

OP-009 [Apitherapy]

High concentrations of Spermidine in Drone Milk (Apilarnil)

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In this project the presence of Spermidine in Apilarnil (fresh/different-larva-stages/dry-techniques/vehicle-solutions) was identified and quantified. A workflow was set up comprising an extraction procedure from the freeze-dried Apilarnil (supplied in high purity within Api-Zentrum Ruhr) and a liquid chromatography coupled with a high-resolution time-of-flight mass spectrometer (LC-ESI-QTOF).

Apilarnil in different stages of larva development age contains Spermidine in higher concentrations as in wheat germs. Furthermore, Apilarnil contains other bioactive amines and polyamines besides Spermidine. This is the first time that spermidine and several other biogenic amines have been definitely proven to be present in a bee product.

The spermidine content is another column for explanation the various health applications for Apilarnil in apitherapy and is most directly related to its health benefits, although further research has to be done. To understand especially the synergies in the presence of different bioactive substances like spermidine and typical hive products e.g. flavonoids will be interesting.

Dr. rer. nat. Thomas Gloger

High concentrations of Spermidine in Drone Milk (Apilarnil) **New research on Drone Milk**



Copenhagen September 2025



Apilarnil - Drone Milk

ApiDrohn®



©Thomas Gloger



ApiDrohn®



Lyophilisat

©Thomas Gloger



Composition*

- approx. 40% proteins and amino acids
- approx. 25 % sugars: glucose, fructose, furanose, maltose, trehalose, isomaltose
- approx. 25 % lipids including many polyunsaturated fatty acids
- Minerals/trace elements: Ca, P, Zn, Mn, Fe, Cu, K, Mg
- Vitamins A, β -carotene, B1, B2, B3, B6, E
- Choline
- Poliphenols
- Q10- α -tocopherol
- stem cells
- **Spermidine**
- Hormones
- Testosterone
- Progesterone
- Prolactine
- Eestradiol
- pH 6.2



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*based on dried substance (max. 5% water) *ApiDrohn*®



Spermatogramm Stud Rams

Table 4: Characteristics of sperm of stud rams				
Indicators	Ejaculate volume, ml	Mobility, score	Concentration, billion/m	Resistibility, thousand
Preparatory period				
Reference	1.01±0.05	7.5±0.06	3.15±0.05	32.4±0.06
Group I	1.03±0.05	7.7±0.05	3.16±0.06	33.0±0.03
Group II	1.05±0.04	7.7±0.03	3.20±0.05	33.1±0.05
Group III	1.04±0.05	7.6±0.06	3.17±0.02	33.0±0.04
Period of use				
Reference	1.10±0.05	8.1±0.01	3.55±0.02	37.3±0.05
Group I	1.17±0.04	8.5±0.05	3.58±0.05	39.4±0.01
Group II	1.24±0.06	8.5±0.03	3.66±0.04	41.2±0.01
Group III	1.19±0.06	8.4±0.02	3.60±0.01	39.1±0.05
Final period				
Reference	1.18±0.03	8.5±0.04	3.55±0.06	40.5±0.02
Group I	1.30±0.04	9.0±0.06	3.54±0.04	42.2±0.05
Group II	1.37±0.05	9.2±0.02	3.65±0.05	43.5±0.06
Group III	1.32±0.02	9.0±0.05	3.60±0.03	42.8±0.04

Group I to III

Dosing I 10 mg/kg II 15 mg/kg III 20 mg/kg

Increase till group II then level-off



Results

Table 5: The results of influence of sperm quality on fertility of ewes and the number of offspring

