Extreme whole-body hyperthermia – A prospective data capture for oncological use

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Extreme whole-body hyperthermia – A prospective data capture for oncological use

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Indication for this prospective observation :

1995 – Phase-I-trial: 490 treatments in late-stage, response: on average all entities in about 60 percent (Von Ardenne et al.)

1995 – Phase-I-trial: 954 treatments, advanced metastasized carcinoma response: 10 % CR, 65 % PR (Yokoyama, M.)

2001 – Publication Int. J. Hyperthermia: Technical-physical aspects and clinical experiences (Wehner, H.; Von Ardenne, A.)

2004 – Publ. Int. J. Hyperthermia: Phase-I/-II-Trial: WBH in scope of von Ardenne's systemic Cancer multi-step Therapy (sCMT) (Hildebrandt, B. et al., Charité

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Search for answers / aim?

- How often is extreme hyperthermia (> / = 41.5 ° C) actually achievable in these stages of cancer?
- Are the already published good data of feasibility and patient safety reproducible?
- What side effects are to be evaluated at what frequency?
- In what frequency are serious complications to be expected?

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Material and method:

1. IRATHERM 2000 Von Ardenne Institut

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2. extreme whole-body hyperthermia in the procedure of systemic cancer multi-step therapy

extreme whole-body hyperthermia ≥ 41,5 – 42,5°C
(using **water-filtered infrared-A radiation** or water bath)
+
Induced hyperglycemia
(Hyperacidity of the tumor)
+
relative hyperoxemia
(combined for improving thermal sensitivity of tumor cells / tissue)

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Treatment data

prospective observation study 01.04.1997–31.08.2016

- Aim: 1000 treatments
- 655 sCMT-treatments overall
- 613 sCMT-treatments > 41,5°C & evaluable
- 306 Patients were involved; 27 cancer types
- **N613 = 93,59 % ≥ 41,5 °C => Temperature target is constantly achievable - average temperature** of all treatments **42,1 °C**
- **18% as Thermotherapy and 82% as Thermo-Chemo-Therapy (N=597)**

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Percentage distribution of temperature level based on 613 case data

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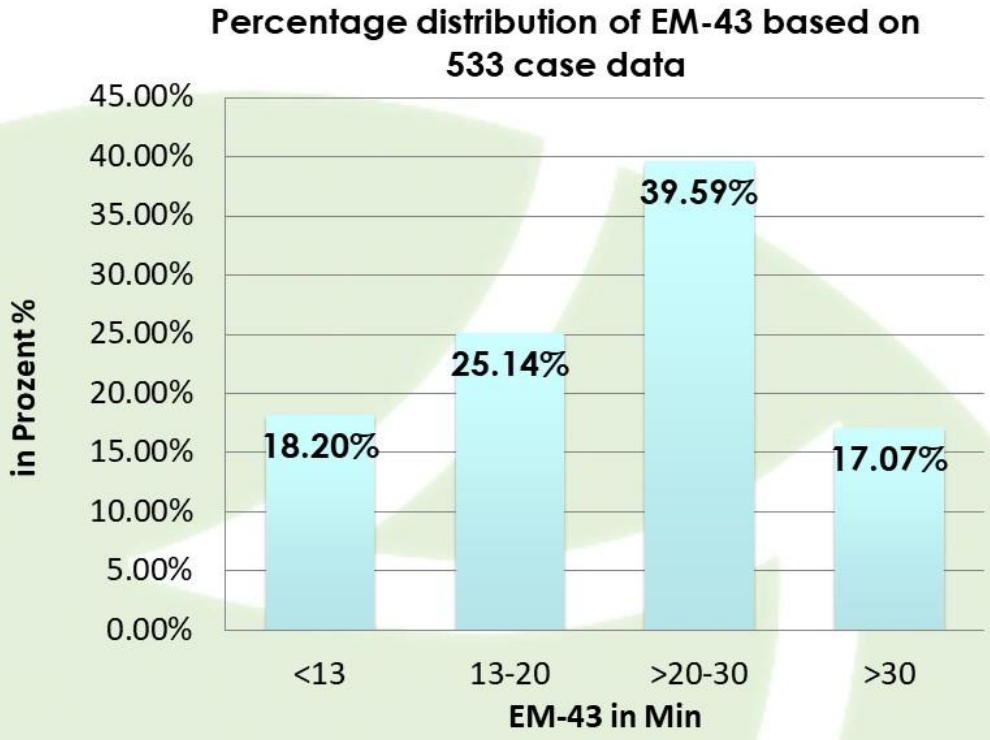

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Side effect

	thermal damage 0-24h	Neurotox-icity 0-24h	coma 0-24h	thermal damage day 1-9	Neurotox-icity day 1-9	coma day 1-9
N-total	595	595	595	595	595	595
N-case	48	10	1	37	9	1
	8,07%	1,68%	0,17%	6,22%	1,51%	0,17%
Grade 1	29	4	0	18	3	0
Grade 2	14	3	0	14	3	0
Grade 3	3	1	1	4	1	1
Grade 4	2	2	0	1	2	0

Σ 0-24 h in total 59 side effect & day 1 – 9 in total 37 side effect

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Thermotherapy

			percentage on 109 cases	
Thermal damage	**0-24 h**	**1.-9. day**	**0-24 h**	**1.-9. day**
Grade 1	5	1	4,59%	0,92%
Grade 2	5	5	4,59%	4,59%
Grade 3	1	2	0,92%	1,83%
Grade 4	1	0	0,92%	0,00%
neurotoxicity	**0-24 h**	**1.-9. day**	**0-24 h**	**1.-9. day**
Grade 1	1	1	0,92%	0,92%
Grade 2, 3 & 4	did not occur			
Coma	**0-24 h**	**1.-9. day**	**0-24 h**	**1.-9. day**
Grade 1 & 2 & 4	did not occur			
Grade 3	1	1	0,92%	0,92%

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Thermo-Chemo-Therapy

			percentage on 488 cases	
Thermal damage	**0-24 h**	**1.-9.day**	**0-24 h**	**1.-9.day**
Grade 1	24	17	4,92%	3,48%
Grade 2	9	9	1,84%	1,84%
Grade 3	2	2	0,41%	0,41%
Grade 4	1	1	0,20%	0,20%
neurotoxicity	**0-24 h**	**1.-9.day**	**0-24**	**1.-9.day**
Grade 1	3	2	0,61%	0,41%
Grade 2	3	3	0,61%	0,61%
Grade 3	1	1	0,20%	0,20%
Grade 4	2	2	0,41%	0,41%
Coma	did not occur			

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Side effect / complication

- We observed in this prospective observation
  3 therapy associated deaths (due to of further pathological facts: unknown Aneurysma, Ileus, not defined) means **0,46 %** based 655 treatments!

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conclusion

- Extreme whole-body hyperthermia in procedure of sCMT is feasible and safe
- Side effects of thermotherapy are minor and mostly thermal damage that heals quickly
- Temperature level and quality can be reliably reproduced
- Overall, both therapy groups have low side effects
- Most patients had already received various cycles of chemotherapy at the time of their hyperthermia treatment, so no conclusions can be drawn as to what the side effects would look like in pure thermotherapy

=>
namely, the irradiation with water-filtered infrared-A heats the surface not so strong that the thermal skin lesions are to explain. Circulation disorders in the upper skin damage are suspected

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Thank you for your attention

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