FDS-B0: Biomedical Bridge Registry

A Non-Clinical Framework for Boundary Maintenance, Disease-Model Translation, and Safety Firewalls in Finite Distinction Systems

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Abstract

The Biomedical Bridge Series applies the language of Finite Distinction Systems (FDS) to biological and biomedical domains. This registry paper establishes the scope, limitations, claim hierarchy, safety firewall, and reporting protocol for that application. It is not a clinical paper. It does not provide medical advice, diagnosis, treatment guidance, prevention guidance, prognosis, patient stratification, clinical decision support, risk prediction for individuals, or replacement for biomedical research, clinical trials, professional guidelines, regulatory review, or licensed medical care. FDS-B0 treats all biomedical uses of FDS as quarantined domain bridges: an admissible biomedical claim must be written as

$$\text{FDS result} + \text{biomedical bridge assumptions} + \text{operational test} \Rightarrow \text{biomedical interpretation}.$$

Failure of a biomedical interpretation may invalidate the mapping, proxy, bridge assumption, or application claim without falsifying the formal FDS core. The paper defines a biomedical claim registry, a biomedical translation barrier, a biomedical FDS object, a multiscale boundary convention, a mechanism non-replacement rule, safety and ethics constraints, and minimum reporting templates for later B-series papers. Its central thesis is that living systems may be studied non-clinically as active finite boundary-maintaining systems under repair, verification, classification, memory, and resource constraints. Disease-oriented interpretations in later B-series papers remain systems-level and hypothesis-generating unless independently validated by established biomedical methods.

Keywords: finite distinction systems; biomedical bridge; non-clinical model; boundary maintenance; systems biology; medical ethics; disease modeling; claim registry; translational barrier; safety firewall; hypothesis generation; active boundary; capacity deficit; maintenance debt.

Clinical and ethical notice

FDS-B0 and all downstream B-series documents are non-clinical systems-theoretic writings. They do not diagnose, treat, prevent, manage, or predict disease in individuals. They do not recommend medications, supplements, devices, procedures, screening schedules, diets, behavioral interventions, therapy timing, dosages, or clinical decisions. Anyone with medical symptoms, diagnoses, treatment questions, emergency symptoms, medication questions, or personal health decisions should consult licensed medical professionals and follow applicable medical guidance. The B-series is a research-interpretation program, not a medical service or clinical decision-support tool.

1 Introduction

Living systems are active, multiscale, resource-constrained systems. They maintain boundaries, classify signals, regulate memory, repair damage, remove defective structures, allocate energy, and respond to perturbations. This makes biomedical systems natural candidates for systems-theoretic interpretation under the FDS language of finite capacity, boundary maintenance, resource budget, active updating, approximation, externalization, pruning, collapse, and invariant persistence [1, 11, 12, 13, 14]. FDS-B0 is written for systems biology, theoretical biology, computational medicine, and biomedical modeling contexts; its purpose is to provide an audit grammar for non-clinical bridge claims, not to guide patient care.

Maintenance debt, defined as the accumulated mismatch between biological repair or verification demand and the available repair, pruning, or regulatory capacity over time, may serve as a unifying theme across B-series papers. In aging-oriented papers, persistent maintenance debt may be modeled as a progressive reduction in effective resource budget, repair bandwidth, or adaptive flexibility. B0 registers this as a non-clinical systems concept, not as a biomarker or diagnostic criterion.

Biomedical language, however, is action-sensitive. A statement about immunity, inflammation, cancer, neurodegeneration, Alzheimer-type decline, or aging can be mistaken for diagnosis or treatment guidance. B0 therefore precedes all disease-specific B-series papers. Its purpose is not to prove a disease theory. Its purpose is to define what type of claim a biomedical FDS paper is allowed to make, what it is not allowed to imply, and how such claims must be reported, tested, demoted, or retired.

Core position

FDS-B0 registers biomedical applications as non-clinical explanatory bridges. FDS biomedical interpretations may organize biological phenomena at the systems level, but they do not authorize clinical action.

1.1 Why a registry paper is needed

The FDS Core separates the theory into a formal layer, a physical-bridge layer, and quarantined applications. Domain applications require explicit bridge assumptions and operational tests; a failure of a domain conclusion may invalidate the mapping without invalidating the formal theorem [1]. Biomedical applications require an even stronger quarantine because they can affect patient behavior, clinical expectations, legal interpretation, and ethical risk.

