ESHO 2017

21-23 June

Athens, Greece

Hellenic Society for Oncologic Hyperthermia

Abstract Book

Under the Auspices of

- Hellenic Society of Radiation Oncology
- Hellenic Society of Nanotechnology in Health Sciences
- Hellenic Society of Interventional Radiology
- Hellenic Society of Medical Physics
- Hellenic Society for Integrative Oncology
- National & Kapodistrian University of Athens

www.esho2017.eu

TOPIC: SUPERFICIAL HT

OP-04

Re-irradiation and wIRA-hyperthermia for superficial widespread breast cancer recurrences: an up date

Dr. Med Markus Notter[1], Prof. Dr. med Peter Vaupel[2]
[1]RO Department Lindenhofspital, [2]RO Department Klinikum rechts der Isar TUM

Introduction: Locally recurrent breast cancer after previous radiotherapy is a challenging clinical situation since initial RT considerably limits the level of re-irradiation (re-RT). Under these conditions, the combination with superficial hyperthermia offers the possibility of achieving local control even with lower RT doses as recently shown by Notter et al. (IHJ, 2016). An up-date after an additional year of follow up should investigate, whether the obtained local control is maintained.
Methods: We report now of 102 patients with large-area, locally recurrent breast cancer (57 patients with lymphangiosis included), which were treated in this retrospective study from Sep 2009 to Feb 2017 with combined hypo-fractionated, low-dose re-RT (4 Gy 1x/week up to a total dose of 20 Gy), delivered 1-4 min after thermography-controlled water-filtered infrared A hyperthermia (wIRA-HT). 24 patients had tissue transfer, 18 patients presented with microscopic disease.
Results: Overall response was: CR: 63/102 (62%), PR: 35/102 (34%), NC: 3/102 (3%), PD: 1/102 (1%). Response rates in patients with macroscopic disease were: CR: 45/84 (54%), PR: 35/84 (42%), NC: 3 /84 (3%), PD: 1/84 (1%). Local control throughout life time after obtained CR-s is presented in the table.
Out of 17 patients with re-recurrences, 30 manifestations were observed: 5 infield (17%), 13 at the border (43%) and 12 outside (40%).
Conclusions: Good local control of heavily pretreated, large-area breast cancer recurrences can be obtained and is maintained in 73% of patients throughout life time. Most of the re-recurrences are observed at the border of or outside former treatment fields. Irradiances up to 150-200 mW/cm2 were applied without generation of heat pain and thus limited patient compliance.
The clinical wIRA/HT-setting used offers a series of advantages over other techniques currently applied in clinical oncology. These include: contact-free heating (e.g., of ulcerated, bleeding tumors) and treatment of irregularly shaped, widespread lesions. No patchwork technique is required for larger sizes (diameter of treatment field is 23-26 cm per applicator with approx. 7% inhomogeneity of irradiance, circular field area = 420-530 cm2). Adaptation to larger areas can be achieved by a twin-applicator system. wIRA is independent of individual body contours. While thermal dosimetry for HT is generally performed with fiberoptic probes that sample only a small number of set locations, in the system applied real-time thermography is used which assesses large surface temperature distributions allowing for the observation of dynamic developments during HT sessions. Thermography also enables the instant and easily achievable protection of heat-sensitive tissue structures (e.g., scars) and can thus avoid hot spots and grade 2 - 4 skin toxicities. Because of low toxicity with this treatment schedule, wIRA-RT can be used for re-reRT-settings (e.g., in 17 patients in our study).
Limitations for wIRA-HT are tumor lesions with depth extensions >20 mm.
Outlook: wIRA-sHT/re-RT is ready to be prospectively tested against standard schedules.
Ref.: Notter et al, IJH Sept. 2016

	all	**macroscopic total**	**macroscopic with L***	**macroscopic Ø L***	**microscopic**

no. patients with CR	63 (100%)	45 (100%)	25 (100%)	20 (100%)	18 (100%)
local control (life time)	46 (73%)	28 (62%)	9 (36%)	19 (95%)	18 (100%)
Re-recurrences	17 (27%)	17 (38%)	16 (64%)	1 (5%)	0

Table 1: Local control & re-recurrences after CR. Legends: L* = lymphangiosis

OP-05

Water-filtered infrared-A (wIRA) in superficial hyperthermia – physical and photo-biological basics

Dr. Helmut Piazena[1]
[1]*Charité-University Medicine Berlin*

Introduction
There is an increasing interest in the use of water-filtered infrared-A (wIRA) for superficial hyperthermia, especially because of its suitability for large-sized area treatment, for contact-free real-time thermographic control of the irradiated region and for both major reduction of side effects and complete exclusion of burn risks.
Methods
wIRA radiators are technically realized by filtering of the emission spectrum of a halogen lamp radiator by a water layer of 7 mm thickness. In order to control skin surface temperature during the exposure, an IR-camera is used integrated in a closed control loop.
Results
wIRA radiators show a structured spectrum in the spectral range of 780 - 1400 nm with strong reduction of the emission within the included water absorption bands. Penetration of radiation into the tissue is mainly influenced by absorption which causes primary generated heat. Mie-scattering supports penetration by forward orientation and diverges the incident radiation. Main chromophores of skin and tissue show relatively small absorption coefficients within the spectral range of wIRA as a part of the "optical window" of tissue for interaction with optical radiation. Therefore, maximum spectral penetration depth was found at 1080 nm yielding a depth of about 28 mm (1 % of incident irradiance), to about 8 mm (10 % of incident irradiance), and to about 5.6 mm (1/e of incident irradiance), whereas mean penetration depths of the whole wIRA spectrum range between 15 mm (1 % of incident irradiance), 5 mm (10 % of incident irradiance), and 1.3 mm (1/e of incident irradiance).
Primary generated thermal energy is dissipated effectively by conduction and by convection creating a much larger heated target volume as compared with the range of absorption.
Data of in vivo measurements and of model calculations are provided which show the effects of incident irradiance on generation of both surface temperature and tissue temperature, and of individual variability which is considered in practical use by thermographic control during the treatment.
Conclusions
wIRA is an effective radiation in superficial hyperthermia with contact free thermographic control of the irradiated area creating the therapeutic temperatures required for therapy of superficial tumour lesions.