet. **Chicken, fish, milk and dairy products are poor carnitine sources,** and **plant foods are pretty negligible.** Avocado is the only exception.

A naturally fatty food, **avocado is a known good source of carnitine** yet does not generally score well on charts. Carnipure only gives it 0.4mg but our experience rates it much higher, so I am rating it at 100mg. We have had polio members able to replace their carnitine dose with a couple of avocados a day when their avocado tree was in season, and then take carnitine supplement for the rest of the year.

Our bodies can make 25% of our carnitine needs. The other 75% we should be getting from our diet.

For polios needing anywhere from 500mg - 3,000mg daily, we would **need to eat half a kilo of steak to get 500g of carnitine or 6 kg of steak to get 3,000mg.** Clearly impossible! We do absorb more from foods than supplements but it is still too much to eat for anyone!

But even if we are taking supplemental carnitine we still need the fatty acids in protein foods for the carnitine to transport into the cell - so we still need to eat protein foods. What we eat during the day helps to boost our muscle reserves and we lose it overnight while we sleep. So we **need carnitine when we get up,** maybe a top-up after lunch, and **we need some protein for every meal.**

Meal Suggestions

Breakfast: eggs, bacon, rissoles, fish patties, lamb's fry. If must have cereal, have porridge with egg whipped in.

Lunch: meat, chicken or fish with salad, soups with meaty chunks, home-made hamburger or steak sandwich & salads.

Dinner: small plate of soup, any variety or entrée. Meat, chicken or fish with cooked veg (white, red/orange/yellow & green). **Red meat at least 4-5 times a week!** Pudding eg custard, rice, sago with added egg whipped in.

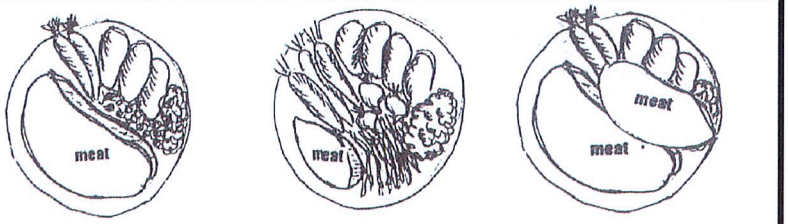


Plate for O Blood Group 49% Australian population

Plate for 'A1' Blood Group 31% Australian population

Plate for 'A2' Blood Group 7% Australian population

Meat proportions for plates - by blood groups

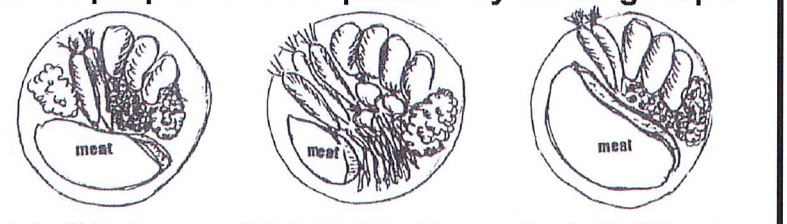


Plate for 'B' blood group 9% Australian population

Plate for 'A1 B' blood Group 3.8% Australian population

Plate for 'A2 B' Blood Group 0.2% Australian population

20-Year carnitine blood tests review by Tessa Jupp RN

I thought, why should our WA polios miss out on the Sydney Conference, so here are some of the keypoints from my comprehensive presentation — for everyone.

My talk is about Carnitine blood levels that we have been doing here in WA since 1996. What these blood tests reveal is that generally, although they may be within the accepted range for "normal" people, we have found that **"polio people" need higher levels.** And how do we know? **The outcome is that when these levels are higher, the fatigue is less and endurance is greater.**

When I first heard a tape by Dr Richard Kunin from a 1994 Canadian Conference I was struck with the similarity of carnitine deficiency symptoms and those for post polio. Look at the chart opposite and see the similarities.

I asked 6 of our polios to try some carnitine I found and 5 improved. In 1996 we did a small (21 polios) double-blind trial which included blood levels. From there we decided to continue blood levels as part of our clinical assessment of carnitine-for-fatigue for our polio clinic.

The main message is - **GO BY HOW YOU FEEL!** Your body tells you. If you are thinking "What is wrong? I am so tired." and other causes have been ruled out, then your carnitine blood level, whatever it is, may be too low for you. If you feel better at a higher level, then that is where you need to be. Take too much - you get diarrhoea. Try it!

EAT MORE RED MEAT - and take carnitine!

I found there were common ways polio people displayed lack of having enough carnitine. **See the body postures below** - standing with stooped, rounded shoulders; not able to stay sitting up straight; hands on hips because "your back is killing you"; running out of energy feelings.