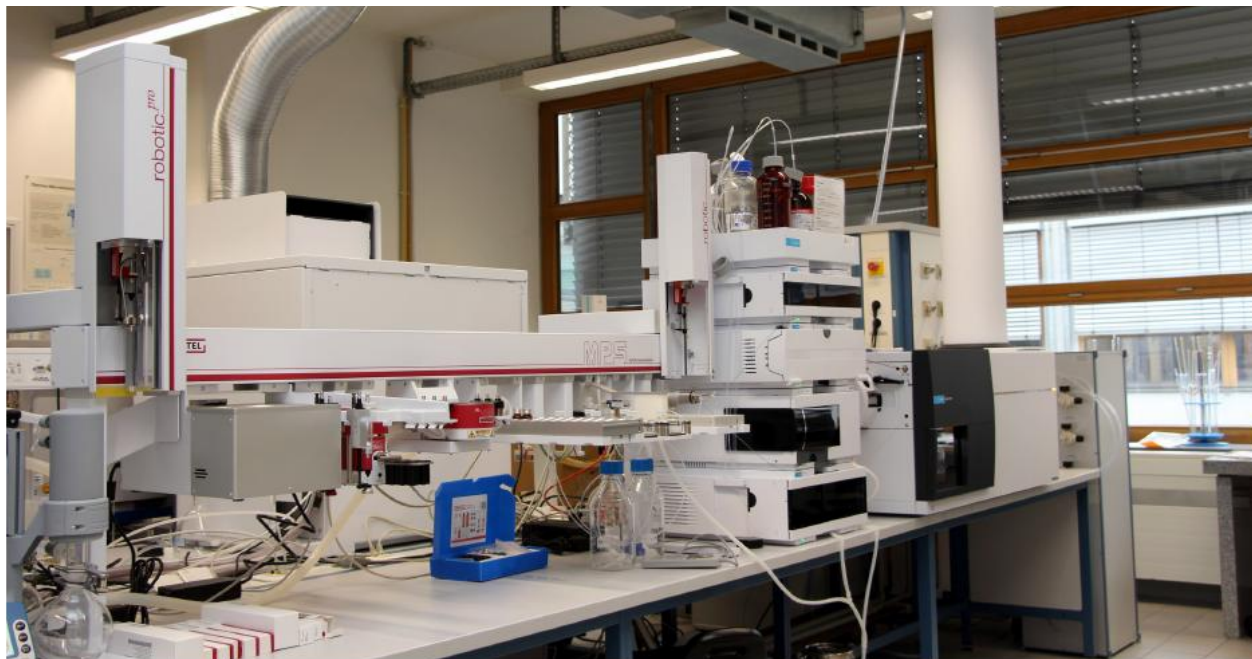
Indicators	Group			
	Reference	Experimental I	Experimental II	Experimental III
	Heads (%)	Heads (%)	Heads (%)	Heads (%)
Inseminated ewes	45 (100)	42 (100)	40 (100)	41 (100)
Fertilized after first insemination	34 (75.5)	33 (78.5)	33 (82.5)	33 (80.5)
Lambled-out ewes	32 (71.1)	31 (73.8)	30 (75)	30 (73.2)
Obtained lambs	34 (106.2)	35 (113)	35 (116.7)	34 (113.3)

1. Freeze-dried Apilarnil is equivalent to fresh Apilarnil.
2. Optimum dosage 15 mg/kg live weight
3. Effect less stress in the animals, haemoglobin in the blood and physical activity are improved
4. Semen
 - Volume of ejaculate + 30.4%
 - Sperm concentration +14.3%
 - Motility + 9.2%
 - Fertilization ability at the first fertilization increases to 82.5 %.



Goal

Development of an analytical method for the automatized quantification of biogenic amines at the example of Spermidine with LC-QTOF



Prof. Dr. Ingo Tausendfreund: Einem molekularen Jungbrunnen auf der Spur:
Automatisierte Quantifizierung biogener Polyamine mit dem MPS Robotic und LC-QTOF

