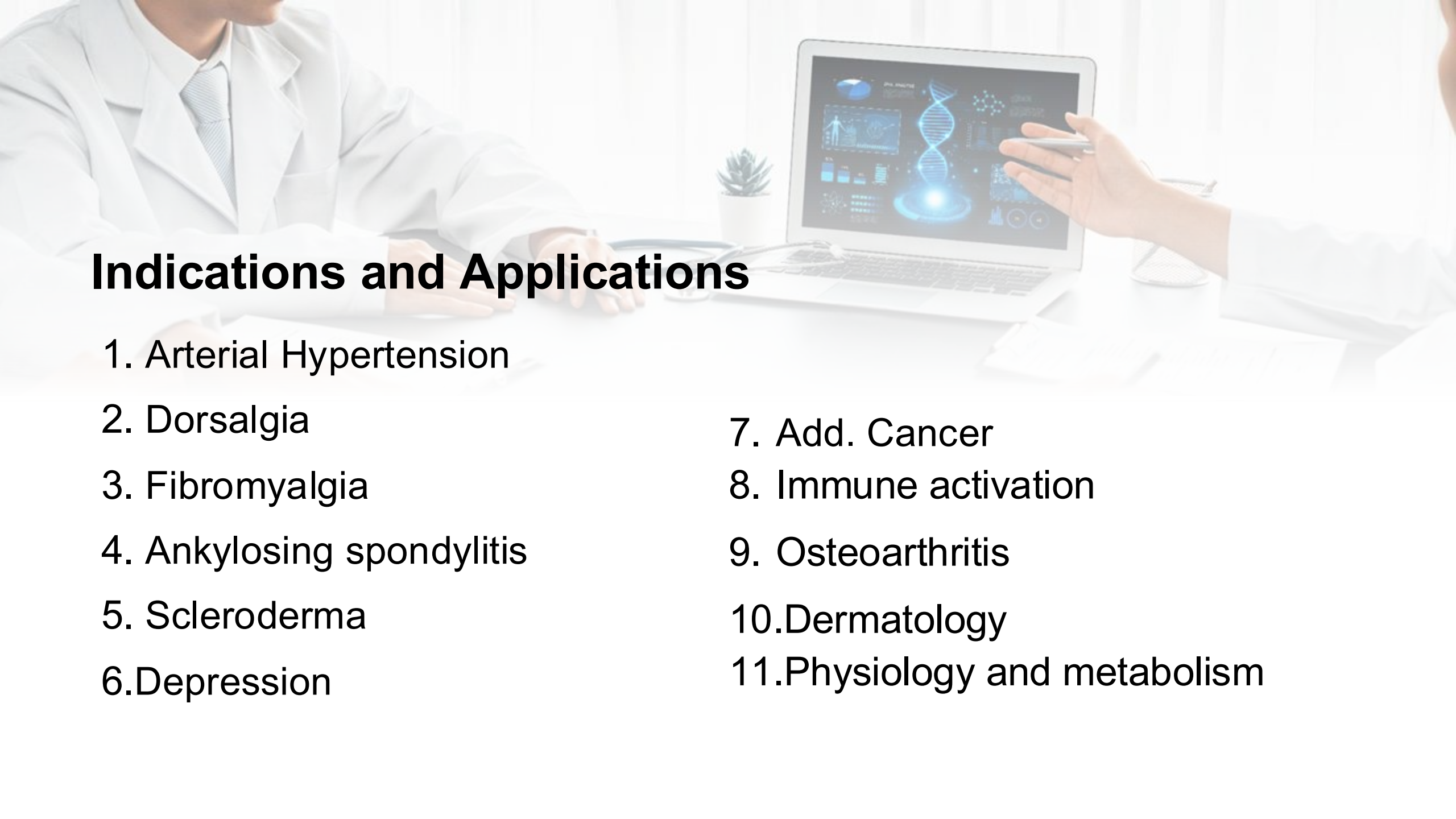


**Clinical literature collection of
Whole body Hyperthermia**

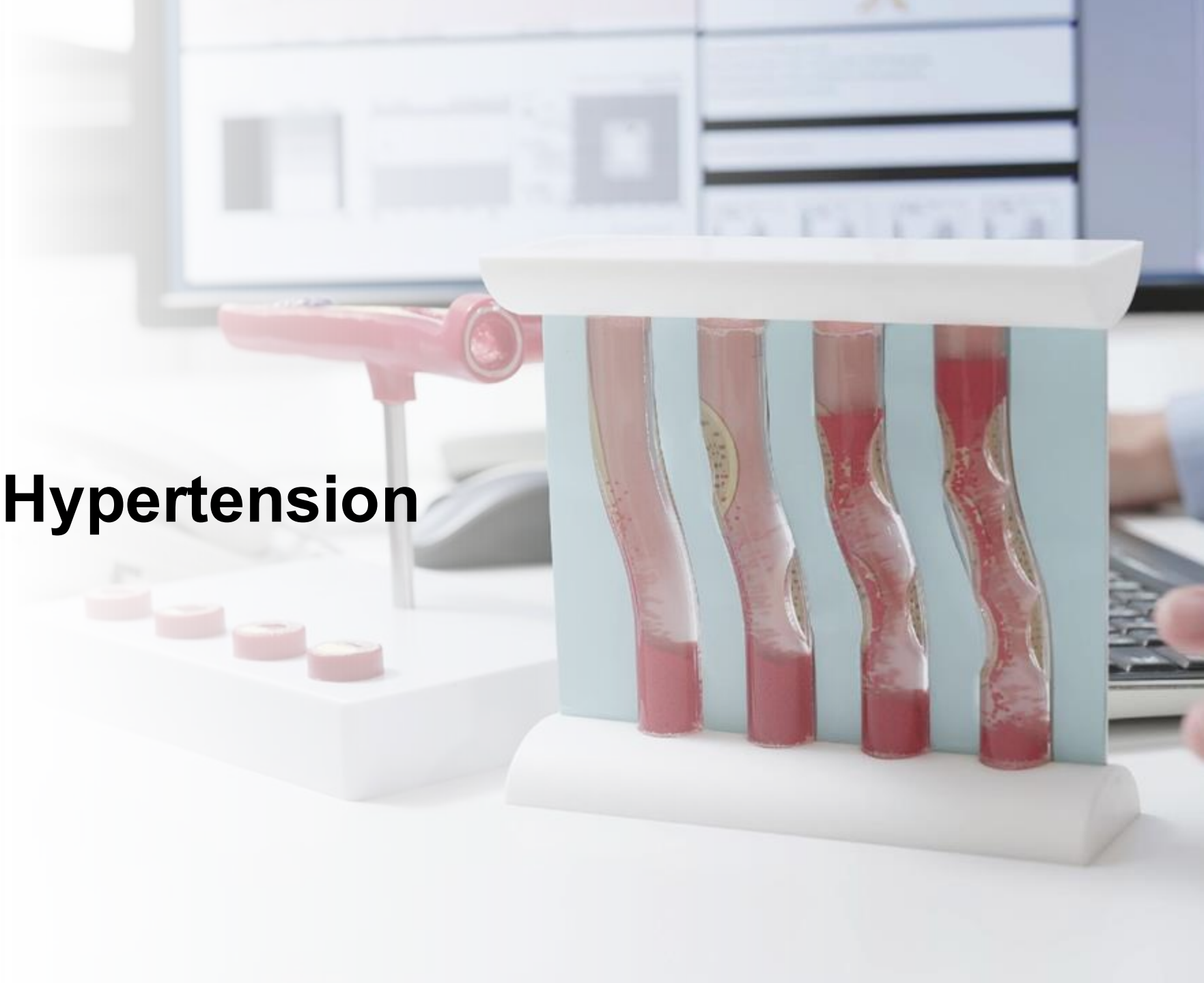


Indications and Applications

1. Arterial Hypertension
2. Dorsalgia
3. Fibromyalgia
4. Ankylosing spondylitis
5. Scleroderma
6. Depression
7. Add. Cancer
8. Immune activation
9. Osteoarthritis
10. Dermatology
11. Physiology and metabolism

