



Third eye of the grower

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22 april 2015

- Phood Consultancy
- QFOOD GmbH

Before:

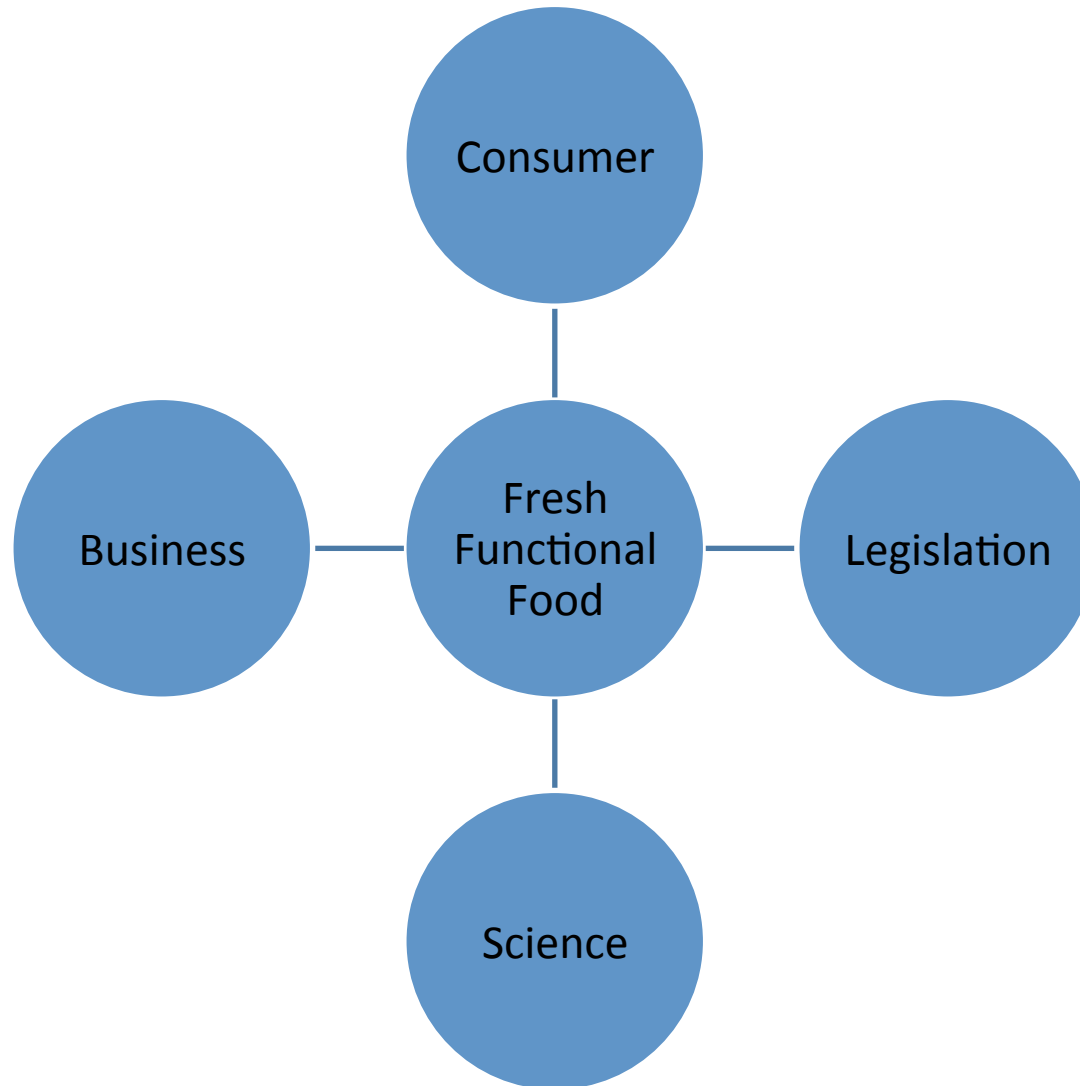
Heineken, SGS, Diversey

- Experience in Functional Food (legislation, testing and communication) quality assurance and certification in the food industry and retail



- Pathway for fresh functional food
- The third eye of the grower





- Since January 2007 new EU-legislation for food claims.
- Two kind of claims:
 - Food claims
 - Health claims
- Scope: Food, beverages and supplements
- Entire Europe
- 270 Claims recognized,=> only 2 on plants



- Much research on animals and in-vitro
- Less human intervention studies
- Epidemiological studies cannot provide evidence:
 - More fruit and vegetables
 - Less fat
 - More exercise
 - Less meat
 - Everybody is different



- Scientific fundament is incomplete for health claims.
- Return on invest in this stage is very low.
- Chain assurance is needed
- Communication towards consumer in 8 sec.
- Companies can't tell everything.