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©Tausendfreund WH



Research Funding NRW

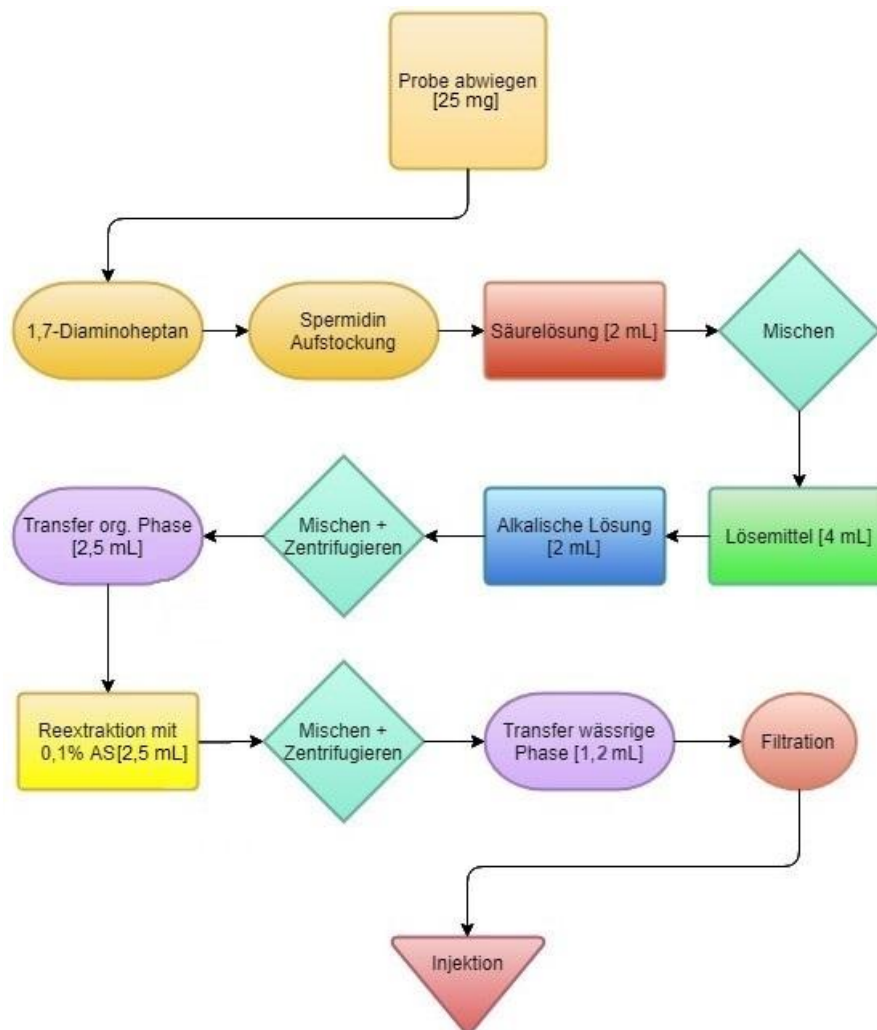
- Zuwendung des Landes Nordrhein-Westfalen für das Förderprogramm „Mittelstand Innovativ & Digital (MID)“