01

Arterial Hypertension



1. Arterial Hypertension

No.	Name	Authors	Title	Year	Journal
1	Meffert_1990b	Meffert H, Buhholtz I, Brenke A, Sönnichsen N	Milde Infrarot-A-Hyperthermie zur Behandlung der systemischen Sklerodermie	1990	Dermatol. Mon.schr. 176
2	Meffert_1990a	Meffert H, Hecht H.-Chr., Günther H., Scherf H.-P., Schumann E., von Ardenne M., Sönnichsen N.	Biophysikalische Ergebnisse des klinischen Tests der IRA-Therm-Hyperthermiertechnik der 2. Generation	1990	ThermoMed 6
3	Meffert_1991	Meffert B, Hochmut O, Steiner M, Scherf HP, Meffert H	Effects of a multiple mild infra-red-A induced hyperthermia on central and peripheral pulse waves in hypertensive patients	1991	Medical & Biological Engineering & Computing

1. Arterial Hypertension

No.	Name	Authors	Title	Year	Journal
4	Meffert_1993b	Meffert H., Scherf H.-P., Meffert B.	Milde Infrarot-A-Hyperthermie. Auswirkungen von Serienbestrahlungen mit wassergefilterter Infrarotstrahlung auf Gesunde und Kranke mit arterieller Hypertonie bzw. systemischer Sklerodermie	1993	Aktuelle Dermatologie (inferred from "Akt. Dermatol. 19 (1993))
5	Meffert_1994	H. Meffert, H.-P. Scherf, Beate Meffert	Milde Infrarot-A-Hyperthermie. Grundlagen, Bestrahlungstechnik, biologische Effekte und therapeutische Anwendungen	1994	Aktuelle Dermatologie ("Akt. Dermatol. 20 (1994))

1. Arterial Hypertension

No.	Name	Authors	Title	Year	Journal
6	Meffert_2002	H. Meffert, Piazena H.	Grundlagen, Bestrahlungstechnik, biologische Effekte	2002	Aktuelle Dermatologie
7	Scherf_1989	H.-P. Scherf, H. Meffert, H. Bäuml, K. Dittmann, H. Siewert, D. Strangfeld, H.-J. Winterfeld, H.-Ch. Hecht, E. Schuhmann, N. Sönnichsen	und therapeutische Anwendungen	1989	Dermatologische Monatsschrift, 175 (1989) 733-740
8	Scherf_1991	H.-P. Scherf, H. Meffert, M. Mischke, K.-P. Schollak	-	1991	Phys Rehab Kur Med 1 (1991) 38-40

02

Dorsalgia



2. Dorsalgia

No.	Name	Authors	Title	Year	Journal
1	Meffert_1990b	E. Weller and D. Ullrich	Infrarot-A- Hyperthermie- Anwendung bei Patienten mit Analgetica- Abusus wegen chronischer Rückenschmerze n	1990	Presented at the 95th Congress of the "Society for Physical Medicine and Rehabilitation" (October 5, 1990)
2	Ettrich_2014	E. Weller and D. Ullrich	Milde Ganzkörperhypert hermie in Kombination mit stationärer multimodal orientierter Schmerztherapie. Evaluation bei Patienten mit chronischem unspezifischem lumbalem Rückenschmerz	2014	Der Orthopäde 43:165–174

2. Dorsalgia

No.	Name	Authors	Title	Year	Journal
3	Hoffmann_2014	G. Hoffmann	Wassergefiltertes Infrarot-A (wIRA) in der Sport- und Präventivmedizin	2014	Schriftenreihe des Fachgebietes Lichttechnik; 8. Sympos. Licht und Gesundheit
4	Wei-Ping_2017	Wei-ping MA, Bing ZHU, Wen W, Ning- chao K, Jun-ping MA, Jin-Zi S, Su-Ying A	A comparative study on the effect of water- filtered infrared-A irradiation and common infrared irradiation in the treatment of lumbar disc herniation	2017	Chinese Medical Journal, Vol 52, Edition 12

