0=No, 1=Yes: The Underlying Logic of Origami Windmill Model Decoding Neural Electromagnetic Waves and Life Inheritance

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Abstract:

This study focuses on an original origami windmill model as the core, establishing a unified and concise binary information processing framework (0/No, 1/Yes) that systematically integrates interdisciplinary content, including neuroelectrophysiology, biological information transmission, disease mechanisms, and aging processes. The study integrates MacKinnon's potassium channel structural theory, Hodgkin-Huxley's action potential experiments, and Ramón y Cajal's neuronal staining and connectivity theory, while also incorporating McFadden's research on life electromagnetic information transmission from the University of Surrey in the UK. It introduces the core concept of homology between Agre's water channels and MacKinnon's potassium channels, clarifying the relationship between dynamic changes in ion channels and the generation of neuronal electromagnetic waves; By quantifying model parameters, defining binary logic boundaries, and proposing rigorous key experimental verification pathways, the "origami windmill" is pushed from a qualitative metaphor to a scientific hypothesis that can be explored. Based on this, new strategies for cancer treatment, anti-aging, and anti Alzheimer's disease (AD) are proposed. The above strategies have been explored and applied, and preliminary practical observations show that this intervention approach has potential application value. It provides a new theoretical framework and verifiable experimental path for understanding the encoding, transmission, and cross generational effects of life information, as well as interventions for related diseases.

Keywords

Origami windmill model; Neuronal action potential; Binary logic; Biological electromagnetic waves; Amplitude encoding; Cancer treatment; Anti Alzheimer's disease; Hayflick limit

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1. Introduction

Is the essence of life complex? The answer can be very simple, 0 and 1, No and Yes. This set of binary logic, originating from the bottom layer of computers, is precisely the core code that drives the operation of neurons, the inheritance of life, and even the regulation of cell division limits. We use the original origami windmill model as the core structure, connecting the classic experiment of action potential by Hodgkin Huxley [1] and the Nobel Prize level study of potassium ion channels by McKinnon [2]. We introduce Kahal's neuronal nitric acid staining method and information flow direction theory [3], and connect McFadden's theory of life electromagnetic information transmission [4]. At the same time, we clarify the core viewpoint that the water channel discovered by Agre [5] and the potassium ion channel studied by McKinnon are essentially homologous channels. This study proposes a hypothesis that various ions may share a channel entrance region with similar topological structure, and the dynamic changes in pore size are mainly regulated by potassium ion flow. This study only focuses on the dynamic changes of potassium channel inlet and does not explore the mechanisms related to ion outlet. The core breakthrough of this hypothesis lies in the unified modeling of the conformational dynamics of ion channels (origami windmill model [6,7]) with the amplitude information dimension of action potentials, the generation of biological electromagnetic waves, and the metabolic requirements for cell proliferation/aging. At the same time, it incorporates peer review suggestions, supplements quantitative parameters, clarifies logical boundaries, improves the evidence chain and experimental verification path, making the theoretical concept more convincing and exploratory.

2. Definition of Binary Logic and Origami Windmill Model

Based on Kahal's neuronal staining observation and hand drawn schematic diagram [3], the neuronal dendrites serve as signal input terminals and axons as signal output terminals, which is highly compatible with the dynamic operation mode of origami windmills. This study rigorously defines binary logic:

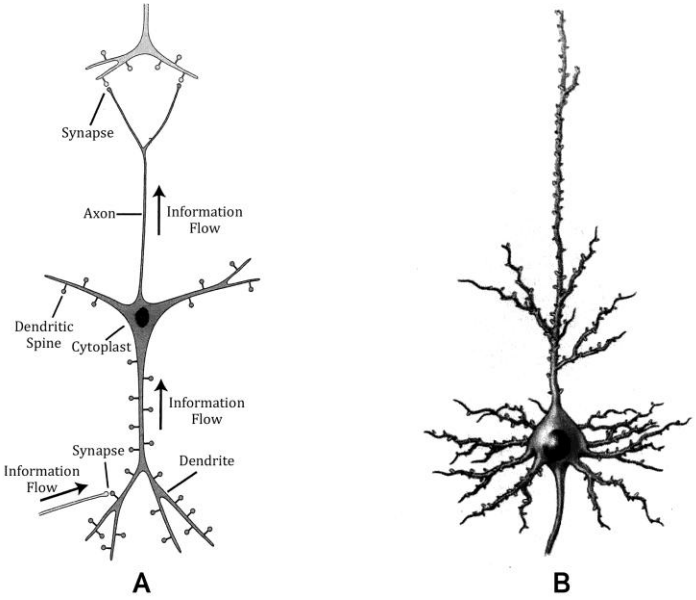

Figure 1: Neurons, Information Flow, and Engineering Antennas

Figure A. Information Flow of Neurons: Dendrites of neurons receive input information from other neurons, which is then transmitted to the cell body and then to the axon. The axon then transmits the information in a direction away from the cell body; **Figure B.** Neurons and Engineering Antennas. The shape of neurons is very similar to whip antennas or Yagi antennas (fishbone shaped).

0=No，The stable no signal state corresponding to the resting potential stage (-60mV~-40mV), at which sodium ions enter the cell at a constant speed, the origami windmill rotates at a constant speed, and the channel aperture is maintained at the basic threshold, allowing only small diameter ions to pass through without generating electromagnetic waves that can carry information, and information transmission is in a “stop” mode;

1=Yes，The amplitude encoding signal state corresponding to the entire range of action potential (-40mV~+40mV~-60mV) is positively correlated with the windmill aperture, which in turn determines the ion flow rate and electromagnetic wave intensity, complementing rather than opposing the frequency encoding theory of classical neuroscience.

Table1 Corresponding relationship with the whole process of neuronal action potential

potential / Counterpart	Resting potential	action potential	
		rising phase	falling phase
Voltage variation	−60mV～−40mV	−40mV～+40mV	+40mV～−60mV
Sports mode	Na^+enters the cell through dendrites with uniform linear motion	Na^+ uniformly accelerates into，K^+ leaves with uniform acceleration, the replacement ratio is 3:2:1	K^+ enters with uniform acceleration, Na^+ leaves with uniform acceleration, and the replacement ratio is 2:3:1
Charging and discharging	20% of charging process completed	80% of charging process completed	100% ofdischarge process completed
Neuron site	Occurs in dendrites	Na^+accelerates from dendrite to cell body K^+ accelerates to leave the cell body from the axon	K^+ accelerates from dendrite to cell body Na^+ accelerates to leave the cell body from the axon
Charge change	Charge:0～100G +40mV cell inner membrane ion saturation, 300G Na^+		Charge:100G～0 −60mVcell inner membrane ion saturation, 200G K^+
Origami windmill	Uniform rotation	Uniformly accelerated rotation	Uniform deceleration rotation
Electromagnetic wave	The static field does not generate electromagnetic waves	An accelerating charge can produce electromagnetic waves	

The information significance of amplitude encoding can be intuitively explained through thought experiments: when neurons receive strong stimuli, they will drive the origami windmill to rotate faster and have a larger aperture, resulting in an increase in the amplitude of the action potential and a synchronous increase in ion flow intensity and duration, ultimately generating stronger electromagnetic field signals; When this strong signal acts on postsynaptic neurons, it can trigger more persistent changes in membrane potential, and even activate multiple downstream neurons to form synchronous discharges, achieving enhanced information transmission; However, weak stimuli can only maintain small aperture and low amplitude action potentials, corresponding to weak electromagnetic field signals, and can only trigger basic responses of postsynaptic neurons. The “amplitude encoding” proposed in this model does not replace the classical “frequency encoding”, but rather reveals that the amplitude of action potential itself may carry neglected analog information, providing a new dimension for neural information encoding.

3. The core mechanism of ion dynamics and electromagnetic wave generation

The difference in radii of different ions determines their threshold for passing

through the windmill aperture. The reference radii of each ion (in picometers) are as follows: sodium ions are about 102pm, calcium ions are about 100pm, potassium ions are about 138pm, and chloride ions are about 181pm.

The rising phase of the action potential (-40mV~+40mV) accelerates the influx of sodium ions, and the origami windmill rotates synchronously. The aperture gradually expands but does not reach its peak, which is positively correlated with the conductivity change of the sodium channel. This stage is the depolarization process of the classical action potential model [7];

In the phase of action potential decrease (+40mV~-60mV), this model proposes a differentiated perspective from classical theory. Here, it is not the potassium ion efflux that dominates repolarization, but rather the acceleration of potassium ion perfusion into the cell, driving the windmill speed to continuously climb to its peak and the aperture to expand to its maximum. This not only allows potassium ions to pass through efficiently, but also allows larger diameter chloride ions to flood in [7].