“A diet rich in fruit and vegetables lowers the risk of cancer.
Brocco fits in this diet”

€680,- fine

- Clear message
- Be careful with heavy claims
 - Use sports claims
 - Use cosmetic claims
- Don't punish by a bad taste
- Trust in Medical Doctors and relatives (influence of social media)



Ingredient

- Lycopene in tomato

Benefit

- Less sun burning

Meaning

- I look more attractive

Source:
Nestec

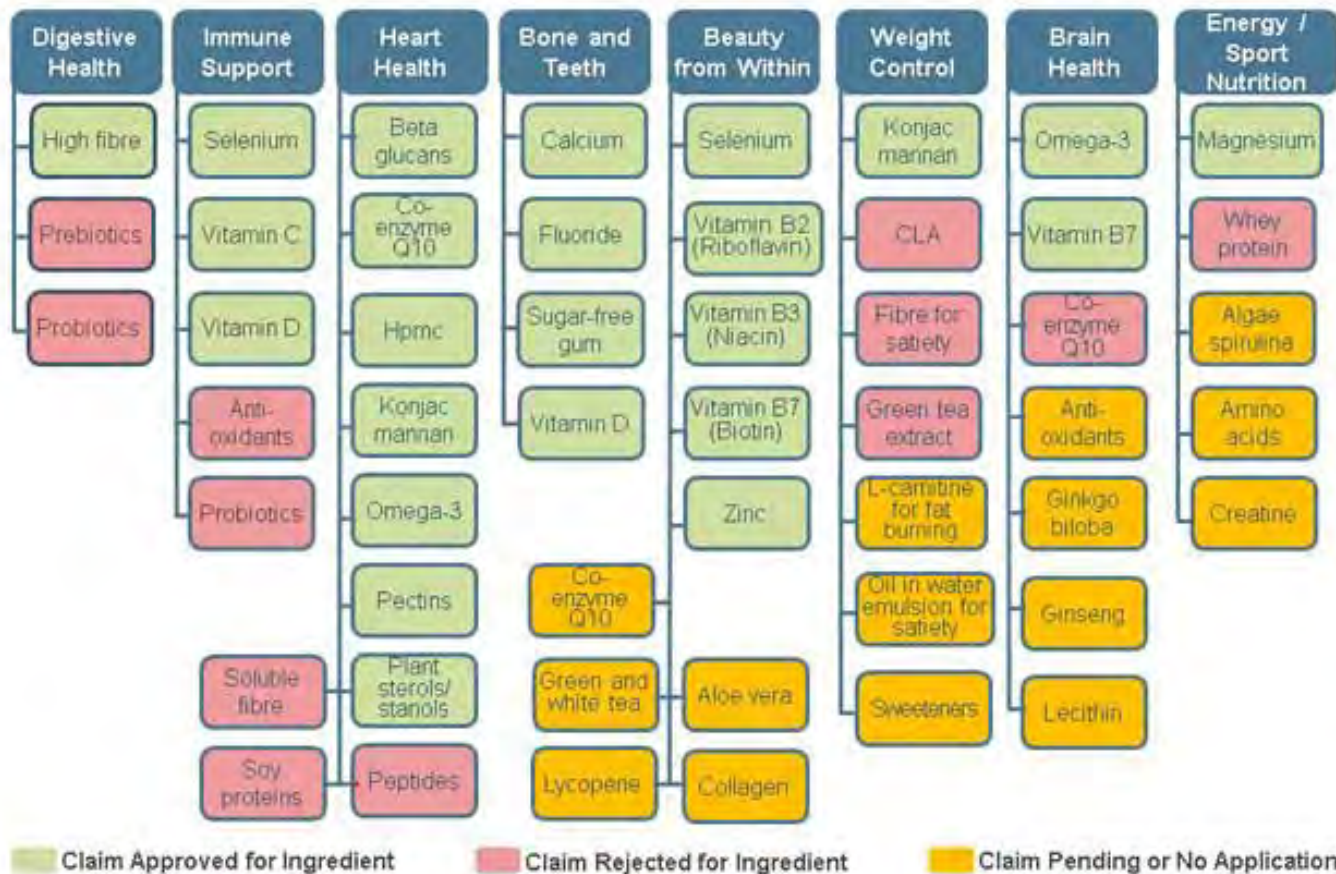
- Don'ts:
 - Start with Health Claims
 - Cancer, heart diseases and diabetics
 - Single substance approach
 - No window dressing



- Do's:
 - Use Food Claims
 - Use the EFSA list (vitamins, minerals)
 - Use little health issues
 - Use the total matrix
 - It should be truth!