This registry paper has five functions:

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1. establish a non-clinical reader contract;
2. reclassify earlier biological drafts as hypothesis reservoirs rather than clinical statements;
3. define a claim-level registry for biomedical bridge claims;
4. define the biomedical FDS object and multiscale boundary convention;
5. provide mandatory reporting and safety templates for B1–B7.

1.2 Biomedical format and scope

The paper follows a biomedical-style structure: background and rationale, methods or registry design, results of the registry specification, discussion, limitations, ethics and clinical-use statement, and conclusion. It contains no human-subject data, no patient-level data, no intervention, no trial, no diagnosis, and no treatment protocol. It is a conceptual registry and governance paper for later non-clinical bridge models.

2 Non-Clinical Reader Contract

2.1 What FDS-B0 does not claim

FDS-B0 does not claim that FDS can diagnose, treat, prevent, cure, manage, or predict disease. It does not claim that FDS terminology defines disease classes, treatment response groups, patient phenotypes, prognosis, therapeutic timing, dosage, risk categories, clinical endpoints, medical devices, or standards of care. It does not replace immunology, oncology, neurology, geriatrics, pathology, systems biology, clinical epidemiology, clinical trials, regulatory science, professional guidelines, or licensed medical practice.

2.2 The biomedical translation barrier

The core safety rule is the biomedical translation barrier:

$$\boxed{\text{FDS biomedical interpretation} \not\Rightarrow \text{clinical action.}}$$

This barrier can be crossed only outside the B-series through independent biomedical validation, ethical review, regulatory review where applicable, professional clinical evaluation, and accepted standards of evidence. The barrier is not a rhetorical disclaimer; it is a structural claim-status rule.

Biomedical translation barrier

No FDS biomedical bridge may be used for diagnosis, treatment, prevention, prognosis, patient stratification, therapy selection, dose selection, intervention timing, clinical triage, or care guidance unless it has been independently converted into a validated biomedical tool under appropriate ethical, regulatory, and clinical processes.

2.3 Relationship to human-subject research ethics

If future work involves human participants, identifiable data, biospecimens, clinical records, patient-generated data, or clinical interventions, it leaves the scope of B0 and must satisfy applicable human-research requirements. This includes principles reflected in the Declaration of Helsinki, CIOMS guidelines, Good Clinical Practice, the Belmont Report, institutional review, informed consent where required, risk minimization, participant protections, and data governance [2, 3, 4, 5]. B0 itself is not human-subject research and contains no clinical data.

3 Reclassification of Earlier Biological Drafts

Earlier biological drafts explored life, death, immunity, cancer, immunotherapy-related hypotheses, immunosenescence, reproduction, and aging in stronger effective-field-theory language. Those drafts are treated here as a hypothesis reservoir, not as clinical guidance. In particular, therapy-adjacent,

cure-adjacent, dosing-adjacent, interval-optimization, and clinical-implication language must be reclassified before any downstream B-series use. The earlier biological volume contains headings and themes on immune-system mapping, cancer as a parasitic or competing system, immunotherapy-related interpretations, treatment-interval optimization, and immunosenescence (internal archive, reclassified under B0). B0 does not discard those ideas. It places them under a stricter non-clinical registry.

Table 1: Reclassification of high-risk prior biological language.

Earlier wording or tendency	B0 reclassification	Allowed downstream use
"Definitive cure" or "cure equation"	Prohibited as a clinical phrase	May be rewritten as a non-clinical systems hypothesis only
"Clinical implications"	Replace with "research implications"	Allowed only as hypothesis generation
"Optimal treatment interval"	Demote to non-clinical timing hypothesis	No treatment scheduling, no patient guidance
"Immunotherapy restores pruning"	Mechanistic metaphor or model claim	Must be tied to established oncology literature if discussed
"Patient should" or "therapy must"	Prohibited	Not allowed in B-series papers
Disease-specific claims without standard biomedical baseline	Incomplete bridge claim	Must add baseline mechanisms and citations

4 Relation to the FDS Core

4.1 Three-layer defense structure

FDS claims have three layers:

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1. **Formal FDS Core:** definitions and conditional mathematical theorems about finite active systems.
2. **Physical Bridge:** thermodynamic or physical assumptions that connect formal updates to substrates, free-energy budgets, and dissipation.
3. **Quarantined Applications:** domain-specific mappings such as biology, cognition, AI, civilization, and medicine.

