



## RACP Foundation Research Awards

### FINAL REPORT

<b>Project / Program Title</b>	The potential of carnosine supplementation to reduce cardiometabolic risk: a double-blind randomised controlled trial	
<b>Name</b>	A/Prof Barbora de Courten,	
<b>Award Received</b>	2017 RACP/Foundation for High Blood Pressure Research Establishment Fellowship	
<b>Report Date</b>	30 January 2018	
<b>Chief Investigator / Supervisor</b>	Barbora de Courten Helena Teede	
<b>Administering Institution</b>	Monash University	
<b>Funding Period</b>	Start Date:	1 January 2017
	Finish Date:	31 December 2017

#### PROJECT SUMMARY

Carnosine, a naturally occurring substance in our tissues, is available as a safe over-the-counter food supplement. Carnosine was shown to prevent type 2 diabetes and cardiovascular disease in animal studies. Our project tested carnosine's effectiveness in reducing risk factors for diabetes and cardiovascular disease in humans. This has important clinical and public health implications, for safe and affordable prevention of diabetes and cardiovascular disease by already available means.

#### PROJECT AIMS / OBJECTIVES

To establish whether carnosine supplementation given for 14 weeks to healthy overweight and obese individuals on a high AGE diet will:

- 1) improve insulin sensitivity and insulin secretory function
- 2) decrease blood pressure and improve lipid profile
- 3) decrease plasma inflammatory markers

#### SIGNIFICANCE AND OUTCOMES

Type 2 diabetes (DM2) is a national and global health priority area. With increasing obesity and sedentary lifestyle, the prevalence of DM2 is increasing. Importantly, DM2 is a major risk factor for cardiovascular morbidity and mortality. This results in a substantial health and financial burden

across the healthcare system. Primary prevention of DM2 has focused on weight loss and physical activity: effective but costly, with low uptake and sustainability. Additional strategies are urgently needed: low-cost and safe approaches that are easy to implement at a population level and work synergistically with exercise.

Carnosine ( $\beta$ -alanyl-L-histidine) is a naturally occurring dipeptide, abundant in mammalian muscle and brain tissues. Already available as an over-the-counter food supplement, carnosine has been safely and successfully used in sport to increase exercise capacity. Carnosine supplementation has been shown to prevent DM2, cardiovascular risk factors, and cardiovascular disease (CVD) in rodents, by reducing chronic low-grade inflammation (CLI), oxidative stress and the formation of advanced glycation endproducts (AGEs). CLI, oxidative stress and AGEs are associated with obesity and appear to increase the risk of DM2 and CVD. Our team's novel human data provided first evidence that carnosine supplementation reduces the risk for DM2 and CVD. This research has important clinical and public health implications for the prevention of DM2 and CVD – through safe, readily available, and low cost carnosine supplementation.

## **PUBLICATIONS / PRESENTATIONS**

### **Publications:**

1. Baye E, Ukropec J, de Courten MPJ, Mousa A, Johnson J, Aldini G, Ukropcova B, de Courten B: Effect of carnosine supplementation on serum adipokines in overweight or obese otherwise healthy adults, *Amino Acids*, in press.
2. Baye E, Ukropec J, de Courten MPJ, Aldini G, Ukropcova B, de Courten B: Carnosine supplementation reduces plasma soluble transferrin receptor in healthy overweight or obese individuals: a pilot randomised trial, *Amino Acids*, in press.
3. Baye E, Ukropec J, de Courten M, Aldini G, Derave W, Ukropcova B, de Courten B: Effect of carnosine supplementation on the plasma lipidome in overweight and obese non-diabetic adults: a pilot randomised controlled trial, *Scientific reports*, 7(1):17458.
4. Menon K, Mousa A, Baye E, de Courten B: Efficacy of carnosine supplementation in the prevention and treatment of chronic diseases: protocol for a systematic review, *BMJ open*, in press.

### **Oral presentations:**

1. Estifanos Baye, Jozef Ukropec, Maximilian PJ de Courten, Barbara Ukropcova, Barbora de Courten. Carnosine supplementation maintains levels of trihexosylceramide and phosphatidylserine lipid classes in non-diabetic overweight and obese adults. *International Congress on Carnosine and Anserine*, Louisville, Kentucky, USA, 2017.
2. de Courten B, Baye E, Ukropec J, Aldini G, Wilson K, Plebanski M, Ukropcova B: Effect of carnosine supplementation on serum adipokine levels in overweight and obese adults: a pilot randomised controlled trial, *Carnosine and Anserine conference*, Louisville, Kentucky, 2017.

### **Poster presentations:**

1. Estifanos Baye, Jozef Ukropec, Maximilian PJ de Courten, Barbara Ukropcova, Barbora de Courten. Effect of carnosine supplementation on the plasma lipidome in overweight and obese adults. *American Diabetes Association Annual Conference*, San Diego, California, USA, 2017.
2. Barbora de Courten, Jozef Ukropec, Maximilian PJ de Courten, Barbara Ukropcova. Effect of carnosine supplementation on plasma inflammation markers in overweight and obese adults. *American Diabetes Association Annual Conference*, International Diabetes Federation

Conference, International Congress on Carnosine and Anserine, Louisville, Kentucky, USA, 2017.

3. Baye E, Ukropec J, de Courten MPJ, Ukropcova B, de Courten B: Effects of carnosine supplementation on the human plasma lipidome in overweight or obese adults, Australian Diabetes Society, Perth, Australia, 2017.
4. de Courten B, Baye E, Ukropec J, de Courten MPJ, Aldini G, Wilson K, Plebanski M, Ukropcova B: Effect of carnosine supplementation on serum adipokine levels in overweight and obese adults: a pilot randomised controlled trial. International Diabetes Federation Congress meeting, Abu Dhabi, 2017.