Post Polio Symptoms	Carnitine Deficiency
Fatigue	Fatigue
Muscle weakness	Muscle weakness
Muscle/joint pain	Muscle pain
Lack of endurance	Exercise intolerance
(and for some)	(and for some)
Swallowing problems	Gastric Reflux
Breathing problems	Shortness of breath
Sleeping problems	Poor muscle tone
Cold intolerance	Poor posture
Increased CK (measures muscle wastage)	Increased CK (measures muscle wastage)

Our survey shows there is no predictor of the dose needed. We are all individual. Some manage with less carnitine supplement. Others need a lot. The dose we each need varies, as do the blood levels. Do more, you need more!

Carnitine Insufficiency Indicators

We suspect the following physical characteristics may be indicators of insufficient carnitine availability.

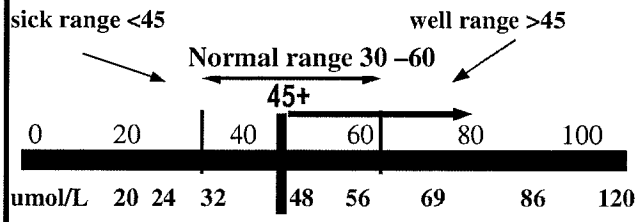
* **Stooped/rounded shoulders**
* **Inability to hold self erect**
* **Slumped posture**

* **Postural back muscle ache**

* **"hitting the wall" feeling**
* **"flag out" after lunch - catnaps**
* **Restoration of energy after rest or short sleep**
* **"heavy feeling" in muscles**
* **Effort to lift arms and/or legs**

Serum Carnitine Levels

Reading blood levels

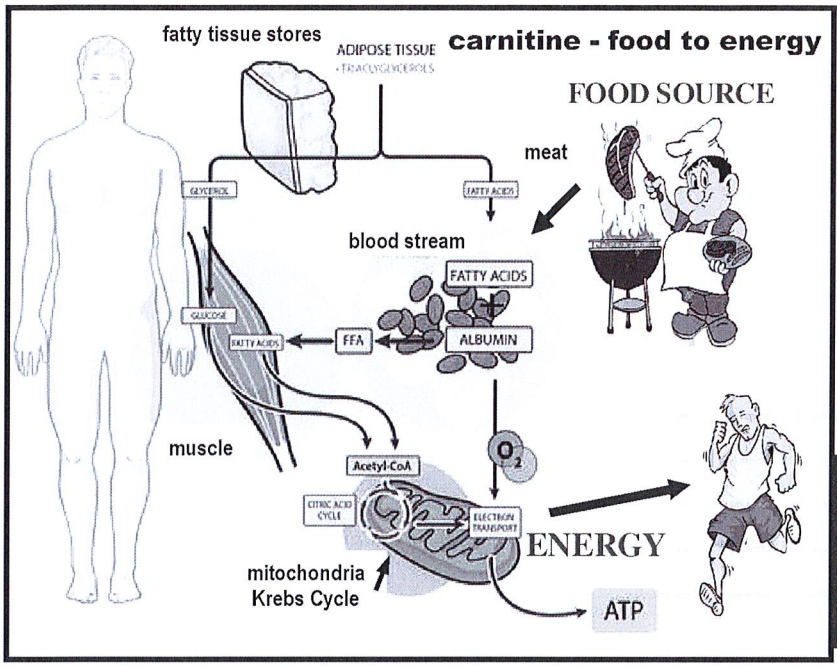


Anne - 20 up to 32 so still needs more carnitine to >45
Phil - 24 up to 69 then back to 58 - so needs more now
Jenny - 48 up to 56 - then needing more again now
Margaret - 57 up to 86, back to 57 when stopped taking
Hugh - 36 up to 50 before - now up to 120 & feels great

The case studies on the people above are on pages 8 & 9. **They have all given permission to use their names** and tell their stories. We all need levels **above 45– 50umol/L** or more. I don't manage below 60 and feel great around 76. Others may get diarrhoea at that level, or may need to spread the dose out thru the day, rather than take it all in one hit in the morning, as I can. We need to work out the method of taking extra carnitine to get the results we need for our polio muscles to work as well as possible.

The Path Lab gives us free carnitine and total carnitine readings. Total includes carnitine that has been used, free is what is still available to be used. So the difference between the 2 levels is the acyl or used amount. If we divide the acyl by the total as a percentage, we see how much we are using out of what we had. Good usage is **around 25%.** If the percentage is too high ie getting up towards 50%, we could run very low within a day or so and that wouldn't be good. Low - we are not using much, so energy will be low or is a problem getting it through.

Our study includes records of **1600 carnitine tests** done thru' our Polio Clinic over the last 20 years at the Princess Margaret Children's Hospital in Perth. More than 1000 of the tests are on polio survivors. The others are on children of polios who are fatigued or others with Chronic Fatigue, cancer or other diseases who have sought our help. Our records include **570 polio survivors**, each with varying numbers of carnitine tests. Most respond to carnitine.