**Ministerium für Wirtschaft, Innovation,
Digitalisierung und Energie
des Landes Nordrhein-Westfalen**



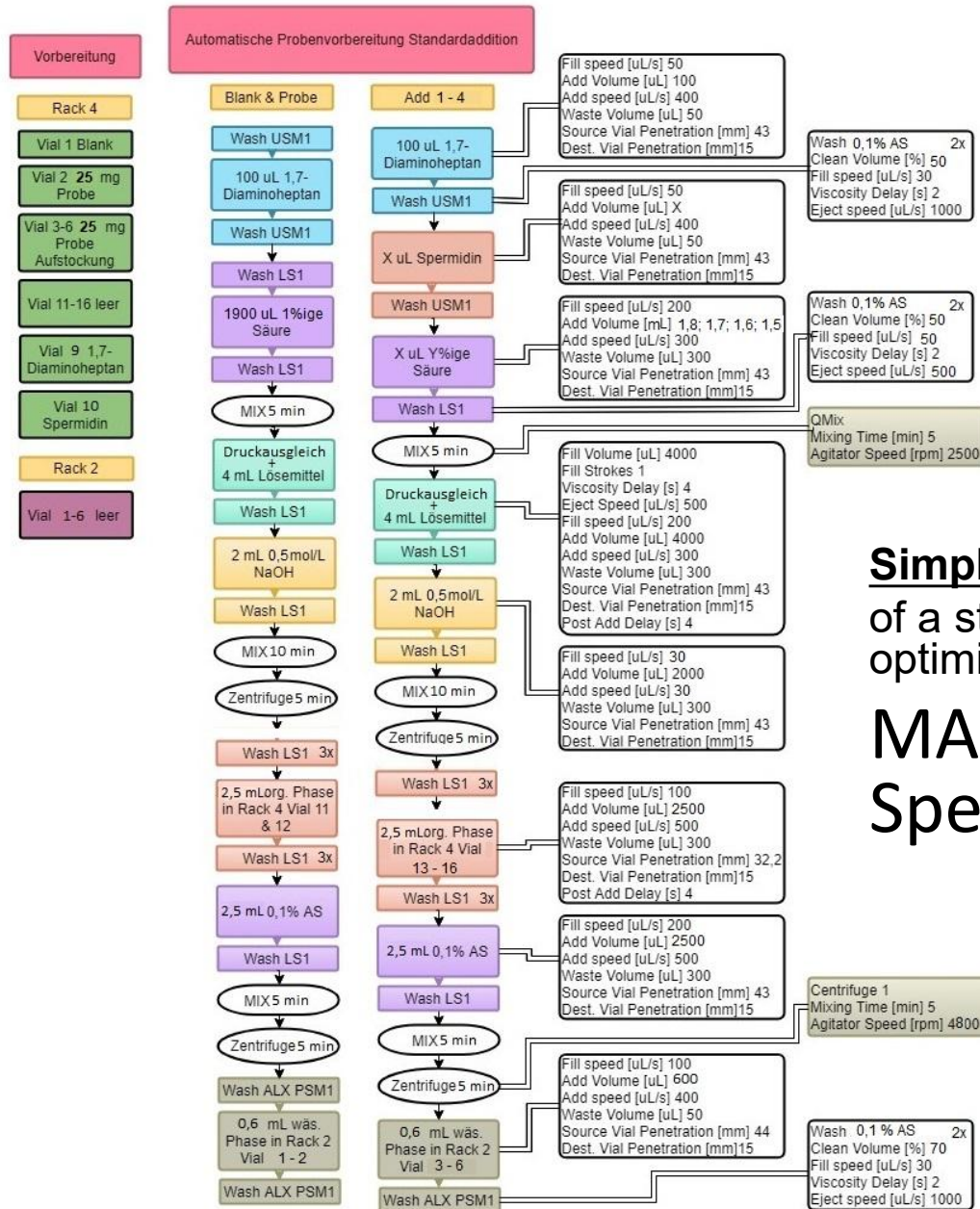


Method Development



Schema of the Extraction/Re-Extraction





Simplified PrepSequence
of a standard addition series with
optimised parameters

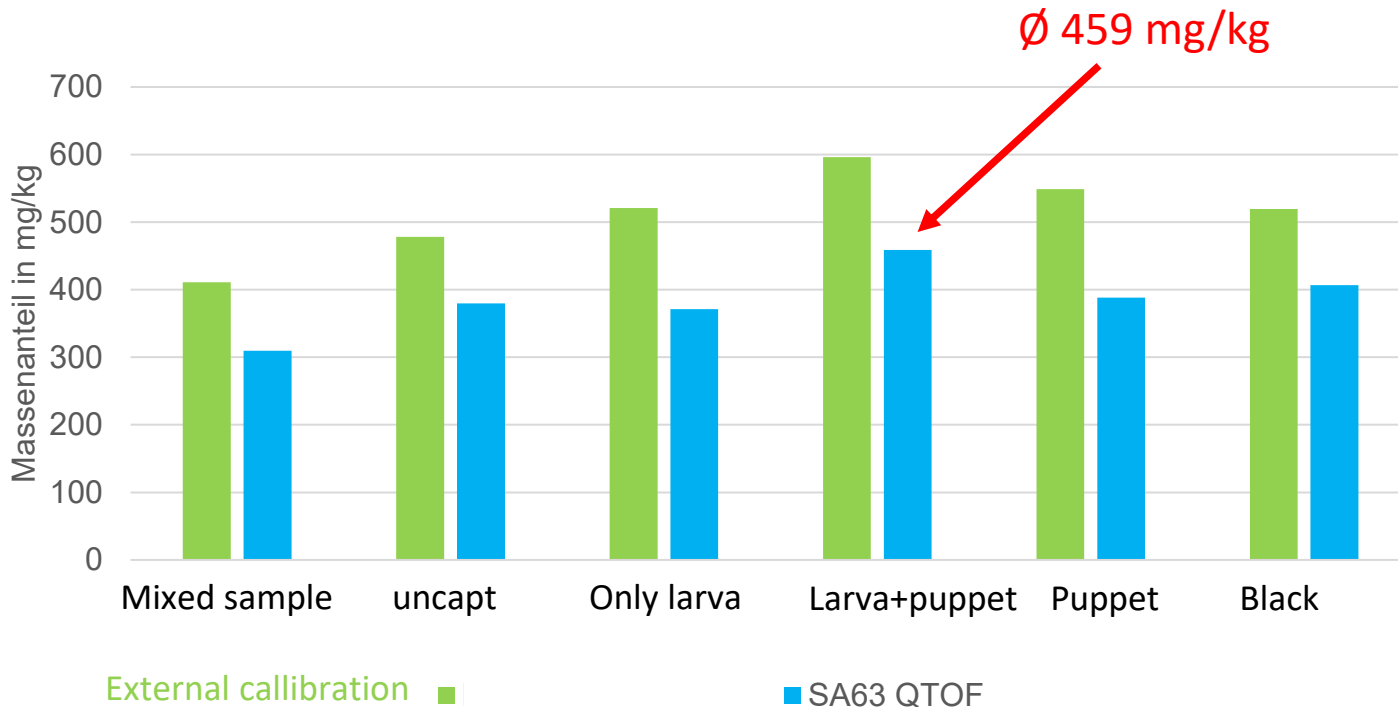
MALDI-TOF Mass Spectroscopy





Westfälische
Hochschule

Spermidine mg/kg



Comparison of spermidine mass fractions of drones at different stages after quantification via external calibration (green) or standard addition procedure (blue).



Spermidine in Apilarnil

Physikalisch-chemische Untersuchung

DJ700 Biogene Amine (dansyl)

Methode : Czech J. Food Sci. Vol.21, LC-UV/DAD

Unterauftragsvergabe an Eurofins Vitamin Testing Denmark A/S, Vejlen, welches für diesen Test akkreditiert ist.

2-Phenylethylamin	127	mg/kg
Cadaverin	27,7	mg/kg
Histamin	<1 (LOQ)	mg/kg
Putrescin	1430	mg/kg
Spermidin	343	mg/kg
Spermin	48,0	mg/kg
Tryptamin	<5 (LOQ)	mg/kg
Tyramin	<1 (LOQ)	mg/kg

Degradation product
of spermidine

ApiDrohn®



Westfälische
Hochschule

ApiDrohn®

uncapped

Larva

Larva+Puppa

Puppa

Old Puppa

Chemometric
Profiling

825

787

811

892

878

790

	ApiDrohn®	Unverdeckelt	Larve	Larve+Puppe	Puppe	Alte Puppe	Mittelwert
External Calibration	411	478	521	596	549	519	512
Standardaddition-procedure	310	380	371	459	388	407	385
Age in Days		0-7	7-14	13-17	16-20	18-21	





High concentrations of Spermidine in Drone Milk (Apilarnil)

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ABSTRACT

Spermidine is a biogenic amine. Spermidine induces autophagy and may extend life span, reduce dementia and other common diseases. Therefore, it gained popularity as a food additive derived e.g. from wheat germs. Drone milk or Apilarnil (ApiDrohn®) is a high value hive product extracted from the male larvae and conserved by lyophilisation. Apilarnil is used in traditional apitherapy for versatile applications.

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Keywords: Apilarnil, drone milk, Spermidine, biogenic amines, ApiDrohn®

INTRODUCTION

Drone milk or Apilarnil (ApiDrohn®) is a high value bee hive product extracted from the male larvae and conserved by lyophilisation. Apilarnil is used in traditional apitherapy for versatile applications, often around fertility of men and women. Besides this amine it contains besides other bioactive molecules hormones: Testosterone, Progesterone, Estradiol and Prolactin [1]. This explains partly the regulative function on e.g. women's menopause symptoms or men's spermatogenesis. The application of Apilarnil shows also good results with animals [2]. In this case the quality of sperm and the number of offspring for stud rams were studied. Mixtures with honey and other bee products like propolis and royal jelly had been traditionally used to strengthen very weak and ill patients. The recipes vary greatly although it seems that Apilarnil is a crucial component for the efficacy.

