BIOLOGICAL LASER THERAPY

The Effects of Intravascular Low Level Laser Therapy in the Scope of a Redifferentiation Therapy of Malignant Tumours

Published in the German Medical Journal of Oncology; No 6/2007

Dr. Frank Andrä, MD
Photo: private

Intravascular laser blood irradiation and the bioimmunotherapy according to Tallberg appear to have additive and synergistic effects in the redifferentiation of tumour cells. The bioimmunotherapy exerts effects on tumour cell mitochondria. By means of mitochondria-nuclear communication malignantly transformed cells can regain their normal gene expression. Intravascular laser blood irradiation changes mitochondria morphologically and activates metabolic energy processes. In an application study these two methods were compared with each other both individually and in combination in maximally chemotherapeutically pre-treated tumour patients. Clinically and morphologically synergistic and additive effects were observed.

In the 1950s many articles were published on therapeutic experiments with mitochondria, including tumour mitochondria. The results of these papers point in the same direction: To restore normal mitochondrial function or an application of healthy mitochondria means an regeneration impulse for degenerated cells and could assume a key position in the treatment of chronic and progressive diseases (literature at [1]). The bioimmunotherapy according to Tallberg, in which amino acids and trace elements in individual concentrations and in accordance with a tumour specific code are administered (literature at [2]), functions in accordance with this principle.
Tallberg proved experimentally that tumour cell mitochondria modify their morphological structure on application of special amino acid/trace element mixtures and clustered around the cell nucleus of transformed cells, partially penetrated into it, and apparently via the paths of mitochondria-nuclear communication effected a normalisation of gene expression and thus a cell redifferentiation to normal body cells or induced apoptosis[2] (literature on mitochondrial-nuclear interaction at [3].) The redifferentiation process progresses in three phases: Proliferation reduction, proliferation inhibition and complete degeneration of the tumour tissue. However, since this process takes months to years, the therapeutic concept of tumour redifferentiation therapy should be further optimised by integrating additional procedures such as intravascular laser blood irradiation.

Laser blood irradiation activates metabolic processes

Intravascular laser blood irradiation has been applied and systematically studied for decades in the former Soviet Union and indeed for chronic diseases such as Diabetes mellitus, liver diseases, cardiac and renal insufficiency. In the relevant litera-

ture it has been e.g. reported that as a result of laser blood irradiation mitochondria are morphologically altered and metabolic energy processes are activated. This method allows the mitochondria of human lymphocytes to morphologically form so-called "giant mitochondria" (these are reactive phenomena, and in no case pathological giant chromosomes, such as those described in diverse degenerative diseases) and simultaneously the ATP and RNA synthesis rates increase significantly. In the process, cells with a low (acidic) pH and hypoxia are said to react better than normal cells (literature overview at [4]). Based on this data, we presumed that the laser blood irradiation and the bioimmunotherapy according to Tallberg exerted similar or equivalent target functions on tumour cells and that synergistic or additive effects could be achieved.

Materials and methods of AWB

Seventeen patients with advanced metastatic carcinomas of different tumour entities were treated. All patients had been pretreated; the conventional treatment was considered to have been completed at that time. Clinically, the patients were in acceptable condition; they were mobile and stable with regard to their haematological situation (Hb, Hkt, thrombocytes, leukocytes, etc.).
The patients were divided into three groups:

- Group I: Five patients received an intravascular laser blood irradiation.
- Group II: Five patients were treated with bioimmunotherapy. Clinically proven formulation mixtures plus phospholipids from animal brain tissue (so-called neurofood) plus vaccine from the patient's own tumour tissue (for detailed information, see Tallberg).
- Group III: Seven patients were concurrently treated with intravascular laser blood irradiation and bioimmunotherapy.

Intravascular laser blood irradiation

The "Weberneedle blood" unit with red light laser, 5 mW, 658 nm, continuous irradiation (Weber medical GmbH, D-37696 Lauenförde) was used. 10 x laser blood irradiation of 30 minutes duration each.
Treatment intensity: biweekly
Application location: Left cubital vein.

Laboratory parameters

Initially and at the end of each five-week observation period examinations were performed to detect the presence of circulating atypical cells, determine their quantification and morphological comparison examinations of the tumour cell mitochondria (subsequent to fluorescent labelling) under a laser scan microscope (= high-resolution morphology). Weekly determination of the relevant tumour markers and examination of a native blood smear with laser scan microscopy to depict immunocomplex aggregates adhering to the erythrocyte membrane (Fluoview, Olympus, x 30,000).