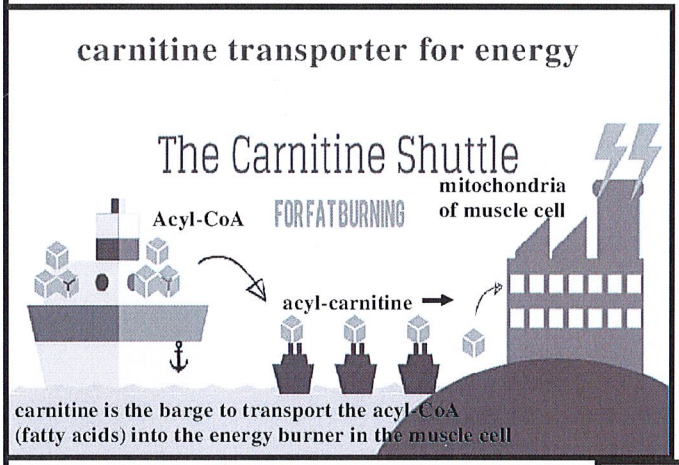


dominance of Type 1 muscles, but that they don't work as well as usual Type 1 muscles and are larger. So the bottom picture in the diagram below shows what happens to a Type 2 muscle when you change the nerve supplying the muscle, to a Type 1 nerve. This changes the fuel needed for the muscle, to the fatty acid-carnitine cycle. Coupled with the loss of carnitine storage space due to loss of muscle as a result of polio, this means that **polio survivors will need more carnitine to be readily available.** ie **a need for higher blood levels of carnitine.**

So more polio muscles run on carnitine fuels but there is less storage tanks left. Thus we need more ships and barges to keep the fires burning to produce energy.

So we either are not getting enough carnitine and/or fatty acids (in protein foods) via the foods we are eating, to produce energy, or there is a problem with the carnitine shuttle through the mitochondria of the muscle cell.

Taking more carnitine seems to enable more to get thru.



CARNITINE BLOOD LEVELS

Our WA research has shown that the carnitine levels of our polios are dropping steadily with time as polios age. We have records over twenty years for some of our polios that record this. An Italian study published in 2007 also shows that **carnitine levels drop generally as we age** and recommends supplemental **carnitine for the elderly**. We can show also that polio people are managing their fatigue, energy levels, endurance and muscle pain, much better when their blood levels of carnitine are above 45 and **many need to have levels of 60 - 80 to manage**.

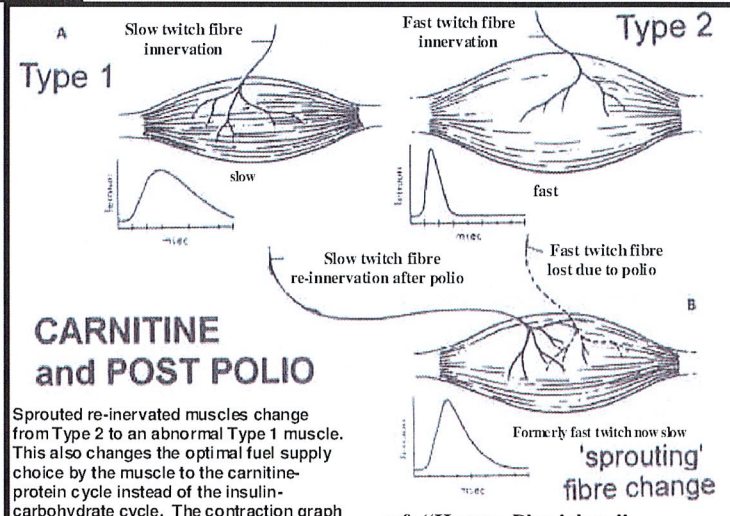
Our WA polio people regularly taking carnitine, are also reporting a slowing of the rate of increasing muscle weakness and improvement in muscle strength and endurance, when taking adequate carnitine supplement.

So **the interpretation of blood levels helps** me **to advise** people on need to change their dose or how they are taking carnitine. But **if people listen to their bodies,** use trial-and-error and bowel tolerance, and successful outcomes, **they can manage their own improvement on carnitine.**

This diagram above is the easy version to explain that fatty acids (Acyl-CoA) are split by carnitine enzymes to join the acyl to the carntitine to transport thru the cell membrane then unload and join back with the CoA to burn for energy in the power house ie **Krebs Cycle,** to produce ATP.

Fatty acids give us 129 ATP (energy units) with carnitine which is needed **for Type 1 muscles** for endurance. **Glucose** from plant foods using insulin only **gives us 36 ATP** - the Type 2 muscle fuel.

The graphs in the diagram opposite shows the changes to the energy available, when the nerve supplying the muscle is changed, which happens with the nerve "sprouting" to reconnect orphaned muscles to enable recovery after polio. Muscle biopsy work done on polios by **Prof Kristian Borg MD PhD from Sweden** suggests a



Sprouted re-inervated muscles change from Type 2 to an abnormal Type 1 muscle. This also changes the optimal fuel supply choice by the muscle to the carnitine-protein cycle instead of the insulin-carbohydrate cycle. The contraction graph is now better than a Type 2 muscle but not quite as good as a Type 1 muscle.

ref: "Human Physiology" Moffet D, St Louis USA 1993 p311