The research on biogenic amine like Spermidine has recently shown a number of interesting health effects. In the blood of 90 to 100-year old people high concentrations of Spermidine were found [3]. Showing that the surviving fraction of elderly people has a significant difference in metabolism. Spermidine induces autophagy, immune modulation, cardioprotection, neuroprotection, tumour suppression and may extend life span, reduce dementia and other common diseases. Therefore, it gained popularity as a food additive derived e.g. from wheat germs.

As other germ cells (as sperm or wheat germs) contain a lot of Spermidine it was obvious that Apilarnil could also contain Spermidine.

This research project focussed on the detection and quantification of Spermidine and evident biogenic amines at different larva stages.

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Spermidine Content mg/kg

- Kimchi
- **Apilarnil**
- Sauerkraut
- Wheat germs
- Sojabeanes
- Cheese (Cheddar, Gouda)
- **Sperma**

600-750

300-800

180-230

200-300

250-320

40-50

15-50

Fermentation

Cell formation/
Stem cells



Spermidine - Main Effects

- Autophagy activation
 - promotes cellular self-cleaning: damaged proteins and organelles are degraded and recycled
- Anti-ageing and longevity effects
 - spermidine-rich diet is associated with longer life and healthier ageing
 - protection against age-related cognitive decline
- Cardiovascular protection
 - improve vascular elasticity, reduce the risk of high blood pressure and cardiovascular disease
 - lower cardiovascular mortality with higher spermidine intake
- Cognitive health
 - autophagy in the brain reduces the risk of dementia and Alzheimer's
 - improvements in memory performance
- Immunomodulation
 - reducing protein misfolding and recycling ageing immune cells
- Metabolic and cell protection
 - antioxidant and reduces damage caused by radicals
 - Supports mitochondrial function and overall cellular health



Surviving 100-year-olds have more spermidine in their blood

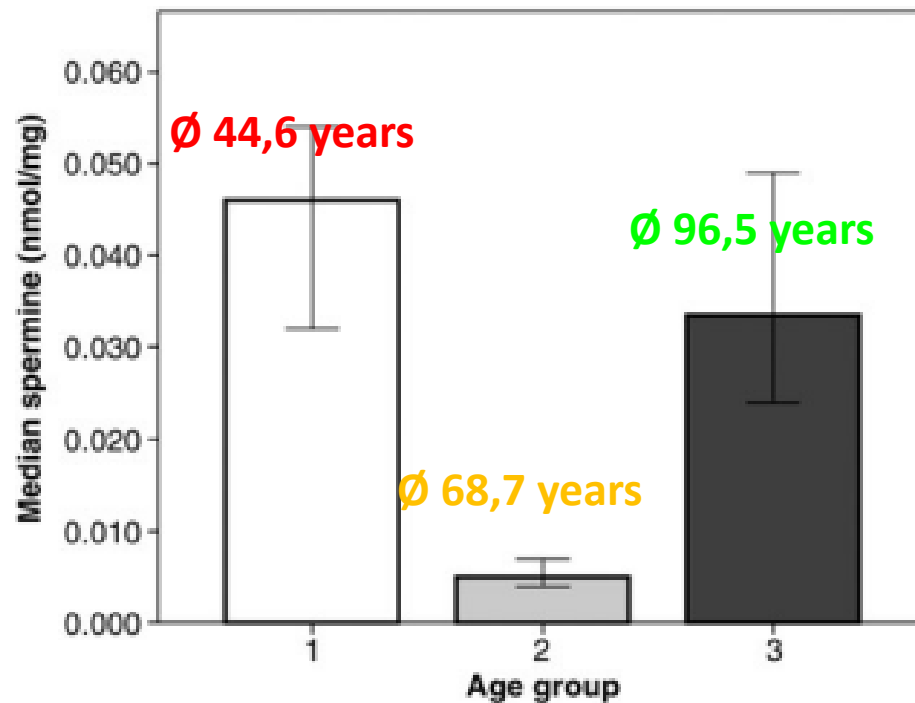


FIG. 3. Spermine levels (expressed as nmol/mg) across the three age groups. Values are expressed as median $\pm$ 95% confidence interval. The differences between the three age groups were evaluated by a nonparametric Kruskal-Wallis test ($p = 4.7 \times 10^{-12}$).

