

Oncothermia application for various malignant diseases

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Abstract

Oncothermia was introduced to our hospital in 2010. Our objective is to report results of 277 patients treated by oncothermia during 20 months. We present some characteristic cases and statistical study of the overall results. We concluded state the feasibility of oncothermia to treat high variety of malignant diseases also in their very advanced (T4N3M1) stages.

Background

Hyperthermia is a long time used treatment in oncology, having debates about its applicability and working mechanisms. There are numerous technical solutions [1], [2] but the results are mostly controversial like the cervix studies are, (the positive [3] and the opposite effect [4] of hyperthermia was published). The basic problem is the missing control, due to the simple fact of the focusing possibilities. The sophisticated technologies are concentrating the localized and focused energy to the target, however the temperature is distributed from any sharply focused volume, naturally trying to be equalized in its neighborhood. The smearing of the temperature is accelerated by the physiologic feedback to cool down the specially heated volume by the extra blood-flow in the heated part of the body [5], [6]. The extra blood-flow naturally supports the tumor by nutrients (mainly glucose) and increases the risk of dissemination. The focusing and heating mechanisms are certainly different in various kinds of technical solutions, which reflects on the problem of the standardization, no reference point exists [7].

Method

Avoiding the controversies, oncothermia was used in our study. Oncothermia has realized the root of the problem: impossibility to localize the temperature in the desired volume. The solution was the nano-heating technology. Oncothermia selects and heats up very locally (in nanoscopic range) the membrane of the malignant tumors, [8]. This effect excites important pathologic pathways to promote apoptosis [9], and overcome on the main problem of the technical challenge by large energy intake but on a very well localized place. It needs 60 min to reach the general temperature equilibrium, which is the time of the active oncothermia session. The oncothermia in this line is working permanently by thermal non-equilibrium conditions. We collected all patients (n=277) who had at least one oncothermia treatment in time-interval Nov.2010 – July 2013 (20 months). The patient group had nM=125 males and nF=152 females. Average age was 53 y [7-84 y]. The various diseases and the number of patients involved in the study were heterogeneous, (see figure 1.) aiming to check the efficacy on the wide range of diseases and stages.

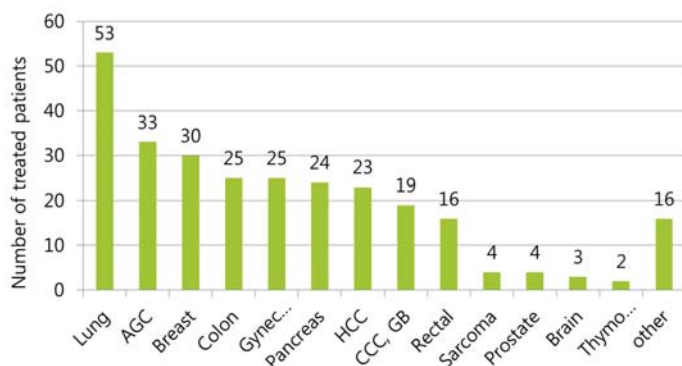


Figure 1. Diseases and the patients number who were involved in the present study

Major target areas were Lung 53, Stomach 33, Breast 30 and Colon 25. We assume the reason why lung cancer was the highest number. It is not only because lung cancer is the most common cancer in Korea but also other area's cancers easily metastasize to lung.

The treatment had step-up heating protocol [60W□150W], using 20 cm and 30 cm diameter electrodes. The step-up grades were fit by personalization, with careful control of the actual patient. Oncothermia

was applied 1~4 times a week (figure 2.). 47.9% of the patients got 3 times a week and the cases of 4 treatments a week was on multiple locations.

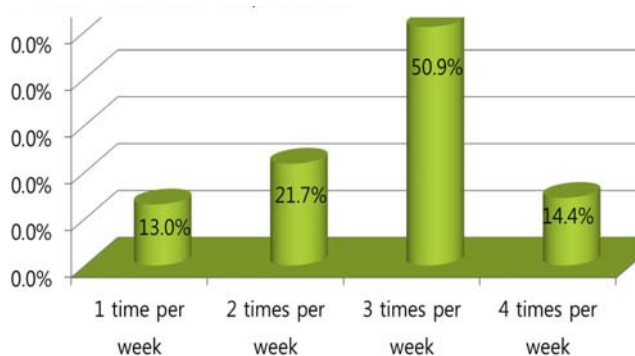


Figure 2. Distribution of the frequency of the oncothermia treatment

Oncothermia was applied in complementary combination with various chemo- radio-therapies, as well as trimodal (chemo-radio-thermo) application was also used. A certain part of the patients, where standard therapies were not applicable due to various reasons, had oncothermia monotherapy, (figure 3.) 38.3% of patients who received Oncothermia was concurrently treated with Immune Therapy or Orthomolecular medicine within the same hospital. 45.5% received chemo therapy, 5.8% received radiation therapy and 10.5% was with both chemo and radiation therapy. Oncothermia as monotherapy was applied to patients who were not in good condition to get other therapies.

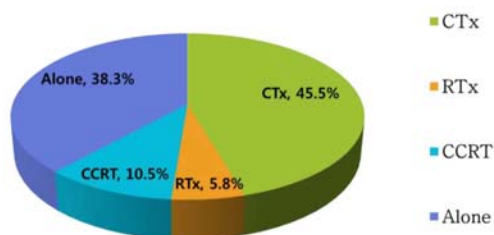


Figure 3. Oncothermia complementary to standard treatments. (CTx – chemotherapy, various kind; RTx – radiotherapy various kind; CCRT – concurrent chemo-radiotherapy various kind; alone – oncothermia monotherapy)

Distribution of the cumulative treatment numbers was heterogenic. 49% of the patients received less than 12 times, 24% was less than 24 times, 14% less than 36 times and 13% more than 36 times oncothermia treatment. The highest number was more than 200 times in a year, handling the fatal disease as chronic.

