

# GOCARB NEWSLETTER

# GoCARB

TYPE 1 DIABETES SELF-MANAGEMENT AND CARBOHYDRATE COUNTING:  
A COMPUTER VISION BASED APPROACH

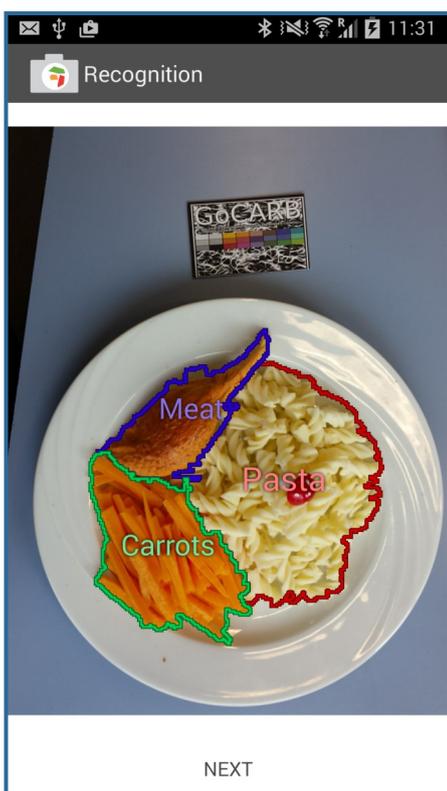
5.8 mmol/L  
MEAL TIME  
CARBS  
HEALTH  
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## ISSUE 3

MARCH 2015

## GOCARB: THE NEXT CHAPTER



*The screenshot above shows the latest development of the GoCARB user interface. With this interface the user can override (if necessary) the automatically generated food groups or quantities for full control of their results.*

GoCARB is a Marie Curie Industry-Academia Partnerships and Pathways project funded by the European Commission's 7th Framework Programme. The aim of GoCARB is, through a series of inter-sectorial staff secondments, to develop a mobile phone application which will estimate the carbohydrate content of a meal in near real time. This information can be used to optimize the insulin intake of individuals with type 1 diabetes.

This last year has seen the GoCARB team bring world-wide attention to their work and results. Since Newsletter number 2 (September 2014) the team members have attended numerous events, both academic and otherwise, to spread the word on GoCARB, in this issue you can see the variety of events attended.

One particular highlight was the team's presence at the university of Bern's *Nacht der Forschung* (Researchers Night) in September

2014. Most of our time is spent working with other academics so it was a welcome break to devise some light-hearted activities for the general public to interact with.

Given the importance of this final project year we have decided to publish a total of three separate GoCARB Newsletters in 2015. Please look out for Issue No. 4 around June 2015. Finally, Newsletter No. 5 will mark the end of the project, but not of the GoCARB system for nutritional content estimation!

We do hope you enjoy this issue, and please do not forget to check on [www.gocarb.eu](http://www.gocarb.eu) for all the latest news.

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## NEWS FROM GOCARB

### 1 Researchers Night

On Saturday the 6<sup>th</sup> September 2014 GoCARB was presented to the public at the 2<sup>nd</sup> University of Bern Researchers Night. Members of the ARTORG Diabetes Technology Research Group, including the seconded researcher from ROCHE USA, joined many other members of the University to give the public an insight into their work. The GoCARB team took the opportunity to remind the attendees of the importance of carbohydrate counting, especially for diabetic patients, and demonstrated the GoCARB system. The GoCARB stall was kept busy with interested parties from opening at 16:00 until after 23:00!



During the event children were entertained with a simple carbohydrate counting game and adults were able to explore the GoCARB prototype on real plates of food, generating their own results by experimenting with the application, whilst the GoCARB video (see [Newsletter No. 2](#)) played in the background.

### 2 Open Doors Day

To celebrate the 20<sup>th</sup> anniversary of the Department of Clinical Research (DCR), University of Bern (<http://www.dkf.unibe.ch>), the DCR and the ARTORG Center for Biomedical Research (<http://www.artorg.unibe.ch>) opened their doors on 6<sup>th</sup> November 2014 to welcome the interested public and offer a glimpse into the various research activities of their institutes.

The GoCARB system was demonstrated to more than 100 people as part of these celebrations, along with the broader work undertaken by the Diabetes Technology Research Group.

