International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Iron, Fever and Cancer: An Intrinsic Gravitational–Thermogenetic Theory from Stars to Human Biology

Iresh Ranjan Bhattacharjee

Independent Researcher, Institute for Intrinsic Gravitation Biology, Assam, India

Abstract
Cancer-associated fever, localized tumour hyperthermia, iron accumulation, and solid mass formation are consistently observed clinical phenomena, yet they remain mechanistically fragmented across molecular, genetic, and inflammatory explanations. In this theory-forward article, we advance **Intrinsic Gravitational Thermogenesis (IGT)** as a unifying physical principle governing energy dissipation, mass clustering, and thermal retention across scales—from stellar evolution to embryogenesis and oncogenesis. Drawing on astrophysics, thermodynamics, bone–marrow physiology, and cancer biology, we propose that iron acts as a conserved thermophysical mediator linking gravitational compression in stars with metabolic–structural heat generation in tumours. This framework does not displace molecular oncology but embeds it within a deeper energetic and physical architecture, offering a scale-invariant theory of growth, fever, and pathological mass formation.

Keywords: Intrinsic gravitation, thermogenesis, iron metabolism, cancer fever, mass clustering, stellar–biological continuum

1. Theoretical Premise and Scope

Modern cancer biology is dominated by genetic, epigenetic, and signalling-centric explanations. However, cancer presents emergent macroscopic features—solid lumps, regional hyperthermia, impaired heat dissipation, and iron sequestration—that are not reducible to gene-level causation alone. These features are instead characteristic of **dense, energy-dissipating systems**.

Astrophysics has long recognized that whenever matter aggregates beyond a critical density, intrinsic gravitation drives compression, collision frequency rises, entropy increases, and heat is generated. We propose that **living systems are not exempt from this rule**, but rather operate as regulated, miniature thermodynamic systems whose stability depends on balancing inward mass accretion against outward energy dissipation.

Cancer, within this framework, represents a **failure of thermodynamic regulation** rather than solely a failure of genetic control.

2. Intrinsic Gravitation as a Biological Principle

2.1 Gravity Beyond Newtonian Distance Forces

In biological systems, gravity does not act as a long-range attractive force in the Newtonian sense. Instead, it manifests as **intrinsic gravitation**—the tendency of mass, density, and inertia to cluster toward centroids under constrained volumes.

Examples include:

- Centrosome centration during mitosis
- Cellular aggregation in embryos and tumours
- Bone marrow compartmentalization
- Vascular congestion and tissue densification

These processes generate localized compression analogous to gravitational collapse in astrophysical systems.

2.2 Thermodynamic Consequences of Mass Clustering

When mass density increases:

1. Molecular and cellular collision frequency rises
2. Elastic and inelastic collisions convert mechanical energy to heat
3. Entropy increases
4. Heat retention becomes dominant if dissipation pathways are impaired

This sequence is scale-invariant and applies equally to protostars and tumour nodules.

3. Iron as the Thermodynamic Keystone

3.1 Iron in Stellar Evolution

In stars, fusion proceeds exothermically until iron is formed. Iron fusion is endothermic and halts outward pressure, precipitating collapse. Thus, iron marks the **thermodynamic termination points of stellar life**.

Key physical properties of iron:

- High density (~7.9 g/cm³)
- High thermal inertia
- Magnetic susceptibility
- High molar heat capacity (~25 J/mol·°C)
- These properties make iron a **sink for energy** and a stabilizer of dense cores.

3.2 Iron in Human Physiology and Cancer

In human biology, iron occupies an analogous position:

- Central to haemoglobin and oxygen delivery
- Essential for mitochondrial respiration
- Required for DNA synthesis and proliferation

Cancer cells exhibit iron addiction: increased uptake, reduced efflux, and intracellular accumulation. From an IGT perspective, this is not merely metabolic—it is **thermodynamically inevitable** in dense, rapidly accreting cellular systems.

Iron amplifies heat retention within tumours, reinforcing local hyperthermia and further destabilizing surrounding tissues.

