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Conference Paper

Lyme Disease and Oncothermia

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Lyme disease is a tick-borne disease with multiple organ failures, and systemic disorders. Dramatic change becomes apparent in the chronic phase of the disease. Chronic fatigue syndrome, lapse of concentration, depression, joint pain, and muscle pain are a few, but major clinical symptoms characterizing the disease. The human immune system is defenseless. *Borrelia* uses various mechanisms to escape from immunoattacks or antibiotic therapies. This "stealth phenomenon" needs new therapeutic principles to be interrupted. Our objective in this paper is to study the effect of oncothermia, which is a well-established oncological therapy, on Lyme disease. First, in our present work, we definitely concentrate on the quality of life of the patients.

1. Background

Lyme borreliosis (LB), or Lyme disease, is transmitted by ticks of the *Ixodes ricinus* complex. Its manifestations had been documented [1]. The etiologic agent, *Borrelia burgdorferi*, was first isolated from the vector tick *Ixodes dammini* (now *I. scapularis*) [2]. *Borrelia burgdorferi* is a bacterial species of the Spirochete class of the genus *Borrelia*, which has a double-membrane envelope [3]. *Borrelia burgdorferi* is one of the few pathogenic bacteria that can survive without iron, having replaced all of its iron-sulfur cluster enzymes with enzymes that use manganese, thus avoiding the problem many pathogenic bacteria face in acquiring iron. It takes more than 24 hours of attachment for transfer of *Borrelia burgdorferi*. Huge development was made during the past 20 years understanding *Borrelia burgdorferi* and its consequent illness. Its microbiology [4], epidemiology [5], diagnosis [6, 7], and clinical practices [8–10] are studied in detail.

Clinical symptoms of Lyme disease are serious. We are listing only some major of them as follows: fatigue syndrome, lapse of concentration, depression, joint pain, muscle pain, erythema chronicum, myocarditis, cardiomyopathy, arrhythmia, arthritis, arthralgia, meningitis, neuropathies, and facial nerve palsy.

Borrelia burgdorferi infections have been linked to non-Hodgkin lymphomas, [11]. Oncothermia, well known in cancer therapy [12], might be an adequate method for treatment of Lyme disease. The applied bioelectromagnetic energy absorption acts on the cellular membrane [13] and on its regulation [14], tuning the parameters to the membrane destruction [15]. The applied interaction radiofrequency (RF) range (RF carrier with LF modulation [16, 17]) coupled by impedance (capacitive) mode could act on the cell-membrane states of the bacteria. The huge temperature gradient on the membrane could modify the HSP structure shown by DNA array involving first of all the HSP60 and HSP70 chaperones proteins [18]. *Borrelia burgdorferi* is especially sensitive on the membrane states of these HSPs [19, 20], so the effect is expected. These experimental results on the special activity of chaperones have to be clarified in more detail in connection with the applied modulation of oncothermia [21], which also modified the HSP activity [22], in consequence it could be a useful tuning parameter for selection of the bacteria.

2. Method

In 12 patients (8 male and 4 female; mean age 55 y, [39 ÷ 76]) suffering from Lyme disease the influence of oncothermia on healing processes was examined in this pilot study. Their medical history was the cohort forming ability. Tick bite was recognized for 75% (9/12) patients and erythema migrans of

