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THE NATURAL ANTIOXYDATIVE ACTIVITY OF RAW MATERIALS, HALF-FINISHED AND FINAL PRODUCTS MEASURED IN ONLY ONE VALUE – RPF

N. GROTH, *managing director*; K. HEILSCHER, *Prof. Dr.sc.techn*.

Privatinstitut Galenus GmbH, Volmerstr. 7A, D 12489 Berlin-Adlershof
e-mails: galenus.gmbh@t-online.de; k@rl-kuehn.de

RPF – a measurement of the natural antioxidative activity of raw materials half-finished and final products

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The search for reproducible standardized half-finished and finished products started at the 1st ISA Conference 2003 in Berlin has not yet been successful.

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The goal to consider the dynamics of the bioactivity of the Seabuckthorn during the processing methods is not very popular in the industry.

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Our goal is to preserve the bioactivity of the berries and to combine it with an appropriate processing biotechnology.

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Why the whole of the berry?

Why biotechnology exclusively?

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Only the sum of the energy of the Seabuckthorn plant can explain the numerous pharmacological effects which are documented.

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The large spectrum of healing capacities with Seabuckthorn products must be reflected in the methods for analyzing.

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Among the variety of methods the most important is the analysis of antioxidants with the Radical Protection Factor (RPF), determining the scavenging capacity of free radicals.

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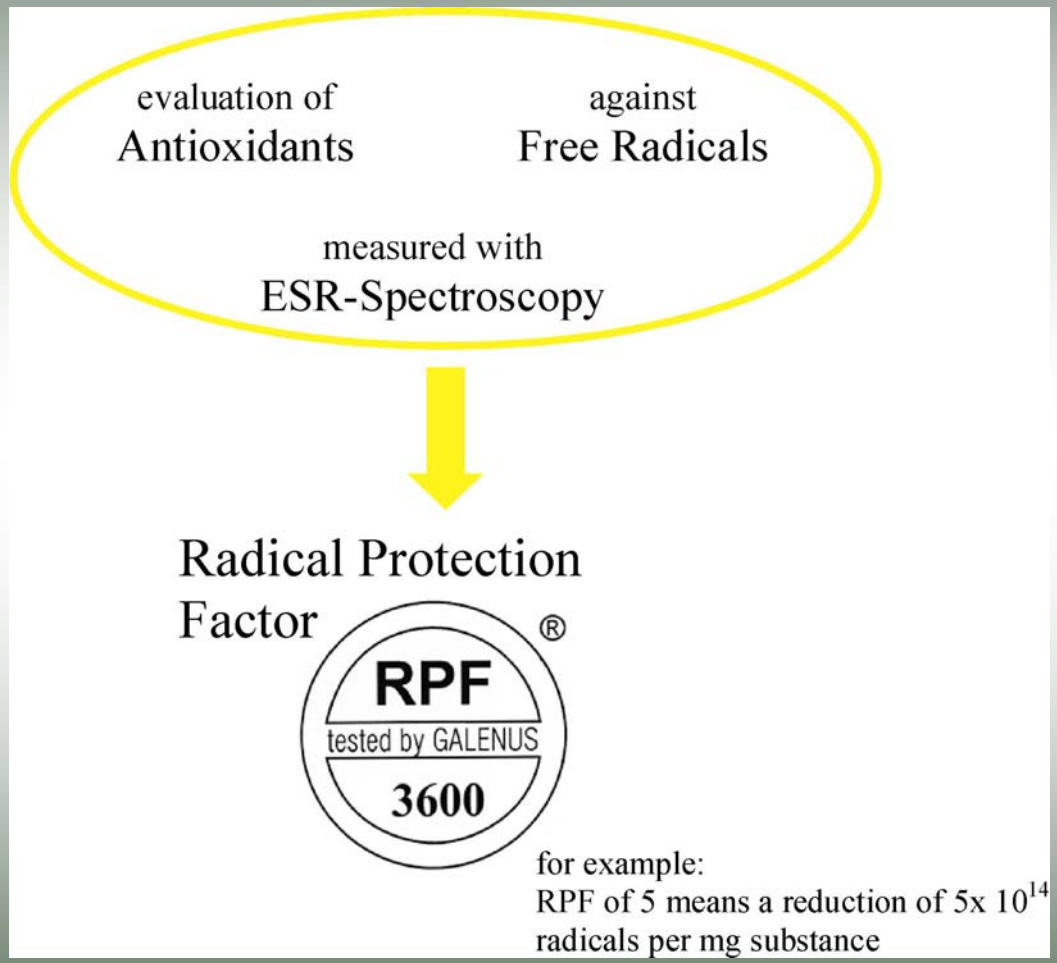

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Definition and measurement

The Radical Protection Factor (RPF) determines the scavenging activity of an antioxidant against a test substance. This test substance consists of a “very reactive semistable radical which reacts with all known antioxidants.