EFSA's main approvals/rejections within leading FF trends



The third eye



Q-FOOD

- Eye for volume
- Eye for taste
- Eye for health





The grower



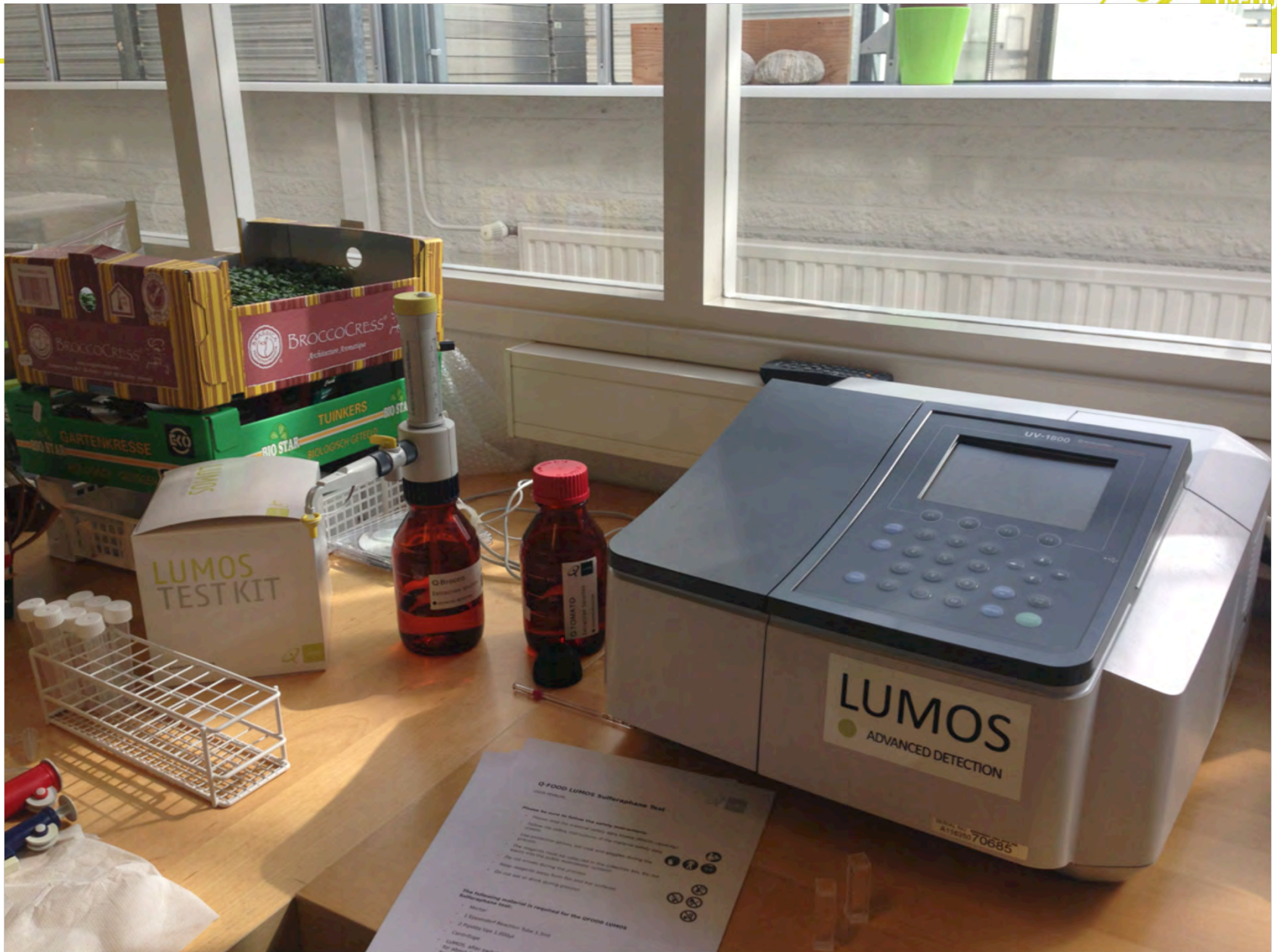
Q-FOOD



ADVANCED DETECTION







ADVANCED DETECTION

How to see health



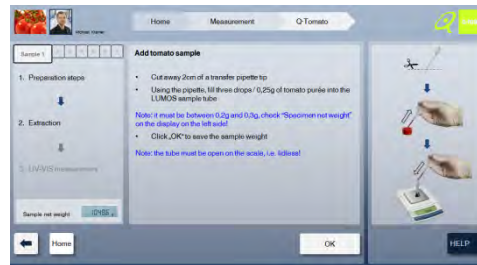
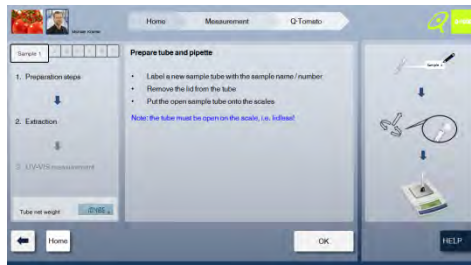
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- Sulforaphane in Brocco Cress
- Caroteens in tomatoes, bel peppers, water melon



QFOOD presents the new LUMOS Q-CT Carotene test:
A fast and direct approach to analyze mixed Carotenes from food samples.