4. Bone Marrow, Skeleton, and Core Thermoregulation

The bone–bone marrow–spinal axis functions as a **distributed thermal reservoir**. Calcium–phosphate matrices, magnesium-dependent enzymes, sodium–potassium ionic fluxes, and iron-rich marrow together create a system optimized for:

- Heat storage (high specific heat)
- Heat conduction (trabecular bone)
- Heat convection (marrow blood flow)

This system sustains human core temperature under physiological conditions (Fig 1). Its collapse at death produces **algor mortis**, demonstrating that temperature maintenance is an active, material-driven process—not merely neural control.

5. Cancer Fever as Thermodynamic Inevitability

Conventional explanations of cancer fever emphasize cytokines and inflammation. IGT reframes fever as a **physical consequence of impaired heat dissipation**:

- Tumours lack effective vasodilation
- Dense cellular architecture traps heat
- Iron-rich environments increase thermal inertia

Systemic fever emerges when localized tumour heat exceeds compensatory capacity. The frequent association of fever with liver metastasis reflects the liver's central role in iron storage and metabolic heat regulation.

6. Embryogenesis, Cancer, and Stellar Homology

Embryos, tumours, and stars share a common growth logic:

- Rapid mass accretion
- Density-driven clustering
- Core–periphery thermal gradients

Human embryos generate measurable heat during early cleavage stages. Germ layer stratification mirrors planetary layering:

Stellar Layer	Biological Layer
Core	Endoderm
Mantle	Mesoderm
Crust	Ectoderm

Cancer represents a **pathological reactivation of embryonic thermogenetic programs**, divorced from developmental termination signals.

7. Intrinsic Gravitational Thermogenesis (IGT): Formal Model

IGT proposes the following causal chain:

Mass accumulation → Density increase → Collision frequency → Heat generation → Iron-mediated heat retention → Impaired dissipation → Fever and tissue damage

This model integrates seamlessly with molecular oncology while explaining macroscopic cancer behaviour that genes alone cannot.

8. Predictions and Testable Implications

The IGT framework predicts:

- Correlation between tumour iron density and local temperature gradients
- Preferential tumour survival in thermally insulated tissues
- Enhanced efficacy of therapies disrupting iron retention or heat storage
- These predictions are experimentally testable using thermal imaging, iron chelation studies, and marrow–tumour interface analysis.