03

Fibromyalgia



3. Fibromyalgia

No.	Name	Authors	Title	Year	Journal
1	Schleenbecker_1998	Schleenbecker HG, Schmidt KL	Zur Wirkung einer iterativen milden Ganzkörperhyperthermie auf den Fibromyalgieschmerz	1998	Phys Rehab Kur Med 8 (1998) 113 – 117
2	Brockow_2007	Brockow T, Wagner A, Franke A, Offenbächer M, Resch KL	A Randomized Controlled Trial on the Effectiveness of Mild Water-filtered Near Infrared Whole-body Hyperthermia as an Adjunct to a Standard Multimodal Rehabilitation in the Treatment of Fibromyalgia	2007	Clinical Journal of Pain

<https://pubmed.ncbi.nlm.nih.gov/17277647/>

3. Fibromyalgia

No.	Name	Authors	Title	Year	Journal
3	Walz_2013	Walz J, Hinzmann J, Haase I, Witte T	Ganzkörperhyperthermie in der Schmerztherapie. Eine kontrollierte Studie an Patienten mit Fibromyalgiesyndrom	2013	Schmerz
4	Langhorst_2023	Langhorst J, Koch AK, Kehm C, Öznur Ö, Engler H, Häuser W	Mild Water-Filtered Infrared-A Whole-Body Hyperthermia Reduces Pain in Patients with Fibromyalgia Syndrome - A Randomized Sham-Controlled Trial	2023	Journal of Clinical Medicine

<https://pubmed.ncbi.nlm.nih.gov/23354314/>
<https://pubmed.ncbi.nlm.nih.gov/37109279/>

3. Fibromyalgia

No.	Name	Authors	Title	Year	Journal
5	Öznur_2023	Öznur Ö, Schlee C, Utz S, Langhorst J	Investigating the Influential Factors of Mild Water-Filtered Infrared-A Whole-Body Hyperthermia for Pain Relief in Fibromyalgia: A Mixed-Methods Approach Focusing on Predictors and Patient Perspectives	2023	Biomedicines

<https://pubmed.ncbi.nlm.nih.gov/38001951/>

04

Ankylosing spondylitis



4. Ankylosing spondylitis

No.	Name	Authors	Title	Year	Journal
1	Stegemann_2013	Stegemann I, Hinzmann J, Haase I, Witte T	Ganzkörperhyperthermie mit wassergefilterter Infrarot-A-Strahlung bei Patienten mit axialer Spondyloarthritis	2013	OUP (Orthopädische und Unfallchirurgische Praxis)
2	Zauner_2014	Zauner D, Quehenberger F, Hermann J, Dejaco C, Stradner MH, Stojakovic T, Angerer H, Rinner B, Graninger WB	Whole body hyperthermia treatment increases interleukin 10 and toll-like receptor 4 expression in patients with ankylosing spondylitis: A pilot study	2014	International Journal of Hyperthermia

4. Ankylosing spondylitis

No.	Name	Authors	Title	Year	Journal
3	Lange_2017	Lange U, Müller-Ladner U, Dischereit G	Wirkung iterativer Ganzkörperhyperthermie mit wassergefilterte Infrarot-A-Strahlung bei ankylosierender Spondylitis – eine kontrollierte, randomisierte, prospektive Studie	2017	Aktuelle Rheumatologie
4	Clinical Rheumatology	Turner I.H., Ladner U.M., Uhlemann C., Lange U..	The effect of mild whole-body hyperthermia on systemic levels of TNF-alpha, IL-1 beta and IL-6 in patients with ankylosing spondylitis.	2008	Clin Rheumatol 2009; 4:397-402

05

Scleroderma



5. Scleroderma

No.	Name	Authors	Title	Year	Journal
1	Meffert_1990b	Meffert H, Buhholtz I, Brenke A, Sönnichsen N	Milde Infrarot-A-Hyperthermie. Auswirkungen von Serienbestrahlungen mit wassergefilterter Infrarotstrahlung auf Gesunde und Kranke mit arterieller Hypertonie bzw. systemischer Sklerodermie	1990	Dermatol. Mon.schr. 176
2	Meffert_1993a	Meffert H, Müller GM, Scherf HP	Milde Infrarot-A-Hyperthermie zur Behandlung von Erkrankungen des rheumatischen Formenkreises. Anhaltende Verminderung der Aktivität polymorphkerniger Granulozyten.	1993	Intern. Sauna-Arch. 10 H. 4