- based on extraction and UV/VIS spectroscopy
- integrated mathematic analysis by the LUMOS analyzer
- easy, fast, precise and reliable:
 - ease of use, every step controlled by Q-OS software
 - you do not have to worry about data analysis
 - less than 10min for a test
 - data quality is independent on user or analyzer influence. It is a robust system with reliable data acquisition



- Q-CT extracts all carotenes contained in the sample in a safeguarding way in order to maintain the chemical integrity of carotenes
 - > carotenes are not affected by the Q-CT pre-analysis
 - > **this is in contrary to today's laboratory standard: HPLC testing**
- the efficiency of the Q-CT extraction can be seen in the color of the specimen after extraction
 - > **the Q-CT test results show all carotene in the purest possible way**
 - > **the error is usually below 1%**

In the following, the systematic problems of HPLC testing will be shown.

HPLC test: reproducibility and stability issues



Evaluation of the quality of HPLC tests:

The reproducibility (r) on the same machine and between laboratories (R) is shown here. It becomes very clear that differences for the measurements exceed 25% in real samples. I.e. a result may differ more than 25% from the real concentration.

Carot Juice with honey					Precision of the test results		
	Total Carotene	β-Carotene	α-Carotene	γ-Carotene			
Grand Mean [mg/l]	150.1	99.5	41	4.8			
r [mg/l]	6.4	8.6	7.6	1.5	r: reproducibility on same analyzer		
R [mg/l]	17.6	26.3	23.5	5.2	R: reproducibility between laboratories		
Multivitamin Juice with Carrot							
	Total Carotene	β-Carotene	α-Carotene	γ-Carotene			
Grand Mean [mg/l]	9.7	5.2	2.4	0.4			
r [mg/l]	0.3	1.3	0.6	0.3			
R [mg/l]	1.7	2.6	1.1	0.3	Source: MEBAK		



- Stability of carotenoids is low at high temperatures*.
This means that under NaOH and heat (HPLC extraction conditions) severe degradation is possible
 - > systematic error of the HPLC test
 - > considerable qualitative and quantitative changes are inevitable

-> You can't rely on Carotenoid quantification by HPLC

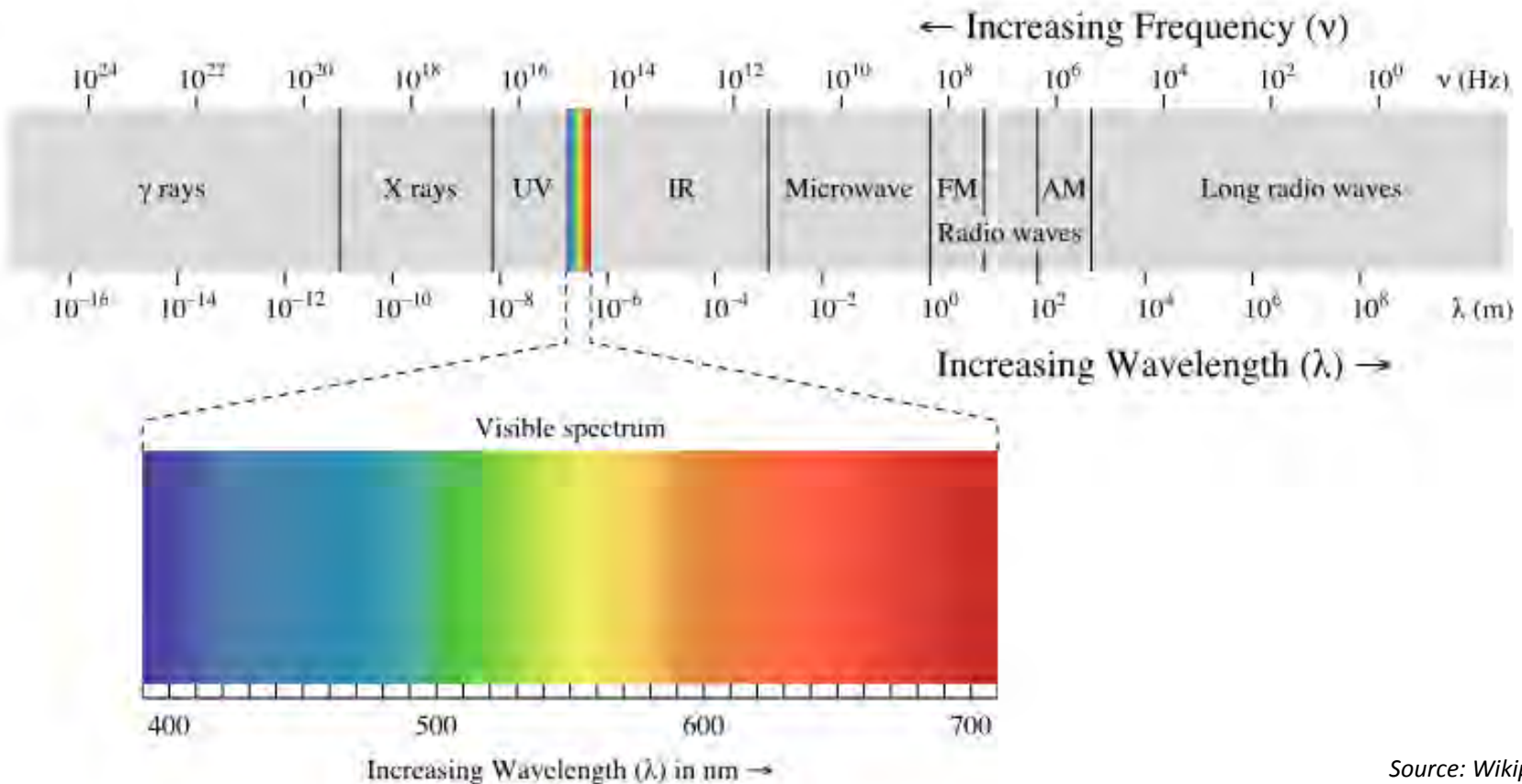
* Source: Chen et al., 1994 – J Agric Food Chem