### 3 Lectures, Seminars and Invited Talks

When	Where	Title and Presenter
11.10.2014	European Diabetes Technology Course October 10-11, 2014, Copenhagen, Denmark	<i>Carb Counting with CGM</i> Markus Laimer
21.10.2014	Bern University Hospital "Inselspital", Switzerland Training Cycle 2014/2015: Endocrinology - diabetology	<i>The GoCARB Project</i> Stavroula Mougiakakou
22.11.2014	Deutschschweizer Diabetikertag, Bern, Switzerland	<i>Trends in Diabetes Self-Management Tools</i> Christoph Stettler
07.12.2014	New Technologies for Diabetes Management: Educational Course Seminar organized by the Committee on Continuing Education of the Greek Paediatric Society and the 1st Department of Pediatrics, P. & A. Kyriakou Children's Hospital, Athens, Greece December 5-7, 2014, Nafplio,	<i>Smartphone Technologies and Carbohydrate Counting</i> Stavroula Mougiakakou
07.02.2015	Jahrestagung der Arbeitsgemeinschaft Diabetologie und Endokrinologie Mainz, Germany	<i>Einsatz von Smartphones und Computer Vision zur Kohlenhydratgehalbestimmung in Mahlzeiten</i> Stavroula Mougiakakou

## NEWS FROM GOCARB

### 4 Conferences

#### European Conference on Computer Vision 2014



#### European Conference on Computer Vision

The European Conference on Computer Vision took place in September 2014 in Zürich. There were big-name attendees from industry (such as Google, Microsoft, Toyota, Leica) and academia in the areas of computer vision and smartphone technologies.

The GoCARB team arrived fully prepared, bringing some delicious food to tempt delegates with, and highlight the advantages of using GoCARB to calculate the carbohydrate content of a meal. The GoCARB system was thus presented during one of the demonstration sessions.

#### European Congress on eCardiology & eHealth 2014

Held in Bern Switzerland on Friday 31st October 2014. The coordinator of GoCARB Dr. S. Mougiakakou, presented the scientific session entitled:



*Diabetes and eHealth: Self-management and Smartphone Technologies*

## Diabetes Technology Meeting 2014

Held in Bethesda, Maryland USA, the Diabetes Technology Meeting is North America's foremost conference in the area of diabetes technology. The results of the GoCARB validation in a laboratory setup were presented in a poster presentation entitled *A smartphone based Carbohydrate Estimation System using Computer Vision Methods: A Feasibility Study*.



## EASD Diabetes Technology 2015

EASD has organized the 2nd Diabetes Technology Meeting in Düsseldorf on 11-12 February 2015. Dr. Agianniotis presented the *in silico* results of using the GoCARB system within the framework of the artificial pancreas.

## Advanced Technologies & Treatments for Diabetes 2015



This year the GoCARB team attended in force the ATTD conference, which is the largest gathering of diabetes technology professionals in Europe.

Team members from the University of Bern and Roche Diagnostics travelled to Paris to spread the GoCARB word, present the results of the preclinical study (poster and oral presentations), and discuss developments in the field.

## 5 Annual Meeting

On October 29<sup>th</sup>, 2014 the GoCARB consortium met to review the progress of the project and to decide on the next steps. The main objectives of the 3rd Annual Meeting were:

- Review of the activities since the Mid-Term Review in August 2013.
- Discussion of shared responsibilities following the feedback received from the Project & Scientific Officers following last years Mid Term Review meeting.
- List of responsibilities and expected outcomes until the end of the project.

The consortium reiterated its desire for a smooth, on-time and on-budget end to the project.

### *BREAKING NEWS*

## MADiMa2015

1<sup>st</sup> International Workshop on Multimedia Assisted Dietary Management

In conjunction with the 18<sup>th</sup> International Conference on Image Analysis and Processing

Genova, Italy, September 8<sup>th</sup> 2015



The GoCARB consortium is pleased to announce that the organising committee of the International Conference on Image Analysis and Processing (ICIAP) has agreed to host the

