

Medicine Without Reference Ranges: The Dinosaur Thought Experiment

Absurd Health Institute · Medical Concept Papers, Volume Three · Third editorial pass, 17 October 2026

Article type: Mechanistic research perspective · **Status:** Conceptual argument, not clinical guideline

A reference interval is a local description, not a universal law of life The dinosaur thought experiment asks what would happen if medicine encountered an organism whose healthy physiology did not fit human laboratory assumptions. The point is not that dinosaur blood chemistry is known or that we can reconstruct extinct disease thresholds from scattered fossil evidence. It is that any reference interval belongs to a particular population, assay, environment, developmental stage, and species. If those conditions change, the meaning of “normal” may change too.

Comparative physiology offers real examples. Body temperature, red-cell structure, renal concentrating ability, metabolic rates, and oxygen transport vary across existing animal species. A value ordinary in one physiological system may be pathological or meaningless in another. Similarly, human laboratory intervals change with age, pregnancy, and context. This is why a threshold cannot replace understanding the system that generates the measurement.

A test of explanatory independence The thought experiment becomes a scientific exercise if investigators try to predict a species' functional requirements from anatomy, ecology, and physiology before observing its clinical reference ranges. One could compare how transport, excretion, and metabolism scale with size, body temperature, and feeding patterns across living species. Predictive success would show that mechanistic constraints travel farther than a memorized human threshold. Failure would reveal missing variables or invalid scaling assumptions.

This approach should also expose an error in the opposite direction: there is no warrant to discard well-validated human reference intervals because an extinct animal might differ. Clinical thresholds often encode strong evidence about risk. The controversy is aimed at superficial interpretation, not at measurement itself. Medicine's deeper scientific unit is a living organism maintaining functions within constraints; numbers become meaningful when attached to that organism's capacities and hazards. The dinosaur simply makes the hidden anthropocentrism obvious.

Comparative physiology forces the question: normal for what organism? A single numerical threshold may have a clear meaning for one species, tissue or developmental stage and a different meaning elsewhere. For example, oxygen transport and temperature regulation depend on body design, environmental conditions and metabolic demand. The dinosaur experiment asks whether a clinician trained only on human intervals would even recognize healthy function in an unfamiliar organism. That question reveals how clinical normality depends on prior knowledge of the system.

The useful science is in choosing testable comparisons among living species, since dinosaur biochemistry cannot be observed directly. If a proposed physiological principle predicts function after scaling for size and environment, it has greater explanatory reach than a memorized range. If it fails, the investigator must identify hidden variables rather than insist the unfamiliar species is diseased. The lesson is a defense of mechanistic reasoning, not an argument against the clinical validity of well-established human intervals.

Biological normality must survive a change of organism Suppose a physiological index predicts adequate oxygen delivery in humans only because humans have a particular respiratory and cardiovascular design. Applying the same threshold to an unfamiliar species might make a healthy individual appear pathological. The comparative challenge is to identify the underlying function—matching tissue oxygen demand with delivery—and ask how different anatomical solutions fulfill it. The dinosaur framing exposes the difference between a species-specific reference interval and a general physiological constraint.

Extinct organisms cannot provide direct clinical laboratory data, so the empirical comparison should use living species and appropriate scaling methods. An accurate prediction of function across those differences would demonstrate that the mechanistic model has genuine explanatory reach. The aim is not to discard reference ranges, but to understand what makes them meaningful in the first place.

Reference ranges become powerful when attached to function. A threshold gains clinical meaning from the population, assay and outcomes used to establish it. Across species, underlying physiological functions may be conserved even when numerical measurements differ radically. The dinosaur thought experiment exposes the danger of taking one human range as a universal property of life. A test among living animals could ask whether oxygen demand, transport or renal excretion can be predicted from organ design and environment better than from a transferred human cutoff. This is a defense of causal interpretation, not a call to ignore validated diagnostic thresholds for human care.

Detailed considerations from the original investigation

What would medicine look like for a living organism whose normal values, drug kinetics and population outcomes are unknown? The dinosaur manuscript uses extinction as an epistemological thought experiment. It does not describe actual clinical experience with living non-avian dinosaurs. Its value lies in forcing a distinction between direct evidence, comparative inference, physical constraint and speculation. The absence of reference ranges does not make all guesses equally credible.

For extinct dinosaurs, fossil paleopathology can reveal some bone injury, tumors, infection-associated lesions and growth patterns, but soft-tissue physiology remains poorly observed. Birds and crocodilians provide phylogenetic information, yet neither serves as a generic stand-in for all dinosaur taxa. Scaling laws constrain heat exchange, biomechanics and cardiovascular demand, while comparative anatomy limits possible respiratory and digestive systems. A responsible model assigns confidence to each claim according to evidentiary distance: physical laws are strong constraints, conserved biology is informative, reconstructed physiology is less certain, and detailed drug response without measured pharmacokinetics is largely unknowable.

A fossilized injury can document that a dinosaur suffered bone pathology, but not the animal's exact pain experience, blood chemistry or treatment response. Acknowledging this boundary is not anti-scientific; it is what makes the inference credible. The thought experiment reminds medicine that good explanations must identify which observations actually support the claimed mechanism.

The thought experiment should not imply that contemporary medicine is merely “bookkeeping” because it uses population evidence. Clinical trials, reference distributions and diagnostic validation are extraordinary strengths precisely because physiological reasoning alone can mislead. Nor is it safe to extrapolate drug doses by body size across very different species, or to assume specific rates of growth, healing and longevity without taxon-specific evidence.

The scientific criterion is internal discipline: identify the evidence for each inference, show alternative explanations, and avoid conclusions stronger than fossils and comparative biology support. Hypothetical dinosaur cases should be explicitly labeled illustrative scenarios rather than observations. If new paleontological evidence conflicts with a proposed scaling assumption, the model must change.

The paper is best published as philosophy of medical inference and comparative physiology, illustrating humility under profound uncertainty rather than offering veterinary treatment for imaginary patients.

A reference range belongs to a population and assay, not to life in general; dinosaur physiology reveals the hidden human assumptions.

A giant archosaur with different cardiovascular scaling cannot be called hypotensive by inserting a conjectural value into a modern adult human chart.

Use extant birds and crocodilians to constrain scaling hypotheses and state which traits fossils cannot determine.

Dinosaur physiology cannot be reconstructed by simply projecting the normal ranges of modern birds or crocodilians onto a single extinct animal. Growth rates, skeletal vascularization, respiratory anatomy and body-mass scaling provide partial constraints, but many soft-tissue and regulatory properties leave little direct fossil evidence. Even when a plausible circulatory model is developed, its parameters may be uncertain enough to permit widely different resting and exertional predictions. That uncertainty should be presented quantitatively where possible. The thought experiment is strongest as a critique of careless reference-range transfer, not as a claim to diagnose extinct creatures. It asks which minimum functional requirements must be satisfied for an organism of a given size and design, and which observations in living comparators would narrow the possibilities. That methodological humility is precisely what makes an imaginative comparison valuable to contemporary clinical reasoning.

Selected scientific reading

1. Kitano (2002), Systems biology: a brief overview, Science.
<https://doi.org/10.1126/science.1069492>
2. Bailleul et al. (2019), Dinosaur paleohistology: review, trends and new avenues, PeerJ.
<https://doi.org/10.7717/peerj.7764>

Editorial source note: The inherited selected readings are retained from the source manuscript and have not all been independently verified. Newly checked evidence is identified separately. The mechanistic extensions are hypotheses except where explicitly described as established physiology.