LUMOS: Introduction into Spectroscopy



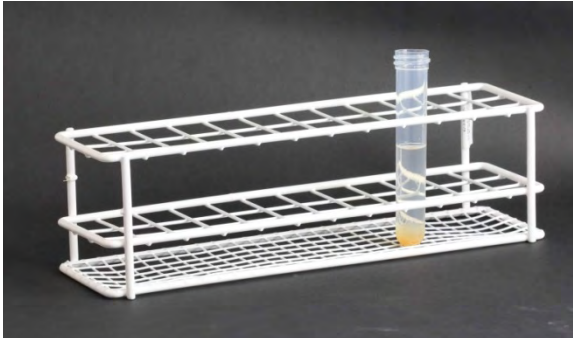
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Carotenes and sulforaphane show absorption in the blue / green range
-> they seem red to yellow and green to the human eye



Source: Wikipedia

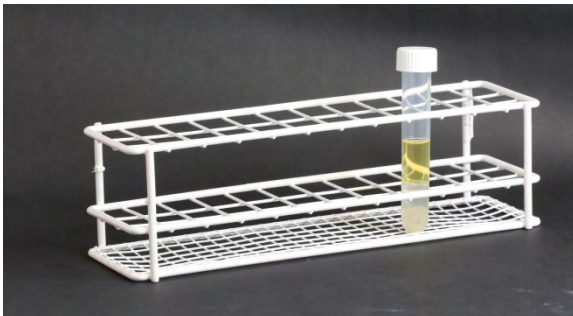
Visible extraction – visible control of results



1. directly after mixing extraction buffer and sample, the sample is orange, the buffer transparent



2. after shaking, the carotene is beginning to separate from the sample, the buffer is getting orange



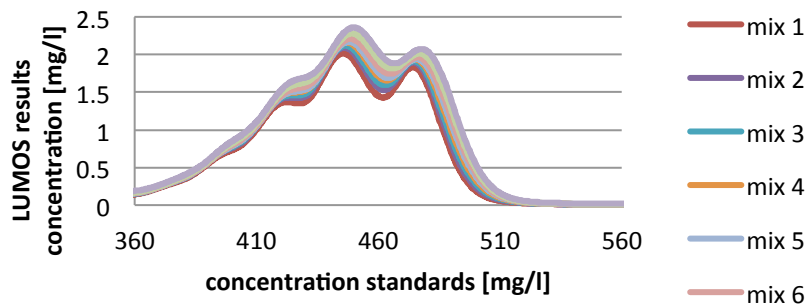
3. after waiting for some moments, the buffer contains all carotenes, the sample sinks to the bottom and is white / transparent

-> 100% carotene is solved in the buffer

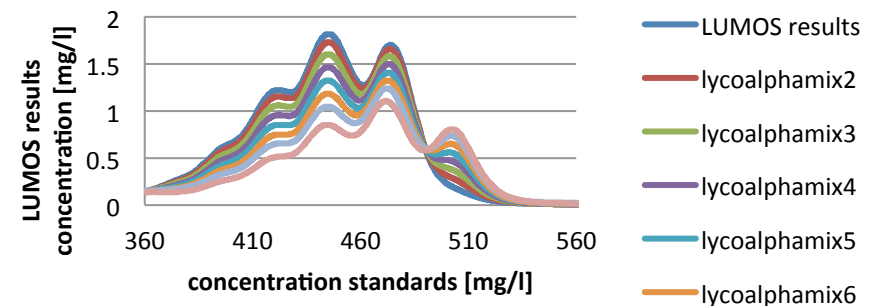
Spectral Fitting: Validation of Analysis Results

The Q-OS LUMOS Software contains a multitude of calibration curves of pure compounds and mixes. Based on these, QFOOD managed to develop full-scale modeling algorithms for the carotene analysis.