5. Scleroderma

No.	Name	Authors	Title	Year	Journal
3	Foerster_2005	Foerster J, Fleischanderl S, Wittstock S, Storch A, Meffert H, Riemekasten G, Worm M	Infrared-Mediated Hyperthermia Is Effective in the Treatment of Scleroderma-Associated Raynaud's Phenomenon	2005	Journal of Investigative Dermatology

06

Depression



6. Depression

No.	Name	Authors	Title	Year	Journal
1	Janssen_2016	Janssen CW, Lowry CA, Mehl MR, Allen JJB, Kelly KL, Gartner DE, Medrano A, Begay TK, Rentscher K, White JJ, Fridman A, Roberts LJ, Robbins ML, Hanusch KU, Cole SP, Raison CL	Whole-Body Hyperthermia for the Treatment of Major Depressive Disorder - A Randomized Clinical Trial	2016	JAMA Psychiatry
2	Zschaeck_2021	Zschaeck S, Weingärtner J, Ghadjar P, Wust P, Mehrhof F, Kalinauskaite G, Ehrhardt VH, Hartmann V, Tinhofer I, Heiland M, Coordes A, Kofla G, Budach V, Stromberger C, Beck M	Fever range whole body hyperthermia for re-irradiation of head and neck squamous cell carcinomas: Final results of a prospective study	2021	Oral Oncology

<https://pubmed.ncbi.nlm.nih.gov/27172277/>
<https://pubmed.ncbi.nlm.nih.gov/33626457/>

6. Depression

No.	Name	Authors	Title	Year	Journal
3	Flux_2023	Flux MC, Smith DG, Allen GGB, Mehl MR, Medrano A, Begay K, Middlemist BH, Marquart BM, Cole SP, Sauder CJ, Lowry CA, Raison CL	Association of plasma cytokines and antidepressant response following mild-intensity whole-body hyperthermia in major depressive disorder	2023	Translational Psychiatry
4	Giollabhui_2024	Giollabhui NM, Lowry CA, Nyer M, Foster SL, Liu RT, Smith DG, Cole SP, Mason AE, Mischoulon D, Raison CL	The antidepressant effect of whole-body hyperthermia is associated with the classical interleukin-6 signaling pathway	2024	Brain, Behavior, and Immunity

<https://www.nature.com/articles/s41398-023-02402-9>

<https://pubmed.ncbi.nlm.nih.gov/38677624/>

07

Add. Cancer



7. Add. Cancer

No.	Name	Authors	Title	Year	Journal
1	Bull_2008	Bull JMC, Scott GL, Strebel FR, Nagle VL, Oliver D, Redwine M, Rowe RW, Ahn CE, Koch SM	Fever-range whole-body thermal therapy combined with cisplatin, gemcitabine, and daily interferon- α : A description of a phase I-II protocol	2008	International Journal of Hyperthermia
2	Sulyok_2012	Sulyok I, Fleischmann E, Stift A, Roth G, Lebherz-Eichinger D, Kasper D, Spittler A, Kimberger O	Effect of preoperative fever-range whole-body hyperthermia on immunological markers in patients undergoing colorectal cancer surgery	2012	British Journal of Anaesthesia

7. Add. Cancer

No.	Name	Authors	Title	Year	Journal
3	Zschaeck_2021	Zschaeck S, Weingärtner J, Ghadjar P, Wust P, Mehrhof F, Kalinauskaite G, Ehrhardt VH, Hartmann V, Tinhofer I, Heiland M, Coordes A, Kofla G, Budach V, Stromberger C, Beck M	Fever range whole body hyperthermia for re-irradiation of head and neck squamous cell carcinomas: Final results of a prospective study	2021	Oral Oncology
4	Kleef_2021	Kleef R, Nagy R, Baierl A, Bacher V, Bojar H, McKee DL, Moss R, Thoennissen NH, Szász M, Bakacs T	Low-dose ipilimumab plus nivolumab combined with IL-2 and hyperthermia in cancer patients with advanced disease: exploratory findings of a case series of 131 stage IV cancers- a retrospective study of a single institution	2021	Cancer Immunology, Immunotherapy