Biomedical claims belong to the third layer unless they are independently reduced to standard biomedical mechanisms and evidence. The FDS Core's application protocol states that applications outside the formal core must be written in the form

$$\text{FDS theorem} + \text{domain bridge assumptions} + \text{operational test} \Rightarrow \text{domain conclusion},$$

and that failure of a domain conclusion may invalidate the bridge assumptions or operational mapping without invalidating the formal theorem [1].

4.2 Active-boundary qualification

The FDS cascade applies only to active-boundary finite systems. A candidate system must have nontrivial updates relevant to future boundary-maintenance loss:

$$P\big(U(M_t, Y_t) \neq M_t\big) > 0, \qquad I(M_{t+1}; \ell_{t+k}) > 0$$

for some lag $k > 0$. For empirical systems, a stronger intervention or ablation criterion is needed:

$$\mathbb{E}[\ell_{t+k} \mid do(U)] \neq \mathbb{E}[\ell_{t+k} \mid do(U_\emptyset)].$$

This excludes passive correlations and forces biomedical bridge papers to distinguish active regulation from mere association [1].

4.3 Failure propagation rule

A failed biomedical bridge does not falsify the FDS Core. It may falsify or demote:

[leftmargin=*]

1. a mapping from biological variables to FDS variables;
2. a proposed proxy or operational measurement;
3. a disease-specific hypothesis;
4. a normal-form model;
5. a claim about a specific biological scale.

No ad hoc rescue is permitted. A failed B-series claim must be revised, demoted, or retired.

5 Biomedical Claim Registry

5.1 Claim levels

B0 defines the following claim-status levels for all future biomedical bridge papers.

Table 2: Biomedical claim registry levels.

Level	Claim class	Biomedical meaning	Clinical use
B-L0	Formal FDS statement	Mathematical or formal systems result inherited from the FDS Core	No
B-L1	Physical bridge	Resource, thermodynamic, maintenance, or dissipation interpretation under explicit assumptions	No
B-L2	Biomedical bridge	Mapping of FDS variables to biological systems or disease processes	No
B-L3	Research hypothesis	A testable, non-clinical hypothesis with measurable proxies	No clinical use

Level	Claim class	Biomedical meaning	Clinical use
B-L4	Preclinical candidate	A hypothesis suitable for in vitro, animal, computational, or observational research design	Not clinical
B-L5	Clinical claim	Diagnosis, treatment, prevention, prognosis, risk prediction, patient stratification, dose, or intervention guidance	Prohibited in B-series

5.2 Allowed and forbidden uses

FDS-B-series papers may generate non-clinical models, compare systems-level interpretations, propose measurable research proxies, and clarify failure conditions. They may not issue patient-level claims, clinical thresholds, diagnosis labels, therapeutic recommendations, or individual risk classifications.

5.3 Clinical translation readiness

B0 distinguishes five translation-readiness states:

[label=TR-3, leftmargin=*]

1. Conceptual only.
2. Hypothesis-generating.
3. Preclinical research candidate.
4. Clinical research candidate requiring external validation and oversight.
5. Prohibited clinical inference within B-series documents.

By default, B-series claims are TR-1 or TR-2 unless explicitly supported by independent biomedical evidence.

6 Biomedical FDS Object

In this paper, the biomedical FDS object refers specifically to

$$S_{\text{bio}} = (X, E, B, M, Y, A, U, \pi, \ell, \Phi, \mathcal{P}, \tau).$$

This is the unique formal representation for the biomedical mapping template. The notation S_{bio} is used consistently for this formal template throughout the B-series.

6.1 Multiscale boundary convention

Biomedicine is multiscale. A B-series paper must specify whether its primary boundary is molecular, cellular, tissue-level, organ-level, immune-system-level, organism-level, tumor-microenvironment-level, microbiome-host-level, or population-level. Variables must not be silently mixed across scales. A cross-scale argument must be labeled as a cross-scale bridge.

Examples:

Table 3: Biomedical mapping of the FDS tuple.