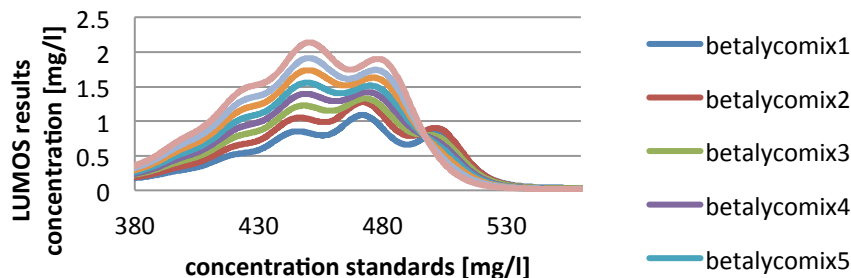
b-Carotene / a-Carotene mix row



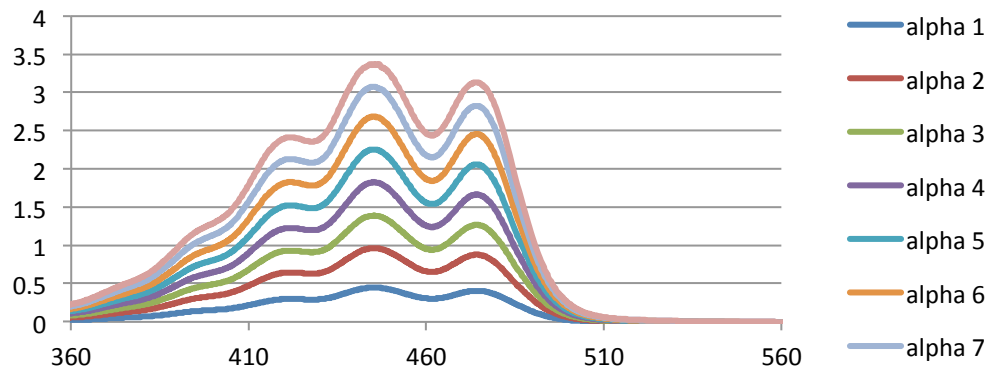
a-Carotene / Lycopene Mix Row



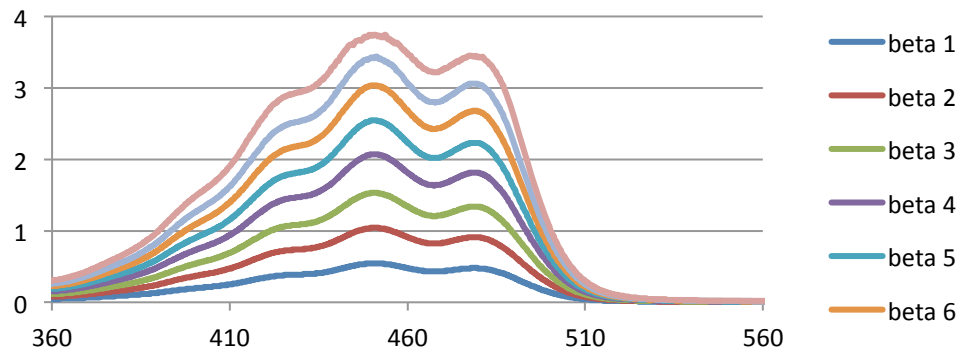
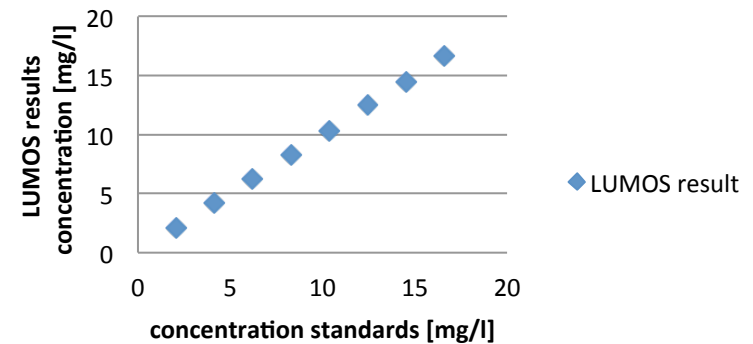
b-Carotene / Lycopene Mix Row