Case reports

We show some characteristic case reports which are well demonstrating the forceful feasibility of oncothermia applications.

Small-cell lung cancer

A 66 years old male patient was diagnosed with small cell lung cancer in June 15, 2011. He received chemotherapy EPS #2 and oncothermia twice a week in one cycle. On September 14, 2011 good partial remission (PR) was observed.



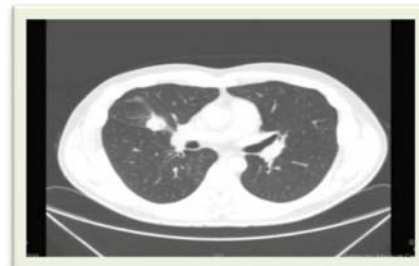
Before the complex therapy with oncothermia



After the complex therapy with oncothermia

Non small-cell lung cancer

Non-small cell lung cancer was diagnosed in July 13, 2011 at the 40 years old male patient. He was treated with chemotherapy Iresa from August 2, 2011 and with oncothermia twice a week (10 times). Good partial remission (PR) was diagnosed in September 14, 2011.



Before the complex therapy with oncothermia

After the complex therapy with oncothermia

Advanced non small-cell lung cancer

The 68 years old female patient was diagnosed with stage IV. non-small cell lung cancer. Stage cT4N2M1a, pleural seeding. She received chemotherapy 15th CTx (Paclitaxel and Cisplatin) from 02 March, 2011 to 15 February 2012. She also received 4 cycles of oncothermia. Good partial remission (PR) was observed in 09 May, 2012.



Chest PA before therapy (19 February 2011)



Chest CT before therapy (20 February 2011)



Chest PA during therapy (15 February 2012)



Chest CT during therapy (15 February 2012)



Chest CT after therapy (09-May-2012)

Advanced adenocarcinoma of lung

48 year old male was diagnosed with adenocarcinoma, stage IV lung cancer (cT4N3M1b). He received chemotherapy S/P 8th. CTx. -[Vinorelbine + Cisplatin] (07-July-2011~ 01-February-2012) and oncothermia complementary. Post-treatment Tarceva is being taken, also it is applied currently. Good partial remission (PR) was observed on 04 June, 2012.



Chest PA before therapy (25-01-2012)



Chest CT before therapy (08-02-2012)



Chest PA after therapy (04-06-2012)



Chest CT after therapy (04-06-2012)

Study results

The half of the patients who was treated, was not evaluated, due to the therapy is in progress. The clinical response for all the patients (n=277) is shown of Figure 4.

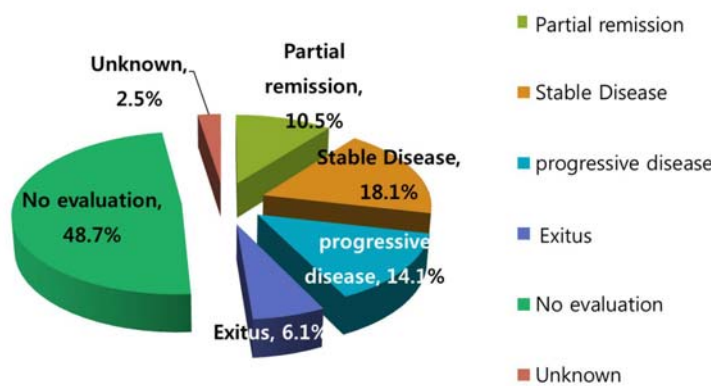


Figure 4. Clinical response for all the patients who was treated with oncothermia at least one times

The clinical response of the evaluated patients (n=142) shows more than half of the patients responded (Figure 5.). We analyzed the Oncothermia treatment results based on the CT images taken after the treatments. But only 52% of the entire group was subjected to result analysis. 48% was not traceable. The result of the 52% was, 21.5% PR, 36% SD, 28.9% PD and 12.6% exitus. So 58.5% of the patients showed either stable disease or partial remission. Given this was applied for end stage patients, this is very encouraging result.

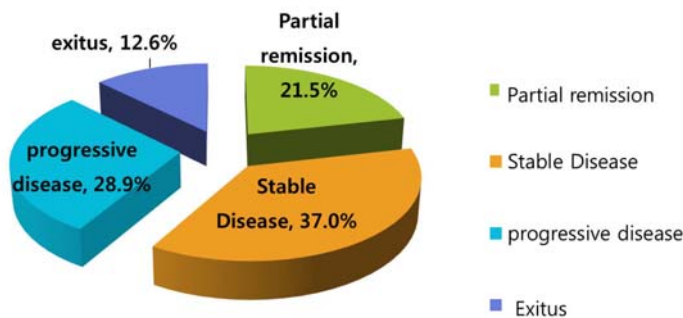


Figure 5. Clinical response of the evaluated patients (n=142)

No adverse effects were observed during the study.

Conclusion

As a conclusion, despite of being small number group and relatively not long period, it seems that oncothermia is feasible good therapeutic modality for the patients with end stages, who can no longer receive standard therapies.

Moreover, apart from the end stage patients, we observed improvement of the quality of life of the treated

patients, and we expect that oncothermia will show good result for general condition, pathological stage on early stage patients too. We expect increase of QoL and enhance of the clinical remission rate and to reduce of the frequency of recurrence and metastases.

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