FDS term	Biomedical interpretation	Required caution
X	Internal biological state: cells, tissues, organs, regulatory networks	Specify scale
E	Environment: pathogens, toxins, nutrients, microbiome, stressors, ecological context	Do not collapse all external causes into one variable
B	Boundary: membrane, epithelium, immune interface, blood-brain barrier, tumor boundary, host boundary	Boundary scale must be explicit
M	Regulatory memory / model state: immune memory, epigenetic state, neural memory, repair state, metabolic adaptation, homeostatic set-points, allostatic baselines	Not necessarily conscious memory; regulatory set-points must be mapped to specific variables
Y	Observation channel: receptors, cytokines, neural signals, biomarkers, clinical measurements	Biomarkers are proxies, not ground truth
A	Action space: immune response, repair, apoptosis, metabolism, behavior, remodeling	Not treatment recommendation
U	Update rule: signaling, learning, clonal selection, plasticity, remodeling	Requires active-boundary qualification
π	Classification or coarse-graining: self/non-self, danger/safe, repair/ignore	Classification labels are model-level
ℓ	Boundary-maintenance loss: infection, tissue damage, dysregulation, loss of function	Not a clinical endpoint unless validated
Φ	Resource budget: energy, nutrients, oxygen, time, immune capacity, repair capacity	Budget proxy must be specified
$\mathcal{P}$	Perturbations: mutation, infection, injury, aging, inflammation, stress	Perturbation family must not be post hoc
τ	Biological update timescale: seconds to years depending on level	Timescale must match mechanism and data

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- In B1, immune boundary verification may operate at cell, tissue, and organism levels.
- In B4, a tumor may be modeled at clonal, tumor-microenvironment, or host-organism scale, but these are different FDS objects.
- In B6, retrieval collapse may involve molecular pathology, synaptic networks, cognitive tasks, and subjective memory; these levels require separate maps.

7 Mechanism Non-Replacement Rule

FDS acts as a causal-topology layer: it does not replace molecular pathways, receptors, cytokines, genes, or cellular mechanisms. It classifies their systems-level roles in boundary maintenance, verification, repair, pruning, memory, and resource allocation.

Mechanism non-replacement rule

A B-series explanation may organize mechanisms at the systems level, but it may not replace, erase, or ignore validated biomedical mechanisms. FDS language is a causal-topology layer unless explicitly tied to validated causal mechanisms.

This rule is crucial for biomedical credibility. B1 does not replace immunology. B4 does not replace molecular oncology, tumor evolution, pathology, immuno-oncology, genomics, or clinical oncology. B6 does not replace amyloid, tau, synaptic dysfunction, vascular factors, neuroinflammation, genetics, or clinical neurology. B7 does not replace geroscience, metabolism, genetics, immunosenescence, senescence biology, or geriatric medicine.

7.1 Mechanism, model, and metaphor

B-series claims must distinguish:

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1. **Mechanistic claim:** a causal biomedical mechanism, e.g., pathway X activates response Y.
2. **Model claim:** a systems-level abstraction, e.g., a tumor behaves as a competing boundary-maintenance subsystem.
3. **Metaphoric phrase:** explanatory language, e.g., maintenance debt or immune patrol.

By default, FDS biomedical language is a model claim, not a molecular mechanistic claim.

FDS Core Result → Biomedical Bridge Assumptions → Mechanism Non-Replacement Check → Non-clinical Hypothesis Card → B-series claim

Figure 1: B0 acts as a gatekeeping registry. No biomedical interpretation passes into clinical language without independent biomedical validation and translation review. The registry ensures that every B-series claim is filed as a non-clinical bridge hypothesis.

8 Biomedical Bridge Protocol

Every B-series paper must include a Biomedical Bridge Claim Card and a Safety Firewall Card.

8.1 Biomedical Bridge Claim Card

Template A: Biomedical Bridge Claim Card

Claim	State the exact FDS biomedical claim.
FDS level	B-L0 to B-L5.
Biomedical system	Specify organism, tissue, disease process, cell type, or scale.
Boundary scale	Define B and scale.
Mapping	Map $X, E, B, M, Y, A, U, \pi, \ell, \Phi, \mathcal{P}, \tau$.
Standard baseline	State established biomedical mechanisms and literature.
What is not claimed	List clinical and mechanistic non-claims.
Operational proxy	Specify measurable proxy and limits.
Failure condition	State demotion or retirement condition.
Clinical status	Non-clinical unless externally validated.

8.2 Safety Firewall Card

Template B: Safety Firewall Card

For each B-series claim, answer: Does this claim diagnose? No. Does it treat? No. Does it prevent disease? No. Does it recommend intervention? No. Does it predict patient outcome? No. Does it alter standard care? No. Does it define standard of care? No. Does it justify self-experimentation? No.