Isolation, identification and semi-quantification of circulating atypical cells

In each case 50 ml of fresh heparin blood. PBS centrifugation to separate mononuclear cells. Multiple washing, pelleting and resuspension as well as transfer to a cell culture medium (MEM plus glutamine solution plus foetal bovine serum). Duration of culture 2 to 3 weeks at 37° C, under CO_2. Immunocytological examination and, if necessary, DNA cytophotometry. Quantification in a Neubauer counting chamber (Fig. 1).

Laser scan microscopy

Typically, plasma proteins are adsorbed onto the erythrocyte membrane. They are not visible in conventional light microscope, but can be discerned in the high-resolution laser scan microscope (Fig. 2). Malignant cells produce abnormal proteins,

which in turn stimulate B cells to antibody formation. As a consequence immunocomplex aggregates which have a high affinity for the erythrocyte membrane. As a result of the absorption of such immunocomplex aggregates on the erythrocyte membrane and simultaneous desorption of the physiological membrane-bound plasma proteins, characteristic images are formed which gradually demonstrate the deviations from the immunologically normal findings. The deviations from normal findings are assigned a diagnostic score of 0 to 30, where a score of 30 indicates a maximum on atypia.

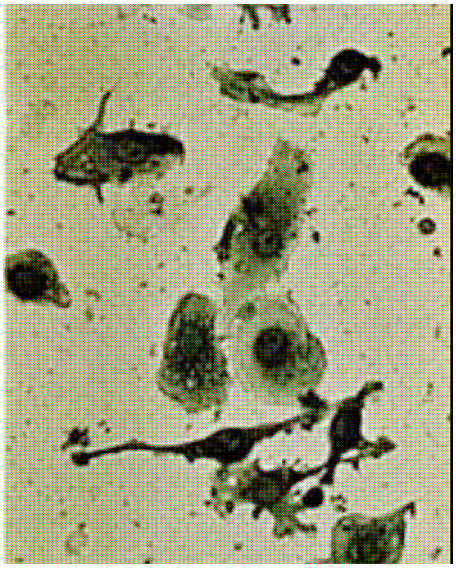

Fig. 1. Typical tumour cell culture

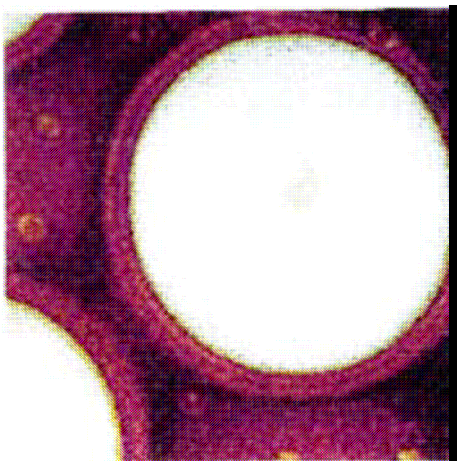

Fig. 2. Normal finding: Erythrocyte with adsorbed plasma proteins

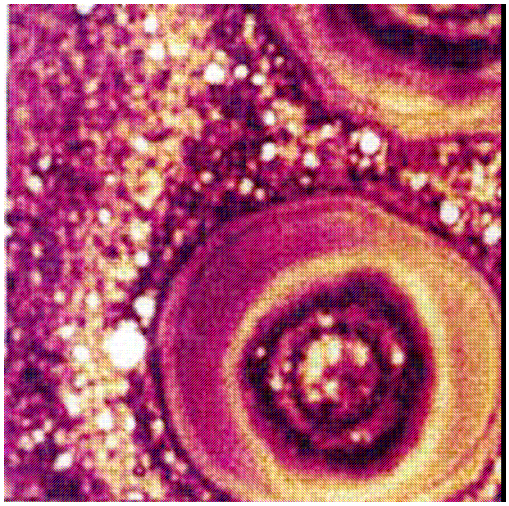

Fig. 3. Pathological finding: Immunocomplex aggregates, desorption of the plasma protein zone and apposition of metalloproteins in the pallor region.