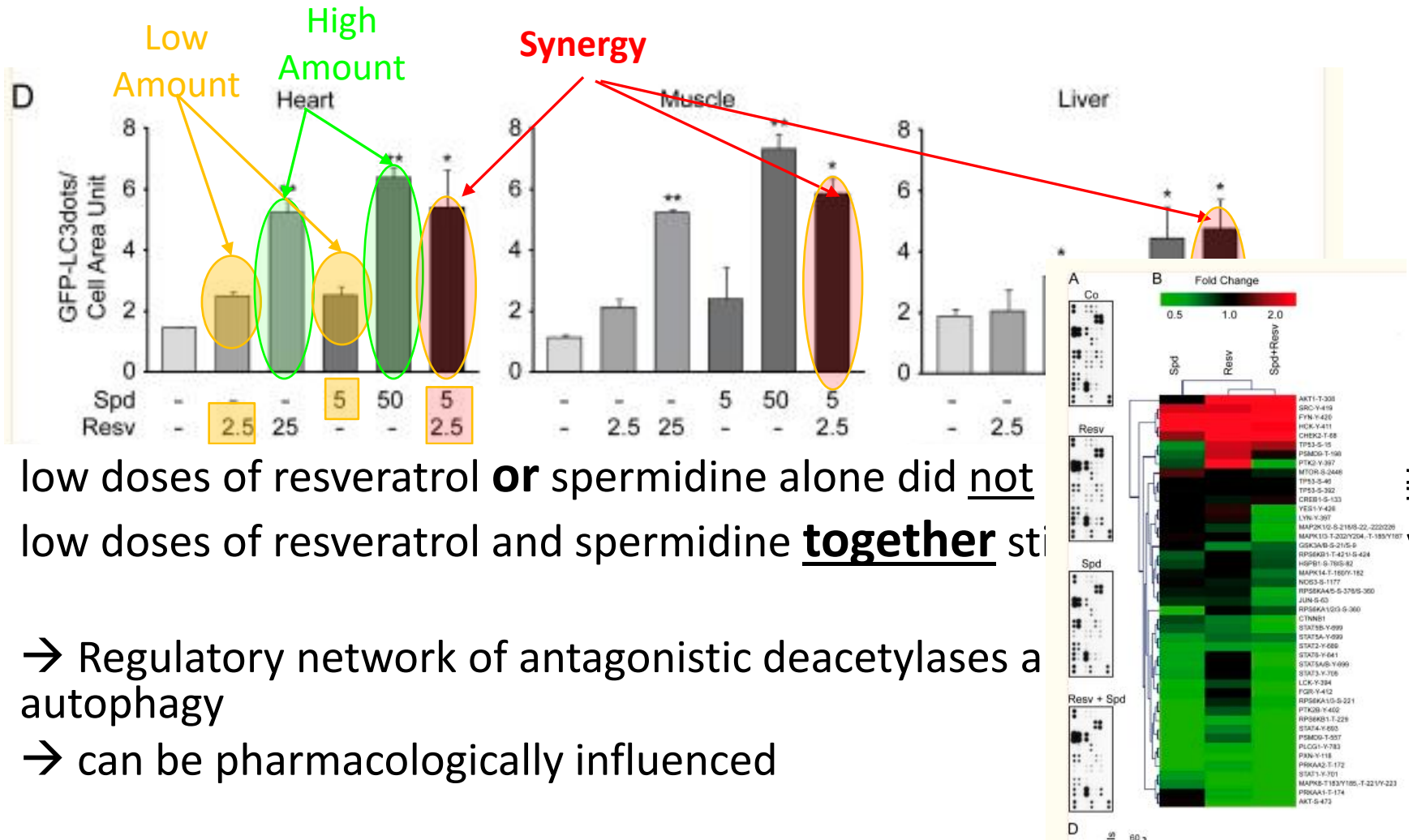
Age Bracket:

1. 31-56 years
13 ♂ and 13 ♀
2. 60-80 years
13 ♂ and 13 ♀
3. 90-106 years
13 ♂ and 13 ♀

- Spermidine greatly reduced in Alzheimer's patients
- Possible treatment of MS



Synergy Spermidine and Resveratrol



low doses of resveratrol **or** spermidine alone did not
low doses of resveratrol and spermidine **together** still

→ Regulatory network of antagonistic deacetylases and autophagy

→ can be pharmacologically influenced



Apilarnil: Operating Principle

ApiDrohn®/Apilarnil is characterized by

1. Micronutrients and their composition

- e.g. large number of essential amino acids
- simple building blocks, which are easily accessible to biosynthesis
- building blocks are balanced in such a way that a **complete organism** is formed

2. Messenger substances and hormones

- General activation
- Builds a male organism - the counterpart of royal jelly (**endocrine system**)
- Improves the conduction of impulses (**nerves**)
- Regulator of metabolism (**liver**)

3. Spermidine

- **autophagy**
- **Tumor suppression/Immune modulation**
- **Cardioprotection/Neuroprotection (nerves)**

4. Antiviral effect & stimulation of the immune system

- Biology of the "naked" larva



Indications

„unclear causes“

Metabolism

- Depression, melancholy, nervous weakness, also organic cause
- Tiredness, nervousness, lack of drive (chemotherapy!!)
- Lack of strength due to overwork, psychological problems, malnutrition
- Chronic nervous disorders, memory problems
- Epilepsy, bedwetting, cystic fibrosis
- Menopause, hot flashes, sleep disorders, mood swings, weight gain
- Inflammation of the genital organs, vaginal flora
- Menstrual disorders, PMS, miscarriage, breastfeeding problems, improves lactation
- Puberty disorders, anorexia
- Impotence, erection problems ("biological Viagra")
- Diabetes, obesity, gout, stomach ulcers and liver (digestive system – alcohol abuse)
- Sports (marathon or weight training) with sufficient preparation for competition

Developmental disorders children

Metabolism



The Power of the Bee - The Book of Apitherapy
ISBN: 978-3-949087-01-1

Apitherapy cures all, but
not everything.*

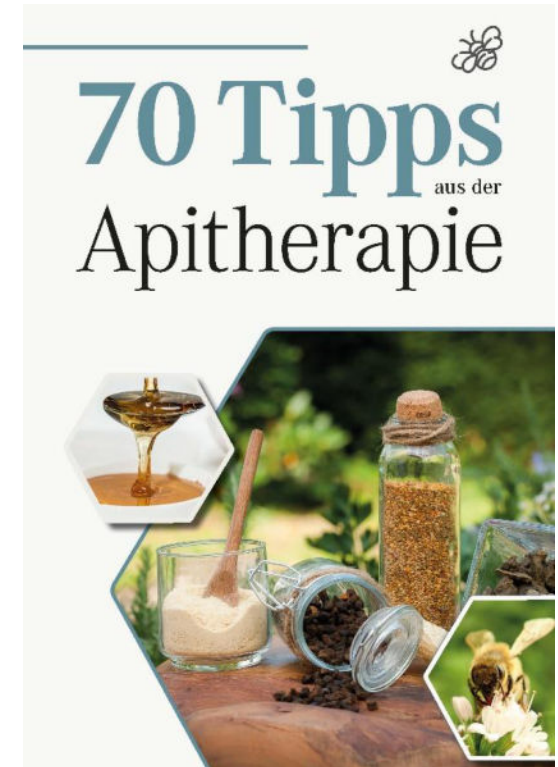
*Tim, Brazilian Healer



Jeff Pettis



DR. THOMAS GLOGER
**THE POWER OF THE
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Hormones

Vergleich **Gelee Royal** – **Apilarnil** - **Apilarnil** *

Testosteron	0,20	0,31	4,56
Progesteron	4,61	51,32	81,22
Prolactin	70,8	410	798,5
Estradiol	52	668	1004,36

- *nmol/100g frisch

Rußland Burimistrova 1999

Kasachstan Karligash Bolatovna Shoinbayeva 2017