8.3 Worked Example: Cancer Claim Card

The following example illustrates how a B-series claim card is filled out. It does not constitute a clinical hypothesis, diagnosis, or treatment recommendation.

Example: Cancer as a competing boundary-maintaining subsystem

Claim	A tumor may be modeled as a resource-capturing, immune-evasive, boundary-remodeling competing active subsystem.
Claim level	B-L2 biomedical bridge / B-L3 research hypothesis
Biomedical system	Tumor-microenvironment-host system
FDS mapping	$U \sim$ somatic evolution / clonal expansion; $\ell \sim$ organ dysfunction; $\Phi \sim$ oxygen, glucose, angiogenic access; $B \sim$ tumor-microenvironment interface
Boundary	Tumor-microenvironment interface; host immune boundary
Memory/model (M)	Clonal state, epigenetic state, adaptive stress response, metabolic adaptation
Update (U)	Somatic evolution, immune evasion, metabolic remodeling
Resource (Φ)	Oxygen, glucose, angiogenic access, stromal support, immune evasion capacity
Not claimed	No diagnosis, no treatment recommendation, no cure protocol, no intentionality claim, no drug-target prediction for specific mutations (e.g., KRAS, TP53)
Operational proxy	Resource capture rate, immune evasion markers, microenvironment remodeling rate
Demotion condition	If these variables do not improve explanatory or predictive modeling beyond standard oncology baselines
Clinical status	Non-clinical; hypothesis-generating only

8.4 Translation Readiness Card

Template C: Translation Readiness Card

Classify the claim as conceptual only, hypothesis-generating, preclinical research candidate, clinical research candidate requiring external validation, or prohibited clinical inference. The default class for B-series papers is conceptual or hypothesis-generating.

9 Operational Test Registry

B0 does not test any disease model. It registers test families for later papers.

Table 4: Operational-test registry for later B-series papers.

Test class	Used for	Examples of non-clinical proxies
Boundary verification	B1, B2	Classification accuracy, false-positive and false-negative rates, tolerance breakdown proxies
Verification saturation	B3, B7	Persistent inflammatory load, repair backlog, response inflexibility, resource depletion

Table 4 (Continued)

Test class	Used for	Examples of non-clinical proxies
Competing subsystem	B4	Resource capture, immune evasion, microenvironment construction, clonal adaptation
Memory maintenance	B5, B6	Record stability, retrieval reliability, semantic degradation, network disconnection
Maintenance debt	B7	Damage accumulation, repair capacity, loss of plasticity, reserve depletion

Table 4 (Continued)

All test proxies must be labeled as research variables. They are not clinical criteria unless separately validated.

10 Safety, Ethics, and Data Boundary

10.1 No patient-level inference

No B-series paper may infer patient-specific diagnosis, prognosis, treatment response, disease stage, therapeutic choice, or personal risk from FDS variables. Patient-level inference requires validated clinical models, appropriate data governance, ethics review, regulatory compliance where applicable, and medical supervision.

10.2 No self-experimentation guidance

No B-series paper may recommend self-experimentation, unapproved interventions, altered medication use, altered therapy timing, avoidance of care, or deviation from licensed medical advice.

10.3 Data and privacy boundary

B0 contains no patient data. Future use of patient-level data, biospecimens, clinical notes, imaging, genomics, wearable data, or other health information would require appropriate privacy, ethics, institutional, legal, and security safeguards outside the scope of B0. If a future FDS-derived software system is intended for diagnosis, treatment, mitigation, prevention, or clinical decision support, it may enter medical-device or software-as-a-medical-device territory depending on jurisdiction and intended use [8, 6, 7].

11 B-Series Registry Map

12 Minimum Reporting Template for B-Series Papers

The reporting template follows standards for transparent research reporting in biomedical and diagnostic contexts [9, 10]. Every B-series paper should contain the following minimum elements:

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Table 5: Initial B-series registry map.

