भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	The Times of India		
Date	April 28th, 2026	Language	English
Headline	**NIMHANS, IITBBS researchers find a new way to decode schizophrenia, uses chaos theory to map how brain's signals behave over time.**		
Link	**NIMHANS, IITBBS researchers find new way to decode schizophrenia, uses chaos theory to map how brain's signals behave over time - https://timesofindia.indiatimes.com/city/bhubaneswar/nimhans-iitbbs-researchers-find-new-way-to-decode-schizophrenia-uses-chaos-theory-to-map-how-brains-signals-behave-over-time/articleshow/130586036.cms?utm_source=whatsapp&utm_medium=amp_social&utm_campaign=social_share**		

Bhubaneswar: Scientists from NIMHANS, Bengaluru, and IIT Bhubaneswar have found a new way to study schizophrenia by tracking how the brain's signals behave over time. Using principles of Chaos Theory, the study sheds light on how the disorder progresses and how treatment may work differently for each patient. It aims to improve diagnosis and treatment of one of the most complex mental health disorders.

Mental health conditions affect nearly 15% of people worldwide, and schizophrenia is among the most severe. It usually begins in late adolescence or early adulthood, often disrupting productive years of life. Scientists associated with the study said understanding how the brain works in such conditions is key to finding better treatment.

Researchers used functional MRI (fMRI), a brain imaging technique that tracks changes in blood oxygen levels, to study brain activity. They focused on resting-state signals (brain activity when a person is not doing any specific task) to understand how different brain regions communicate in schizophrenia patients.

To analyse these signals, scientists designed a special system based on Chaos Theory, which views the disorder as a dynamical disease where brain activity, behaviour and thought processes display chaotic, non-linear dynamics rather than ordered patterns.

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Media/Publication	The Pioneer		
Date	29th April, 2026	Language	English
Headline	Understand schizophrenia through chaos-driven dynamics		

Understand schizophrenia through chaos-driven dynamics

A collaborative breakthrough by IIT BBS, NIMHANS Bangalore

PNS ■ Bhubaneswar

In a significant interdisciplinary research collaboration, scientists from NIMHANS Bangalore and IIT Bhubaneswar have developed a novel approach to understanding schizophrenia using chaos-driven dynamical systems. This pioneering study offers promising insights into brain function, disease progression and potential treatment pathways for one of the most complex mental health disorders.

Mental health disorders affect nearly 15% of the global population with schizophrenia being among the most severe due to its disabling symptoms and early onset, typically during late adolescence or early adulthood. This timing significantly impacts individuals during their most productive years. Understanding the biological and neural mechanisms underlying such disorders is essential for early diagnosis and the development of effective treatments.

Modern neuroscience recognises mental illnesses as brain-based conditions involving dysfunction in neural networks, neurotransmitter imbalances and structural abnormalities. To study these complexities, the research team employed functional magnetic resonance imaging (fMRI), a technique that measures brain activity by detecting changes in blood oxygen levels, known as the blood-oxygen-level-dependent (BOLD) signal.

The study focused on resting-state fMRI (rs-fMRI) signals to examine brain network dysfunction and synchronisation patterns. These signals were analysed using a specially designed chaotic dynamical system. Each patient's brain signal uniquely influenced the system, enabling researchers to observe how brain activity evolves over time and responds to treatments such as antipsychotic medications, transcranial magnetic stimulation (TMS) and electroconvulsive therapy (ECT).

A key innovation of this research is the development of a Chaotic Dynamics Marker (CDM), which can assess disease recovery and guide treatment strategies. Notably, the study revealed that beyond a certain threshold, some treatments may have opposite effects on brain excitation, offering critical insights for personalized medicine.

The research introduces a unique dynamical system named U-KBBC, developed collaboratively by experts across psychiatry (at NIMHANS) and chemistry, materials engineering, electronics engineering and high performance computing at IIT Bhubaneswar. This system produces a distinct attractor pattern named "Sudarshan", which changes shape based on individual brain signals. These variations generate patient-specific markers, including CDM and a synchronization measure (SyncSZ), enabling detailed tracking of disease assessment, progression and recovery.

The team at IIT Bhubaneswar also developed a portable electronic device, "Chinmoy", embedded with the U-KBBC system, enhancing the potential for real-world clinical applications. A joint patent has been filed by NIMHANS Bangalore and IIT Bhubaneswar to protect this innovation.

This study is the first of its kind globally and represents a major step towards integrating advanced chaotic dynamics-based models with clinical neuroscience. While the findings are promising, further validation through large-scale studies is underway. Beyond schizophrenia, the application of chaotic dynamics is expanding into other medical domains, including depression, epilepsy, cancer and cardiovascular disorders.