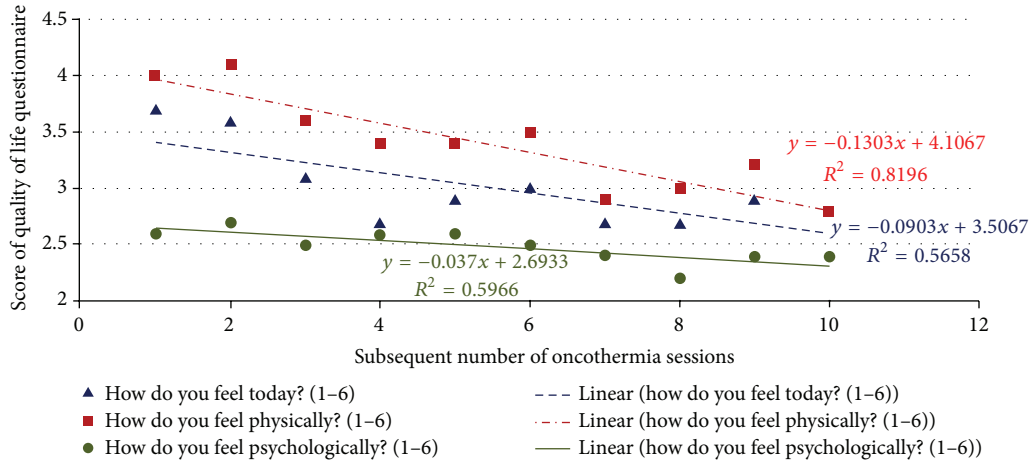

Figure 1: Development of the values of quality of life scores by time of the 12 patients involved in the present study.

Table 1: Average score of the 12 patients in sequences of the treatment sessions.

Questions/number of oncothermia sessions	1	2	3	4	5	6	7	8	9	10
How do you feel today? (1–6)	3,7	3,6	3,1	2,7	2,9	3,0	2,7	2,7	2,9	2,8
How do you feel physically? (1–6)	4,0	4,1	3,6	3,4	3,4	3,5	2,9	3,0	3,2	2,8
How do you feel psychologically? (1–6)	2,6	2,7	2,5	2,6	2,6	2,5	2,4	2,2	2,4	2,4

50% (6/12), antibiotics pretreatment was made for all (12/12), and the typical symptoms of lyme disease/lyme-neurodisease were registered for all (12/12). All the patients were ELISA positive (12/12) and Western Blot positive (12/12) as well. Lymphocyte Transformation Test (LTT) was positive for 42% (5/12), while Borrelia-IgG in cerebrospinal fluid was positive in 17% (2/12) of the cases. Due to the complicated and very expensive laboratory tests, the effects were measured on the quality of life of the patients. For this measurement a special questionnaire was prepared, concentrating on three questions: general feeling today, feeling physically and feeling psychologically. Evaluation was made in grades on a 1–6 scale (1 = excellent, 6 = inadequate/very bad). This score is generally used for quality of life evaluation in our practice for longer time.

Treatments were done by oncothermia method (EHY3000, Oncotherm GmbH, Germany); the duration was 60 min per session. Treatments were 3 times a week, and all 10 sessions together were provided. The heating protocol was a step-up heating (70/100/130/150 W) with modulation, using electrode 40 × 70 cm area, applying it for the trunk of the patients.

As drug support minocycline and hydroxychloroquine were used when indicated. They were administered orally.

Complementary supportive therapy was applied orally as well: high dose Vitamin C 7.5 gr; Vitamin B12; glutathione; homeopathics to support emunctories; medicated mushrooms (capsule); supplementary like Vitamin D, calcium, magnesium.

3. Results

The evaluation of the development of the quality of life shows remarkable improvement (see Table 1 and Figure 1; points are averages of the 12 patients answers).

In the majority of cases dramatic improvement in physical state occurred, a better response to other therapeutic treatments. Particularly neurological disorders could be influenced positively.

The patient feels as good as never before, can do housekeeping again, and could do her/his work again. Those who were frequently absent from the school after the treatment regularly visited the lessons again and so forth.

Adverse effects were sometimes headache and rarely neuropathic symptoms during the treatment.

4. Conclusion

Oncothermia is an important module in treatment-concept of Lyme disease. Mechanism of action against stealth development should be objectified. Procedure of oncothermia treatment (power/treatment-time/treatment frequency) should be defined. Synergies with other treatments should be objectified. Oncothermia should become a vital component in therapeutical treatment of lyme disease.

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