7. Add. Cancer

No.	Name	Authors	Title	Year	Journal
5	Hohneck_2023	Hohneck AL, Sadikaj L, Heinemann L, Schroeder M, Riess H, Gerhards A, Burkholder I, Heckel-Reusser S, Gottfried J, Hofheinz RD	Patients with Advanced Pancreatic Cancer Treated with Mistletoe and Hyperthermia in Addition to Palliative Chemotherapy: A Retrospective Single-Center Analysis	2023	Cancers
5	Pengyuan_2024	Pengyuan L, Jing W, Liting C, Zhenhai W, Yufei W, Ganlu Z, Bingqi Y, Beibei Z, Nan W, Jinan S, Chuanfeng Z, Lan L, Shuhuan Y, Jianjun L, Zhen G, Yuli Z, Zhao J, Hao J, Tingxiang W, Jueyi Z, Yajun W, Chuan S, Jie S, Jian Z, Zhibing W	Water-filtered infrared A radiation hyperthermia combined with immunotherapy for advanced gastrointestinal tumours	2024	Cancer Medicine

7. Add. Cancer

No.	Name	Authors	Title	Year	Journal
7	Kockelmann_2004	Fabian Kockelmann, Urs Giger-Pabst, Mehdi Ouaisi, Petru Bucur, Sarah Barbey, Alexander von Ardenne, Jürgen Zieren	First Clinical Safety and Feasibility Data of Whole-body Hyperthermia Pressurized Intraperitoneal Aerosol Chemotherapy (WBH-PIPAC) for Peritoneal Surface Malignancies	2024	Anticancer Research
8	Moghaddam_2024	Fahimeh Faghihi Moghaddam, Mohsen Bakhshandeh, Bahram Mofid, Hüseyin Sahinbas, Fariborz Faeghi, Hamidreza Mirzaei, Afshin Rakhsha, Amir Shahram Yousefi Kashi, Reza Sadeghi, Arash Mahdavi	Clinical effectiveness of combined whole body hyperthermia and external beam radiation therapy (EBRT) versus EBRT alone in patients with painful bony metastases: A phase III clinical trial study	2024	Journal of Thermal Biology

08

Immune activation



8. Immune activation

1. Evans, S. S., Repasky, E. A., & Fisher, D. T. (2015). Fever and the thermal regulation of immunity: the immune system feels the heat. *Nature reviews. Immunology*, 15(6), 335–349.
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3. Mace, T. A., Zhong, L., Kokolus, K. M., & Repasky, E. A. (2012). Effector CD8+ T cell IFN- γ production and cytotoxicity are enhanced by mild hyperthermia. *International journal of hyperthermia : the official journal of European Society for Hyperthermic Oncology, North American Hyperthermia Group*, 28(1), 9–18.
<https://doi.org/10.3109/02656736.2011.616182>
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5. Vaupel P, Piazena H, Notter M, Thomsen AR, Grosu AL, Scholkmann F, Pockley AG, Multhoff G. From Localized Mild Hyperthermia to Improved Tumor Oxygenation: Physiological Mechanisms Critically Involved in Oncologic Thermo-Radio-Immunotherapy. *Cancers (Basel)*. 2023 Feb 22;15(5):1394. doi: 10.3390/cancers15051394. PMID: 36900190; PMCID: PMC10000497.



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Zhang HG, Mehta K, Cohen P, Guha C.*Cancer Lett*. 2008 Nov 28;271(2):191-204. doi: 10.1016/j.canlet.2008.05.026 Epub 2008 Jul 1 PMID: 18597930 Review