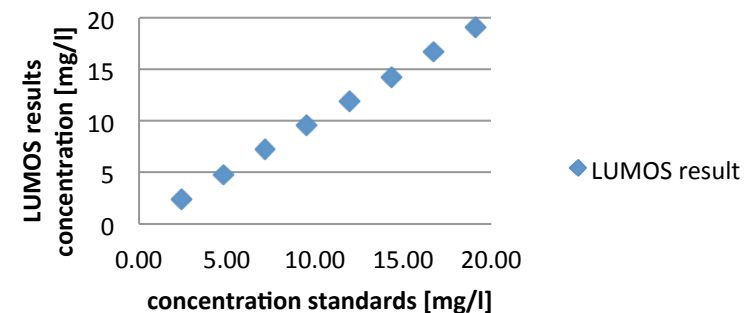
Validation of LUMOS Test



Alpha carotene concentration
row



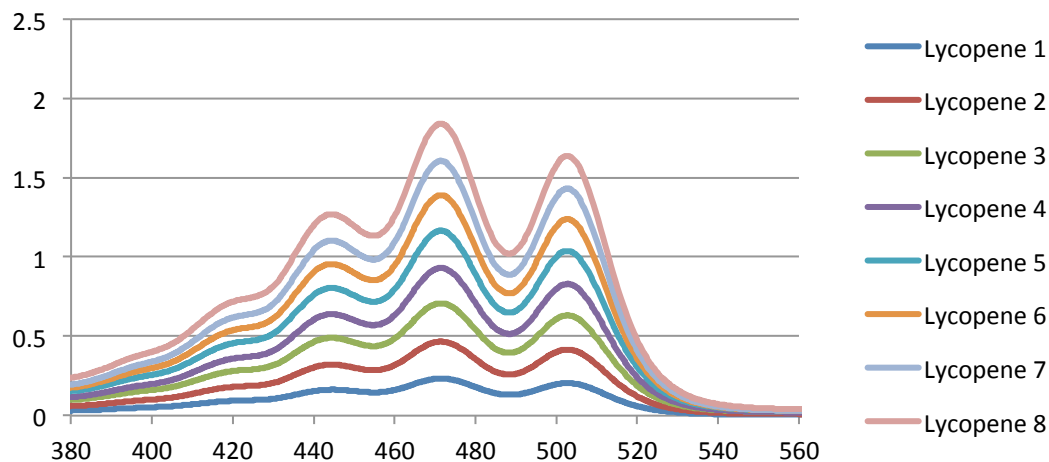
Beta Carotene concentration
row



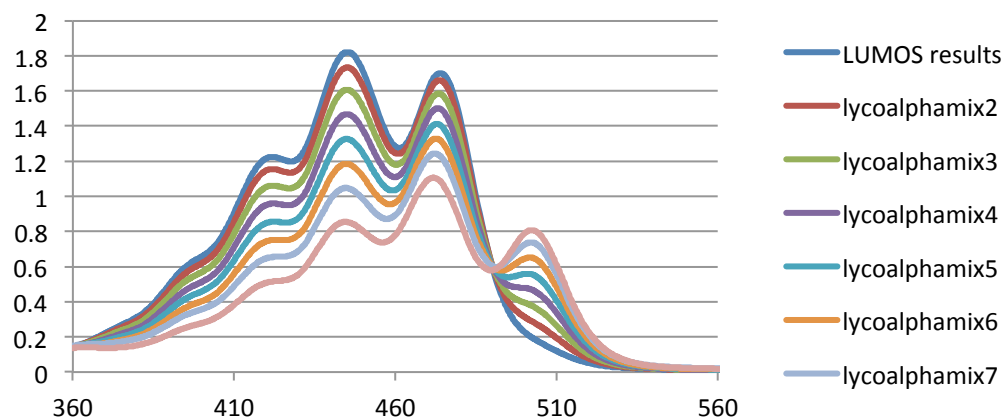
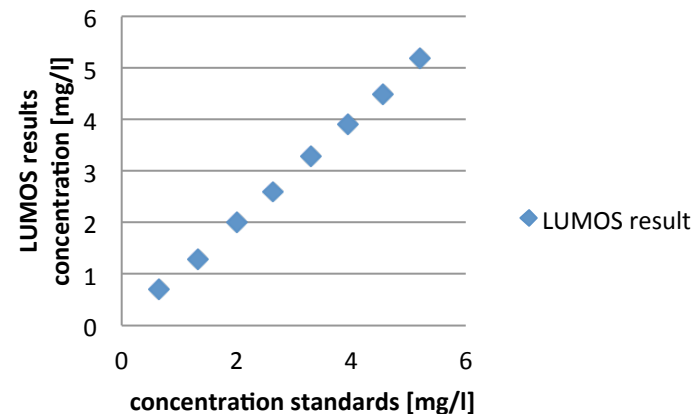
Validation of LUMOS Carotene Test