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The method of the quantitative ESR is the only one which is able to detect free radicals directly.

In comparison with other existing methods as for example chemiluminescence's the ESR is able to investigate also turbid, nontransparent and colored samples. This method has used been for years in the development of UV-protection and skin care products.

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With the strategy of a double defense line system with the first line against UV-irradiation and the second line: the elimination of Free Radicals.

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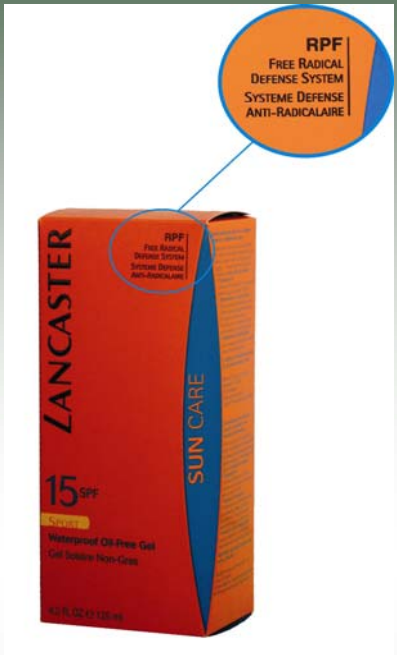

As a result we determine the scavenging activity of the antioxidant against the test radical with a known concentration or number of radicals respectively.

The signal amplitude S1 (standard) of the test radical concentration RC (given in radicals per ml) is measured by an ESR spectrometer.

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The test radical is solved in a water/alcohol solution. After mixing it with the antioxidative substance (also solved in water/alcohol) the signal amplitude S; is measured. The normalized difference between the two signal amplitudes is measured against an internal Mn^{2+} standard

$$RF = \frac{S_1 - S_2}{S_1}$$

whereby the reducing factor RF is in the range from 0, ..., 1.

$$RPF = \frac{RC\left[\frac{radicals}{ml}\right]}{PI\left[\frac{mg}{ml}\right]} RF$$

The result of this calculation is the

$$RPF = N \times 10^{14}\left[\frac{radicals}{mg}\right]$$

For a comfortable handling we use RPF = N.

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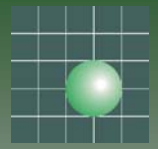
synthetic antioxidants	RPF reduction of 10^{14} rad / mg
vitamin A / Retinol $\geq$ 95%	4.000
vitamin C / ascorbic acid	100.000
vitamin E / (+)-α-Tocopherol 97%	30.000
vitamin E / DL-α-Tocopherol Acetate 96%	100



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natural antioxi-dant	α-Toco-pherol vitamin E mg %	Beta-Carotin mg %	Ascor-bin-acid mg %	Flavo-noide mg %	Unsaturated fatty acids C 16 %	Unsaturated fatty acids C 18 %	Ranzemat in valueh (20l air with 110°C)	RPF 10^{14} rad/mg
Aronia	0.8-3.1	1.1-2.4	10-50	170-700				1300
Rose hip	-	1.0-2.7	470-4700					1570
Seabuckthorn berry (sbb)	3.0-18.0	0.0-18.7	100-1200	50-250				520
Sb pulp.-oil	45	120			38.8	16.2	35.5	290
Sb seed-oil	77	140			11.2	72.7	2.0	500
Sb pulp without seeds		145						625
Sb pulp with grounded seeds		141.9						1100

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The potential fields for the application of the antioxidant status determination by means of the RPF are:

- Cosmetical research
- Pharmaceutical research
- Food and beverage research
- Quality control of the raw material, during and after production

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Undetermined by the RPF are the contents of

- Roughages including the soluble ones, especially the

  pectins and the insoluble: protopectin, cellulose, hemicelluloses and lignin.
- Oil.

  The main part of the oil-quality is analyzed with the RPF but not the quantity.
- Flavors and taste

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First essays to find with the phytoncidity a common value for Seabuckthorn products were not successful. We shall continue on this field.

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