

Correction of carnitine deficiency in children with recent onset Type 1 diabetes (T1D)

Anne-Laure Castell¹, Cécile Bibal¹, Gianpaolo De Filippo¹, Pierre Bougneres¹

¹: Service d'Endocrinologie Pédiatrique, Hôpitaux Universitaires Paris Sud, Hôpital Bicêtre, France

Background

Carnitine deficiency (CD) has been reported in children at time of T1D diagnosis. By impairing free fatty acid β -oxidation in liver, skeletal muscle, heart, and pancreatic β cells, CD might impair glucose homeostasis in various tissues including β cells thus residual insulin secretion.

Objectives

Evaluate the effects of L-carnitine supplementation during the 1st year following T1D diagnosis. We postulated that improving fatty acid oxidation through L-carnitine supplementation may improve insulin sensitivity and β cells function possibly leading to an increase of remission frequency or magnitude.

Patients and Methods

21 children chosen at random at diagnosis of T1D (age 4-16 years), with positive autoantibodies) received carnitine supplementation (« C+ ») with 100 mg/kg L-carnitine per day. They were compared to 20 untreated children (« C- »). Patients with ketoacidosis at diagnosis were excluded. Compliance was checked by the elevation of plasma carnitine.

Results

1. At diagnosis (within 2 weeks after diagnosis):

C+ and C- groups were comparable for HbA1c, C peptide, pH, age, plasma carnitine, insulin doses.

CD was confirmed with a mean plasma total carnitine at 31.8 μ mol/L (normal: 43-65).

2. At 12 months:

HbA1c was 7,1% in C+ and 7,6% in C- (NS) with insulin doses 0,9 U.K.d and 0,8 U.K.d respectively (NS). C peptide was 0,1-1,1 μ g/L in C+ and 0,1-0,8 μ g/L in C- (NS).

Gained weight was 20% of initial body weight in the two groups (table).

L-carnitine	C+ n=21 F/M: 10/11	C- n=20 F/M: 13/7
<i>At diagnosis:</i>		
Age (y)	10.9	10.3
Weight (kg)	37.5	35
HbA1c (%)	11.5	12.6
pH	7.3	7.3
insulin dose (U/K/d)	1.2	1.1
Fasting C peptide (μ g/L)	0.3	0.3
Total carnitine (μ mol/L)	33 (18.8-47.3)	30 (18-41,2)
<i>At 6 months:</i>		
Weight (kg)	43	35
HbA1c (%)	7	6.7
insulin doses (U/K/d)	0.8	0.6
Fasting C peptide (μ g/L)	0.8	0.7
Total carnitine (μ mol/L)	52 (34,7-62,9)	40 (31,9-49,7)
<i>At 12 months:</i>		
Weight (kg)	45	42,2
HbA1c (%)	7.1	7.6
insulin doses (U/K/)	0.9	0.8
C peptide (μ g/L): fast/fed	0.42 / 1.11	0.6 / 1.4
Total carnitine (μ mol/L)	42 (26,4-54,2)	37 (32,9-45,7)

Results expressed in mean value

Conclusions

CD at T1D diagnosis is confirmed. CD supplementation at the given doses hardly brought plasma carnitine up to the normal mean, leaving 1/4 of children in the low carnitine range. The current protocol of supplementation did not change HbA1c, insulin doses or residual β cell function within the first year of clinical T1D.

Contacts: anne-laure.castell@aphp.fr

Disclosure statement

none of the authors have conflict of interest to declare.