Application study confirms the effect of the laser therapy

The important examination results are presented in the following tables. The comparative morphological examination of the tumour cell mitochondria yielded a conformity of changes in the mitochondrial morphology in all three groups. Tumour-specific modifications of the mitochondria occurred, which possibly allow new diagnostic approaches. A comprehensive report on this will be published separately in the near future.

CONCLUSION

Based on diverse information in the literature, we expected that intravascular laser therapy could be effective in the scope of a redifferentiation therapy. This assumption appears to have been confirmed by the results of our application study. Merely as a result of the sole application of intravascular laser therapy, the quantity of circulating tumour cells was reduced and the patient's pathological immune response modulated in the direction of the standard. The bioimmunotherapy according to Tallberg was even more effective in the comparison. Both procedures applied simulta-

neously obviously exhibit synergistic and possibly also additive effects. We presume that the intravascular laser therapy, like the bioimmunotherapy according to Tallberg, influences the mitochondria-nuclear communication by means of a direct effect on the mitochondria, and that malignantly transformed cells redifferentiate to normal somatic cells or transition into apoptosis (additive effect) In addition the known positive immunomodulatory effects of this therapy are likely to be of additional importance (synergism). Our patients were all chemotherapeutically maximally pretreated and have additionally responded well to the intravascular laser treatment. The use of intravascular laser blood irradiation can therefore also be appropriate during conventional oncological treatments. On the basis of the existing data, it can be assumed that the efficacy of chemotherapy (induction of tumour cellular apoptosis) can be increased as a result of intravascular laser therapy. Further investigations are planned in this regard.

Group 1: Laser therapy

Type of tumour	**TZ**	**LSM1**	**LSM2**	**LSM3**	**LSM4**	**LSM5**	**TU marker**
Squamous cell carcinoma/ENT	–25%	26	17	14	6	4	SC : negative CEA : –9%
Adenocarcinoma colorectal	–10%	30	26	18	11	8	CA 19-9: –8%
Mucinous ovarian carcinoma	–11%	30	24	22	15	11	CA 72-4: -12%
Adenopapillar urothelial carcinoma	–9%	28	22	14	14	11	TPA : –6%
Hepatocellular carcinoma	–12%	24	24	21	19	14	AFP : –13%

Group 2: Bioimmunotherapy

Type of tumour	**TZ**	**LSM1**	**LSM2**	**LSM3**	**LSM4**	**LSM5**	**TU marker**
Hepatocellular carcinoma	–70%	22	20	12	11	2	AFP : -22%
Ductal breast cancer	–28%	28	22	14	2	4	CA 15-3: -64%
Prostatic carcinoma	–35%	30	30	12	11	4	PSA : –24%
Prostatic carcinoma	–64%	17	12	11	5	0	PSA : -48%
Lung carcinoma	–53%	30	25	17	14	2	CYFRA 21-1: –34%

Group 3: Combination therapy

Type of tumour	**TZ**	**LSM1**	**LSM2**	**LSM3**	**LSM4**	**LSM5**	**TU marker**
Ductal breast cancer	–100%	28	14	4	4	2	CA 15-3: -87%
Renal cell carcinoma	–89%	26	11	6	2	2	No marker
Non-small cell lung cancer	–78%	30	17	7	6	6	NSE : –74%
Prostatic carcinoma	–100%	22	8	2	2	1	PSA : -83%
Pancreatic carcinoma	–84%	30	28	7	7	5	CA 19-9: -56%
Endometrial carcinoma	–100%	18	4	2	2	0	CA 125: –49%
Cervical-uterine carcinoma	–100%	25	2	2	1	0	CEA : –71%

Table 1: Results of the application study. TZ : Change in the quantity of circulating tumour cells after 5 weeks. LSM 1-LSM 5: Score of the weekly laser scan microscopic findings. TU marker: Total change in the respective tumour marker after 5 weeks.

Literature:

1) Laudahn G., Lüders J.C. Virchows Archiv, 1957, Vol. 329, 5: 581-609

2) Tallberg T. Dt. Ztschr. Onkol., 2003, 35: 78-99

3) Borghouts C. Logos Verlag Berlin, ISBN 978-3-89722-419-3

4) Weber M.H., Fussgänger-May T., Wolf T. Dt. Ztschr. f. Akup. 50, 2007, 3: 12-23

Biological Laser Therapy

Dr. Frank Andrä, MD
Corso Felice Cavallotti, 102
18038 Sanremo (IM), Italy
E-mail: frank@dr-andrae.info