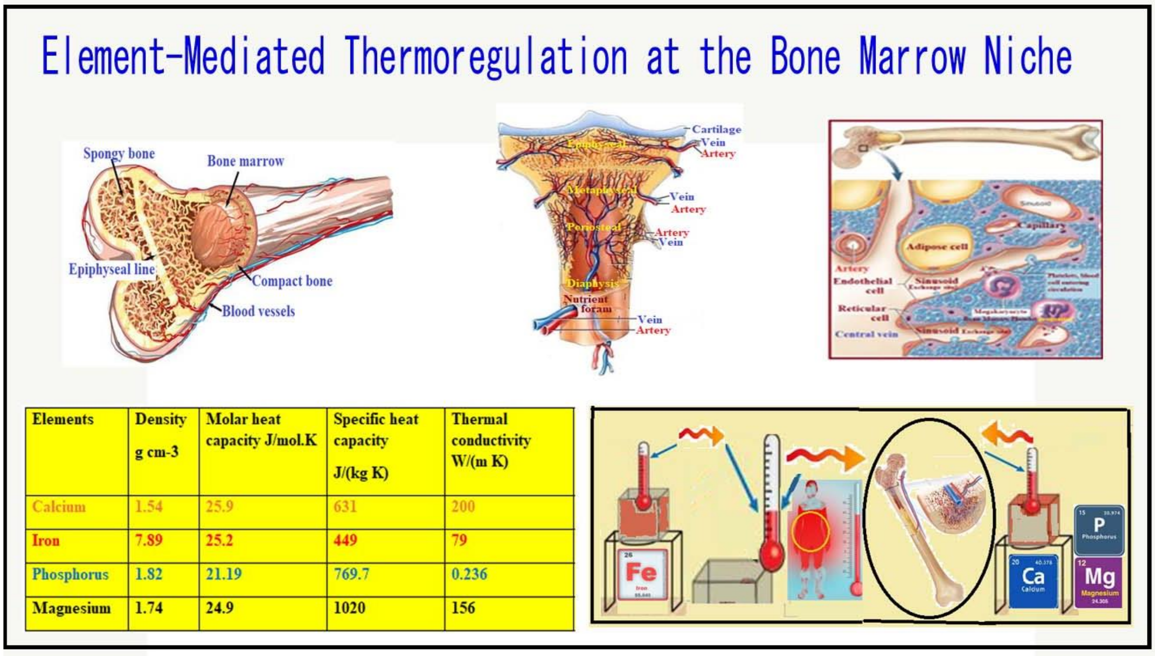
9. Conclusion

Iron is the common thermodynamic endpoint of stars and a central enabler of pathological growth in cancer. Fever, tumour solidity, and heat retention are not incidental symptoms but expressions of a deeper physical law: **where mass clusters, heat must follow**. Intrinsic Gravitational Thermogenesis offers a unifying, theory-forward framework capable of bridging astrophysics, embryology, and oncology into a single explanatory continuum.

References on some selected readings

1. National Cancer Institute. (2023). What Is Cancer? https://www.cancer.gov/about-cancer/understanding/what-is-cancer
2. Manz DH, Blanchette NL, Paul BT, Torti FM, Torti SV.(2016) Iron and cancer: recent insights. Ann N Y Acad Sci.;1368(1):149-61. https://doi.org/10.1111/nyas.13008 . Epub 2016 Feb 18. PMID: 26890363; PMCID: PMC4870095.
3. Guo Q, Li L, Hou S, Yuan Z, Li C, Zhang W, Zheng L and Li X (2021) The Role of Iron in Cancer Progression. Front. Oncol. 11:778492. https://doi.org/10.3389/fonc.2021.778492
4. Rossi EM, Marques VB, Nunes Dde O, Carneiro MT, Podratz PL, Merlo E, dos Santos L, Graceli JB. (2016) Acute iron overload leads to hypothalamic-pituitary-gonadal axis abnormalities in female rats. Toxicol Lett. 5;240(1):196-213. https://doi.org/10.1016/j.toxlet.2015.10.027 . Epub 2015 Nov 1. PMID: 26536400.
5. Nakamura K. Central circuitries for body temperature regulation and fever. (2011) Am J Physiol Regul Integr Comp Physiol. 301(5):R1207-28. https://doi.org/10.1152/ajpregu.00109.2011 . Epub 2011 Sep 7. PMID: 21900642.
6. Howard R, Scheiner A, Cunningham J, Gatenby R (2019) Cytoplasmic convection currents and intracellular temperature gradients. PLoS Comput Biol 15(11): e1007372. https://doi.org/10.1371/journal.pcbi.1007372
7. Koppers A.A. et al. (2021). Mantle plumes and their role in Earth processes. Nature Reviews Earth & Environment, 2, 382–401 https://doi.org/10.1038/s43017-021-00168-6 .
8. Millar T.J. et al. (2017). Negative ions in space. Chemical Reviews, 117(3), 1765–1795. https://doi.org/10.1021/acs.chemrev.6b00480 .
9. Bhattacharjee Iresh Ranjan (2025). Grand Evolutionary Continuum of Mass: Parallels Across Stars, Earth, and Human on Intrinsic Gravitation Mechanisms. IJARESM 13 (1), 20–35. DOI: https://doi.org/10.56025/IJARESM.2024.121224020

Figure 1. Element-mediated thermoregulation at the bone marrow niche



The schematic illustrates how **iron (Fe), calcium (Ca), magnesium (Mg), phosphorus (P), sodium (Na), and potassium (K)** within the **bone–bone marrow–spinal axis** collectively sustains human core body temperature through complementary **thermophysical and transport properties**. Iron-rich marrow provides thermal inertia, while calcium–phosphate matrices, magnesium-dependent metabolism, and Na^{+}/K^{+} ionic fluxes facilitate heat storage, conduction, and convection. Loss of this coordinated system after death results in **algor mortis**, characterized by progressive core cooling (≈1.5 °F h^{-1}, Glaister equation), underscoring the active, material basis of physiological thermoregulation.