9. Osteoarthritis

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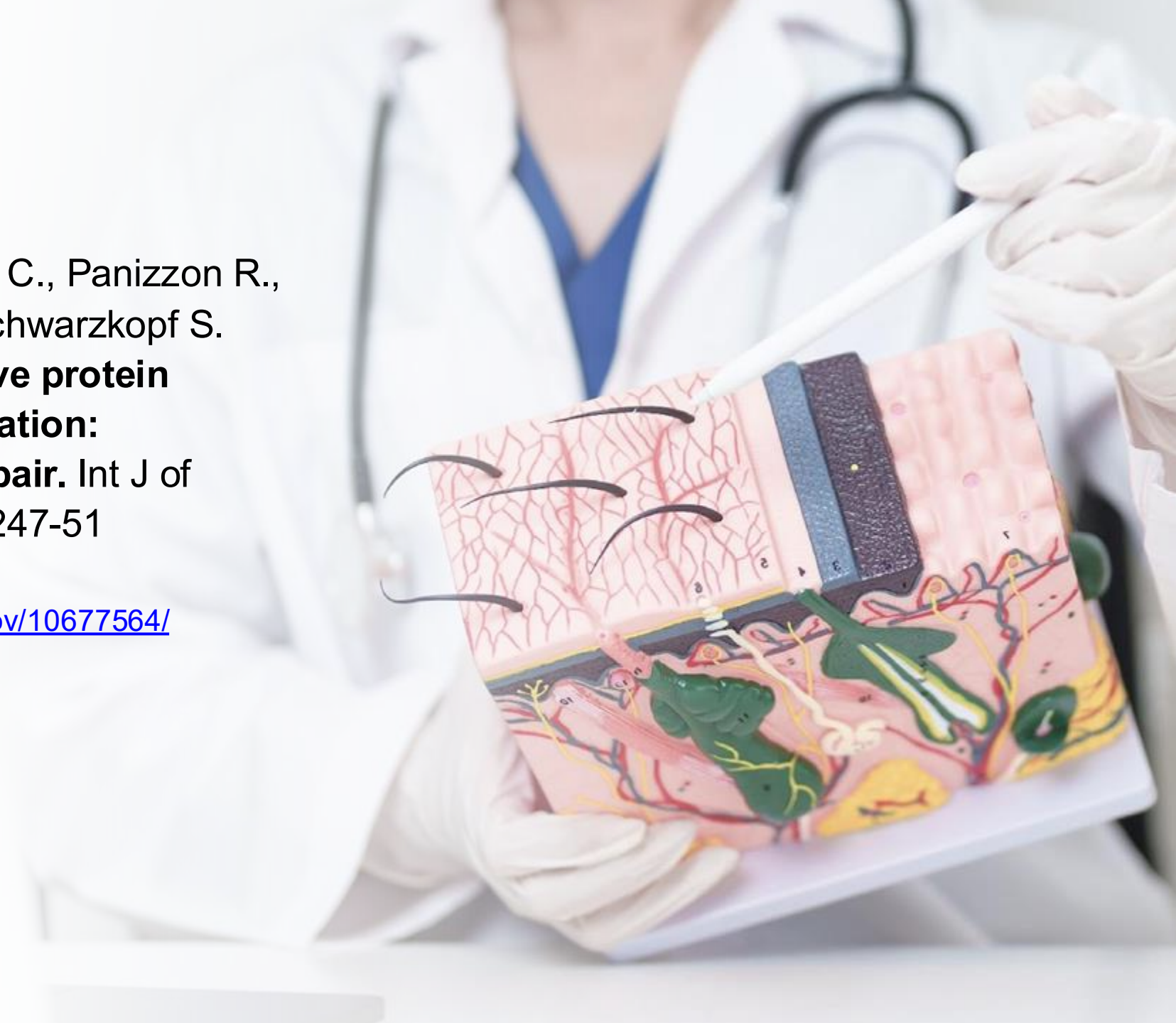
<https://pubmed.ncbi.nlm.nih.gov/19905896/>