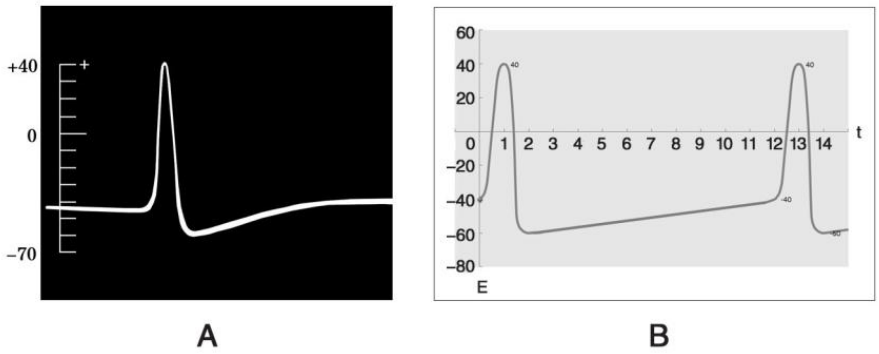

Figure 2 Intracellular recording of action potentials of giant squid axons

Figure A. Record of the first intracellular action potential [1]. **Figure B.** Basic expectations of resting potential and action potential using the ion inequality equation [7], resting potential: N=-60+2t, where t is approximately 0-10ms; action potential: N=-40+170t−90t2, where t is approximately 0-2ms.

It should be specifically clarified that the -60mV threshold involved in this study is the threshold under the hydrogen oxygen water system, and is not directly corresponding to the physiological threshold of the human body; When the aperture exceeds this threshold, chloride ions will flood into cells in large quantities, which is the key triggering mechanism for cellular carcinogenesis. The influx of chloride ions is usually associated with inhibitory postsynaptic potentials, and in this model, the influx of chloride ions during the action potential decline phase is a key link in maintaining intracellular ion balance and ensuring the continuous generation of

electromagnetic waves. Subsequent electrophysiological experiments are needed to verify its spatiotemporal specificity. The ion flow in this stage generates electromagnetic fields of specific frequency and intensity, whose parameters can be compared with the neural signals detected by electroencephalography (EEG) and magnetoencephalography (MEG). This electromagnetic wave is the life information carrier proposed by McFadden, and its amplitude and frequency characteristics together constitute the underlying logic of consciousness encoding.

4. Key experimental verification path

To advance the verification of this hypothesis and consolidate academic consensus, we propose three key experimental pathways and invite researchers from relevant fields to participate in the exploration:

⑴ Electrophysiological verification: At the single-cell or brain slice level, ion imaging and patch clamp techniques are used to synchronously observe the real-time dynamics of intracellular potassium ion concentration during the phase of action potential decline. If a decrease is observed accompanied by a significant increase in intracellular potassium ion concentration (rather than the classical theory of net efflux), it provides direct evidence for the ion dynamics mechanism of this model.

⑵ Structural biology verification: By using techniques such as cryo electron microscopy, compare and analyze the topological structure and electrostatic potential distribution of aquaporins (AQP) and potassium channel proteins (KcSA, etc.) in the pore region. If it is confirmed that the two have highly similar structural features and ion/water molecule coordination mechanisms at the entrance of the pore, it provides a structural basis for the “homologous channel entrance” hypothesis of this model.

⑶ Translational medicine validation: Design prospective clinical studies that, under strict ethical review, provide precise potassium metabolism interventions for specific types of cancer patients (such as those with strong dependence on potassium ion metabolism) or early-stage neurodegenerative disease patients. If several pre groups show statistically significant advantages in imaging indicators, biomarker levels, or clinical symptom improvement, it provides a practical basis for the clinical translational value of this model.

5. Dual track mechanism of life information transmission: tangible inheritance and intangible coding

The This 0 and 1 logical framework not only explains how neurons generate electromagnetic waves to carry consciousness information, but also attempts to build a bridge between tangible inheritance and intangible inheritance. DNA, as a classic genetic material, transmits the blueprint for physical development; The electromagnetic waves generated by neurons[8] can serve as an "intangible information carrier", enabling information exchange between individuals during the action potential (1=Yes) stage.