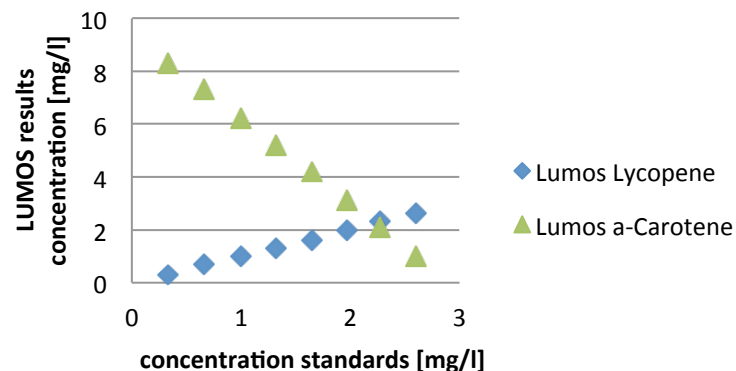
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Lycopene concentration row



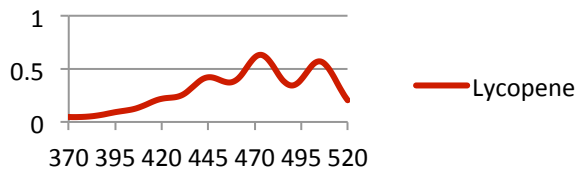
Lycopene / a-Carotene mix row



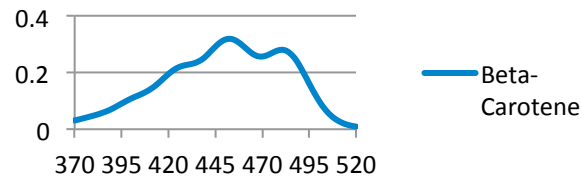
UV – Visible Analysis of Carotenes

Q-OS analyzes the compound spectrum of the test sample and extracts the individual carotenoid concentrations. In sum, the spectra of the three carotenes QFOOD uses in modeling result in the spectrum recorded by LUMOS as it can be seen below.

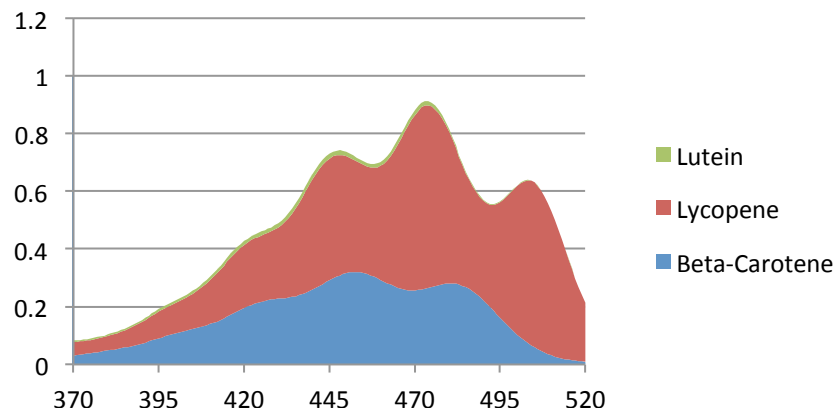
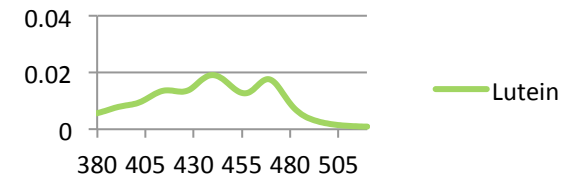
Lycopene



Beta-Carotene





Lutein



The Q-CT test for Carotene, Sulforaphan e.g. in Tomato, Carrot or has the following major advantages to today's standard (HPLC) test:


- simple: only a short training needed
- cost efficient
- quick: a test in less than 10min
- precise:
 - Bioactive substances are not altered by the process
 - visual control is available for the extraction
 - the results are precise and reliable
- less hazardous substances



Kramer

Home
Measurement
Q-Sulforos



Q-FOOD

Sample 1

1. Preparation steps

↓

2. Extraction

↓


3. UV-Vis measurement

84.556 g

Mortar weight

Tare Mortar

- Put the mortar (clean and dry) onto the scales and press **OK**





←
Home


OK

HELP



Kramer

Home Measurement Q-Sulforos

Q-FOOD

Sample 1

1. Preparation steps

↓

2. Extraction


↓


3. UV-Vis measurement

Mince Seedlings



- Take the mortar off the scales and place it on the lab bench
- Pestle the seedlings in the extraction buffer thoroughly for several minutes

Try to mince all seedlings fully to receive a homogenous mixture.




HomeOKHELP



Kramer

Home Measurement **Q-Sulforos**

Q-FOOD

Sample 1

1. Preparation steps

↓

2. Extraction


↓


3. UV-Vis measurement

0.807 g
Extract + buffer weight

Add Buffer

- Add 1000 µl extraction buffer
- Close the tube lid and mix thoroughly
- Put the tube back into the holder on the scales and press **OK**



HomeOKHELP

Sample:

Sample 1

Sulforaphane:65.3 μg / 100 mg FW

The amount sulforaphane in Brocco Cress is as much as in an adult Broccoli





Q-FOOD



ADVANCED DETECTION