10.Dermatology

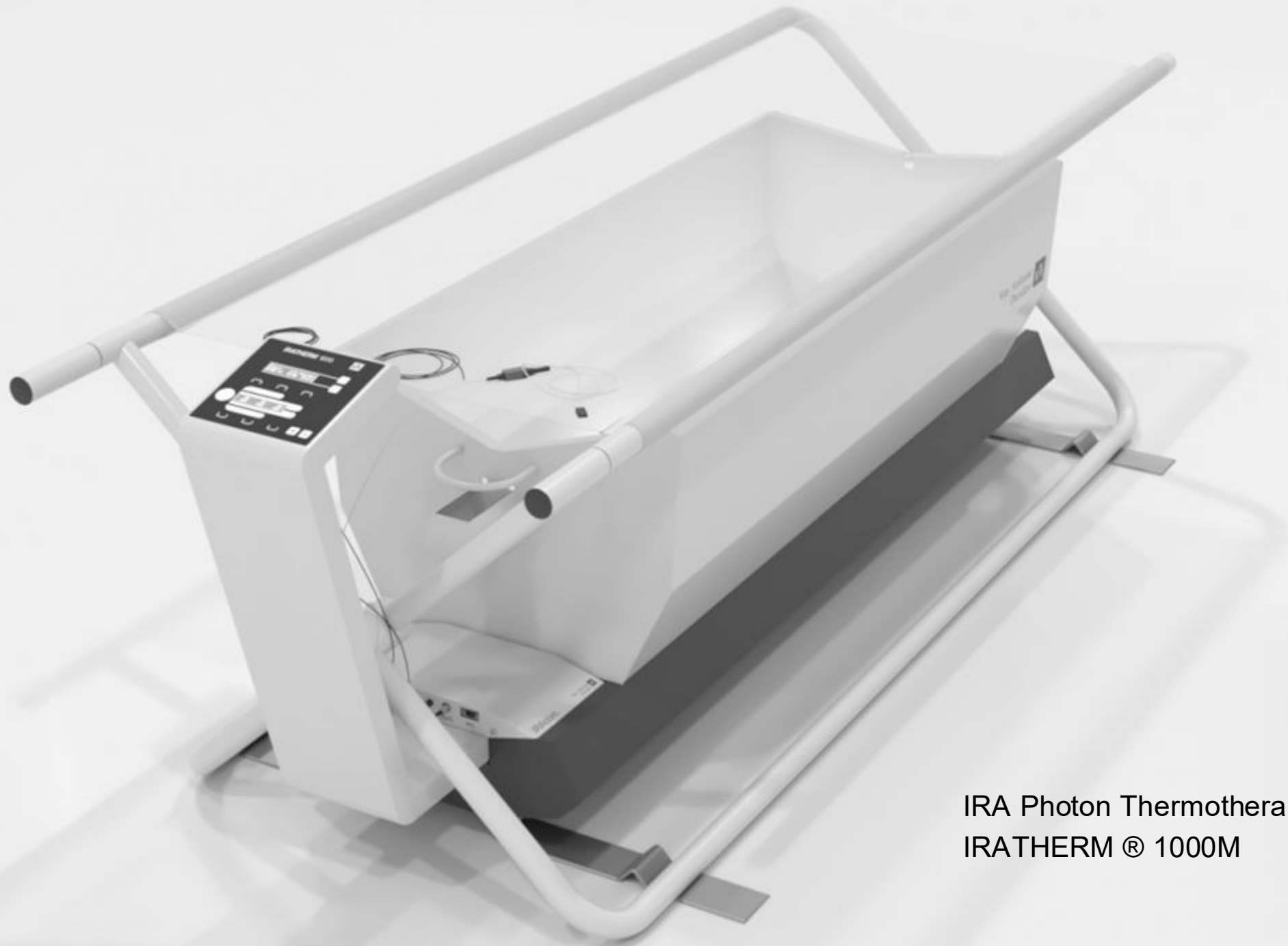
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11. Physiology and metabolism

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3. Hyperthermia activates macroautophagy, the cellular recycling process, removing damaged components and promoting cellular renewal. McCormick et al (2021). J Appl Physiol. 130: 1–9
4. Hyperthermia stimulates mitochondrial biogenesis, increasing mitochondrial numbers and enhancing energy production. It also reduces oxidative stress, which damages mitochondria. Von Schulze & Geiger (2022). Curr. Op. in Physio. 27:100553
5. Hyperthermia modulates inflammatory pathways, reducing inflammatory cytokine production and promoting anti-inflammatory cytokine expression. Gomez (2021). GeroScience. 43(5): 2515–2532



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