### **1st International Workshop on Multimedia Assisted Dietary Management**

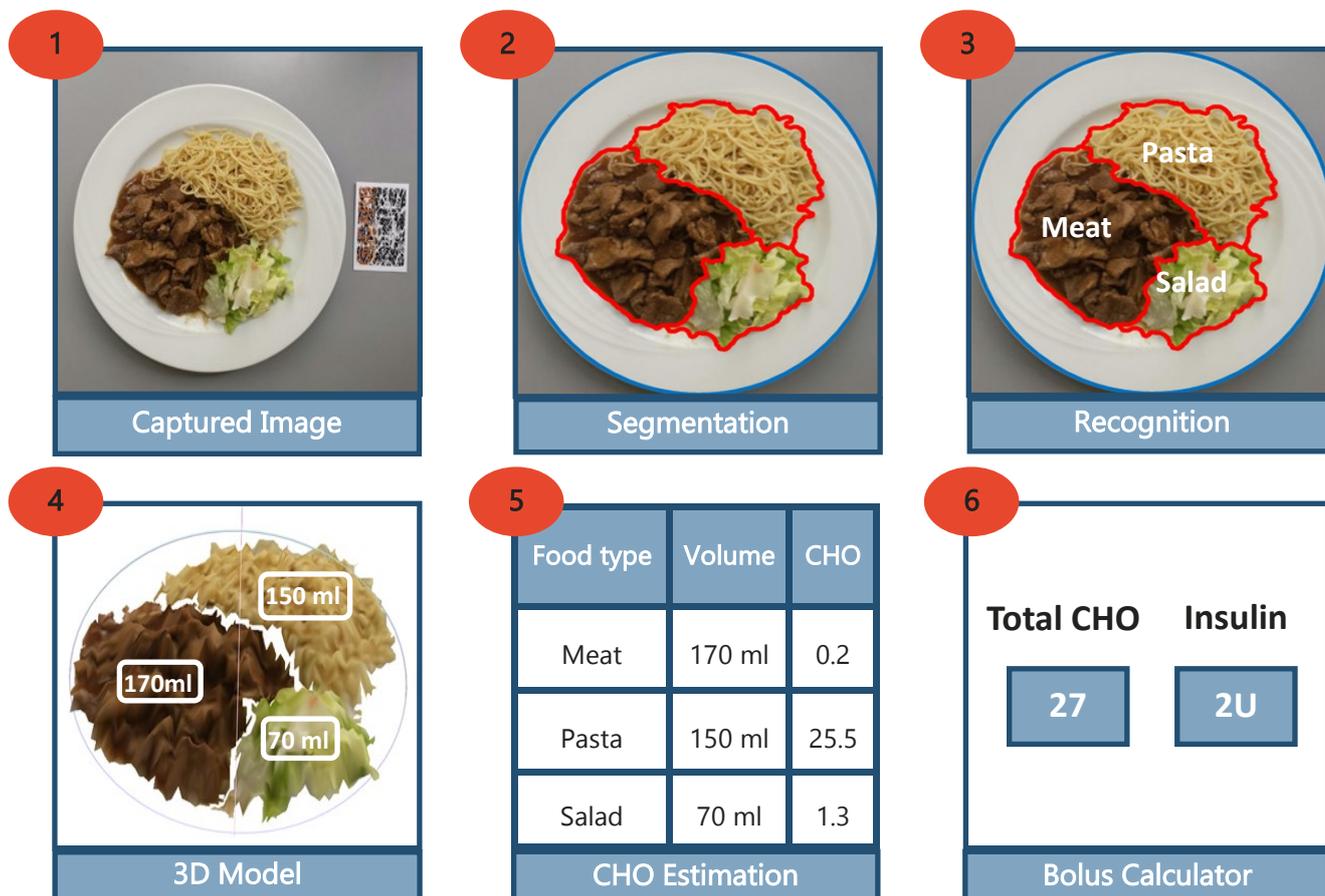
More information can be found on our workshop website ([www.madima.org](http://www.madima.org))

## HOW DOES GOCARB WORK?

The science behind GoCARB has been documented in several scientific, peer-reviewed papers but we thought it would be of interest to our readers to have a summary of how GoCARB calculates the carbohydrates on a plate of food.

### So, here is the 'quick and dirty' guide to GoCARB

The first step requires an Android smartphone with the GoCARB app, and a credit-card sized reference object placed next to the meal. Then, the user opens the GoCARB app and takes two pictures, the first directly above the plate and the second from an angle of approximately 30 degrees from the vertical. GoCARB uses the smartphone's own accelerometer to guide the user when to take the pictures. GoCARB now isolates the plate and using advance computer vision techniques, segments each different type of food found on the plate (*Segmentation*); having segmented each food type the system recognizes it using machine learning methods (*Recognition*). Users are able to override the segmentation and recognition stages if necessary. A corresponding 3D model of the food is generated using both images and the reference object (*3D Model*). The volume of the 3D model is then calculated by knowing the volume, the food type and by using the USDA food database. With this data the carbohydrates contained in the meal are estimated (*CHO Estimation*). This information, along with the patient's own related data, are used in order to calculate the needed amount of bolus insulin (*Bolus Calculator*).



## GOCARB CONSORTIUM LIST

24 SCIENTISTS, 9 NATIONALITIES, 3 PARTNERS, ONE PROJECT!

1

Diabetes Technology Research Group  
ARTORG Center for Biomedical Engineering Research  
University of Bern

Department of Endocrinology, Diabetes and Clinical Nutrition  
Bern University Hospital



<sup>b</sup>  
UNIVERSITÄT  
BERN

2

Roche Diagnostics GmbH, Mannheim, Germany

Roche Diagnostics Operations Inc, Indianapolis, USA



### UNIVERSITY OF BERN

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[ [www.gocarb.eu](http://www.gocarb.eu) ]