In response to the core question of how electromagnetic waves can be transmitted across generations, this study proposes verifiable scientific predictions: extremely low frequency electromagnetic fields with specific spatiotemporal patterns can stimulate embryonic or germ cells, directionally alter their offspring's developmental preferences for neural circuits, and exhibit stable behavioral variations that can be co inherited with specific epigenetic markers (such as methylation patterns of specific genes). At the same time, this hypothesis does not negate epigenetics (DNA methylation, histone modification, etc.), but proposes that electromagnetic waves may regulate the activity of epigenetic modifying enzymes, achieving a regulatory pathway of "intangible information affecting tangible genetics". For example, electromagnetic fields can affect intracellular calcium ion concentration, which is a key regulatory factor for epigenetic modifying enzymes such as histone deacetylases, thereby altering gene expression patterns and ultimately transforming intangible consciousness information into heritable molecular markers, providing new explanatory dimensions for the inheritance of complex traits such as personality.

6. Model based disease intervention strategies and practical translation

This study is based on the origami windmill model [6], providing more detailed and disruptive strategies for cancer treatment, anti-aging, and anti Alzheimer's disease (AD) research. The above strategies have been explored and applied, and preliminary practical observations show that this intervention approach has potential application

value. The above practical transformation results and related retrospective data analysis have been independently compiled and documented, which can be reviewed and discussed by colleagues in the academic community.

6.1 Cancer treatment: control potassium and inhibit chlorine, break the infinite proliferation loop

The infinite proliferation characteristics of cancer cells stem from their much higher demand for potassium ions than normal cells. Rapidly dividing cancer cells require continuous “feeding” of potassium ions to drive the origami windmill to maintain high-speed rotation and large aperture state, ensuring the continuous influx of chloride ions and breaking the cell division limit proposed by Hayflick [9] (related to telomerase activity regulation). This is the core mechanism for achieving immortality in HeLa cells. The core of this strategy lies in utilizing the differences in the robustness of ion homeostasis regulation between cancer cells and normal cells: in order to maintain high-speed proliferation, cancer cells are in a “tight” state of ion pump and channel activity, and are more sensitive to fluctuations in extracellular potassium ion concentration; And the ion homeostasis regulation of normal cells has stronger buffering ability. Based on this, the cancer treatment strategy can be optimized as follows: controlling potassium ion intake at the lowest threshold required by normal cell physiology. Cancer cells may suffer from insufficient potassium ion supply, slowing down of windmill speed, shrinkage of pore size, inability to sustain chloride ion influx, inability to maintain the required potential amplitude and ion balance for cell division, and ultimately either “starve to death” or become normal cells; Normal cells, on the other hand, have a lower demand for potassium ions and can maintain their basic physiological functions without being affected.

6.2 Neurodegenerative disease intervention and anti-aging: increasing potassium levels and maintaining neural signal homeostasis

In the fields of anti-aging and AD, the core mechanism of the strategy of supplementing potassium ions in moderation is to increase the amplitude of neuronal action potentials. The insufficient amplitude of action potentials leads to a decrease in the efficiency of neuronal signal transmission, which is not only an important manifestation of neural function degradation during aging, but also an early trigger for the onset of AD. Previous cutting-edge research has shown that reduced neuronal

activity promotes the deposition of β - amyloid protein, while amplitude attenuation exacerbates synaptic dysfunction, further accelerating the pathological process of AD. Supplementing potassium ions can drive the origami windmill to maintain a reasonable speed and aperture, ensuring stable ion flow and electromagnetic wave signal strength, thereby improving synaptic transmission efficiency, delaying telomere shortening process and neural function degradation, and achieving multiple effects of anti-aging and anti AD effects. It should be clarified that supplementing potassium ions is one of the intervention strategies based on this model, and its effectiveness has been observed to be positive in exploratory applications.

7. Conclusion

In summary, the origami windmill model and its derived binary framework not only provide a unified explanatory prototype for a series of dispersed life phenomena, but also derive a series of clear and verifiable scientific predictions and experimental pathways, while possessing clear clinical translational value. We call on computational neuroscientists, biophysicists, and clinical researchers to participate together in simulating, experimenting, and exploring key aspects of it clinically.

This logic does not require complex equation stacking or obscure theoretical packaging, because the underlying operating rules of life are already simple to the extreme - just the switching between 0 and 1, the choice between No and Yes. This concise framework may provide us with a new exploration path to understand the complexity of life.

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I have independently completed all the research work and writing process of this paper, and there are no other contributors.

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