Paper	Domain	FDS concept	Non-clinical interpretation
B0	Registry and safety firewall	Claim governance	Biomedical bridge protocol, non-clinical status
B1	Immunity	Boundary verification	Immune system as ongoing self/environment verification
B2	Autoimmunity	False positive / self-boundary misclassification	Protected internal structure misclassified as threat
B3	Chronic inflammation	Verification-load saturation	Persistent alarm consumes maintenance bandwidth
B4	Cancer	Competing active FDS	Tumor as resource-capturing, immune-evasive, boundary-remodeling competing subsystem; $U \sim$ somatic evolution, $\ell \sim$ organ dysfunction
B5	Neurodegeneration	Memory-maintenance failure	Biological record substrate loses maintenance fidelity
B6	Alzheimer-type decline	Retrieval collapse / semantic degradation	Progressive retrieval and semantic-stability loss
B7	Aging	Maintenance debt	Maintenance debt exceeds repair capacity over time; $B \sim$ declining boundary integrity, $\Phi_{\text{eff}} \sim$ progressive resource-budget reduction

1. Domain and standard biomedical baseline.
2. Non-clinical reader contract.
3. Claim-status table using B-L0 to B-L5.
4. Biomedical FDS mapping.
5. Active-boundary qualification.
6. Multiscale boundary declaration.
7. Mechanism non-replacement statement.
8. Operational proxies and proxy limitations.
9. What is not claimed.
10. Failure, demotion, and retirement conditions.
11. Safety firewall card.
12. Ethical, legal, and data-boundary statement.

13 Discussion

FDS-B0 converts biomedical FDS from a loose analogy into a governed bridge program. Its main contribution is not a disease mechanism but a registry: a claim can be located, bounded, tested, demoted, or prohibited. This is especially important because FDS terms such as boundary, pruning, repair, memory, classification, resource budget, and collapse have intuitive biomedical resonance. Without B0, those terms could be read as clinical claims. With B0, they become systems-level modeling primitives subject to explicit bridge assumptions and operational tests.

13.1 Why this is stricter than a disclaimer

A disclaimer says what the paper is not. A registry says what the paper is allowed to be. The B0 registry defines claim levels, maps variables, demands standard biomedical baselines, distinguishes model claims from mechanisms, prohibits clinical inference, and specifies demotion rules. This makes later B-series claims auditable rather than merely expressive.

13.2 How B0 protects later B-series papers

B1 may discuss immunity as boundary verification without replacing immunology. B3 may discuss chronic inflammation as verification saturation without proposing treatment. B4 may model cancer as a competing active FDS without implying tumor intentionality or prescribing therapy. B6 may describe retrieval collapse without reducing Alzheimer-type disease to a single abstract process. B7 may model aging as maintenance debt without claiming a cure or intervention strategy.

14 Limitations

B0 is conceptual and procedural. It does not validate any FDS biomedical model. It does not review the full biomedical literature for immunity, cancer, neurodegeneration, Alzheimer-type disease, or aging. It does not define biomarkers, clinical endpoints, patient populations, interventions, or trial designs. It does not establish regulatory status. Its value is to prevent category errors and provide a safe registry for future non-clinical B-series work.

The registry may be too conservative for some speculative research purposes. This is intentional. Biomedical claims have higher misuse risk than many other theoretical domains. Later papers may propose stronger hypotheses, but only within the safety and claim-status architecture defined here.

15 Conclusion

FDS-B0 establishes the biomedical safety boundary for the B-series. It does not propose a clinical theory of disease. It registers a non-clinical explanatory framework in which living systems may be modeled as active finite boundary-maintaining systems, and disease processes may be studied as failures, overloads, misclassifications, competing reorganizations, memory-maintenance breakdowns, or maintenance-debt regimes. Maintenance debt, defined as the accumulated mismatch between biological repair or verification demand and available capacity, may be reversible, partially reversible, or irreversible depending on the system and timescale. In aging-oriented B-series papers, persistent maintenance debt may be modeled as a progressive reduction in effective resource budget or adaptive flexibility. All such claims remain domain bridges. They require biomedical assumptions, operational tests, falsification conditions, and independent validation before any clinical relevance may be discussed.

> **Final registry rule**
>
> The purpose of B0 is not to medicalize FDS. The purpose of B0 is to prevent FDS language from being misused as medicine.

Ethics Statement

This paper uses no human participants, no animal subjects, no patient-level data, no identifiable health information, no clinical records, no biospecimens, and no intervention. It is a theoretical, non-clinical registry paper. No ethics approval was required for the preparation of this manuscript.

Data Availability

No datasets were generated or analyzed. The paper is a conceptual registry and does not contain empirical biomedical data.

Conflicts of Interest

The author declares no conflicts of interest.

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