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Media/Publication	The United News of India		
Date	28th April, 2026	Language	English
Headline	IIT Bhubaneswar- NIMHANS break new ground with chaos-based model to decode Schizophrenia		

IIT Bhubaneswar-NIMHANS break new ground with chaos-based model to decode Schizophrenia

Bhubaneswar, April 28 (UNI) In a landmark interdisciplinary breakthrough, researchers from IIT Bhubaneswar and the National Institute of Mental Health and Neurosciences (NIMHANS), Bengaluru, have developed a first-of-its-kind global approach to understanding schizophrenia through chaos-driven dynamical systems, opening promising new pathways for diagnosis, treatment, and personalized mental healthcare.

The pioneering study marks a major advancement in combining advanced chaotic dynamics with clinical neuroscience to decode one of the world's most severe and complex mental health disorders.

A joint patent has already been filed by IIT Bhubaneswar and NIMHANS to protect the innovation, while larger validation studies are currently underway.

भारतीय प्रौद्योगिकी संस्थान भुवनेश् वर
Indian Institute of Technology Bhubaneswar

Media/Publication	The Jagran		
Date	28th April, 2026	Language	English
Headline	New Hope in Mental Health Treatment: IIT Bhubaneswar Develops Unique Technique for Schizophrenia		
Link	https://www.jagran.com/odisha/bhubaneshwar-iit-bhubaneswar-and-nimhans-pioneer-schizophrenia-treatment-tech-40221949.html		

जागरण संवाददाता, भुवनेश्वर। मानसिक स्वास्थ्य के क्षेत्र में एक बड़ी उपलब्धि हासिल करते हुए आइआइटी भुवनेश्वर और निमहांस, बेंगलुरु के वैज्ञानिकों ने सिजोफ्रेनिया जैसी जटिल मानसिक बीमारी को समझने के लिए नई तकनीक विकसित की है। केओस-चालित गतिशीलता पर आधारित इस शोध को मानसिक रोगों की पहचान और उपचार में अहम कदम माना जा रहा है।

शोधकर्ताओं ने बताया कि सिजोफ्रेनिया को समझने के लिए मस्तिष्क की गतिविधियों का अध्ययन विशेष तकनीक फंक्शनल मैग्नेटिक रेजोनेंस इमेजिंग के जरिए किया गया। इसके तहत रक्त में ऑक्सीजन स्तर के बदलावों के माध्यम से मस्तिष्क संकेतों को मापा गया।

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
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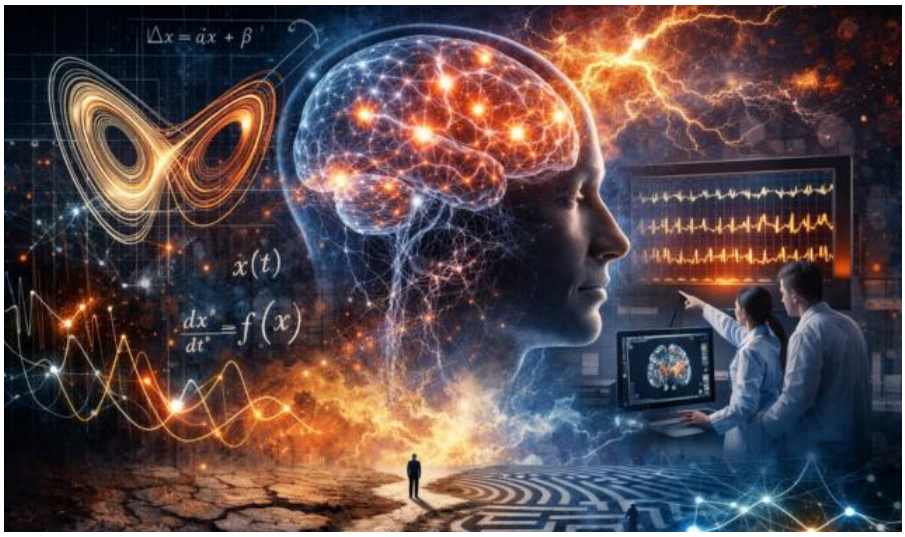
Media/Publication	The Pragativadi		
Date	28th April, 2026	Language	English
Headline	IIT Bhubaneswar, NIMHANS Decode Schizophrenia Through Chaos-Driven Dynamics.		
Link	IIT Bhubaneswar, NIMHANS Decode Schizophrenia Through Chaos-Driven Dynamics https://pragativadi.com/iit-bhubaneswar-nimhans-decode-schizophrenia-through-chaos-driven-dynamics/		



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This collaboration exemplifies the power of multidisciplinary and multi-institutional research in addressing complex health challenges. The team aims to extend this work across medical institutions in India and globally, contributing to improved diagnosis, treatment, and understanding of mental health disorders.

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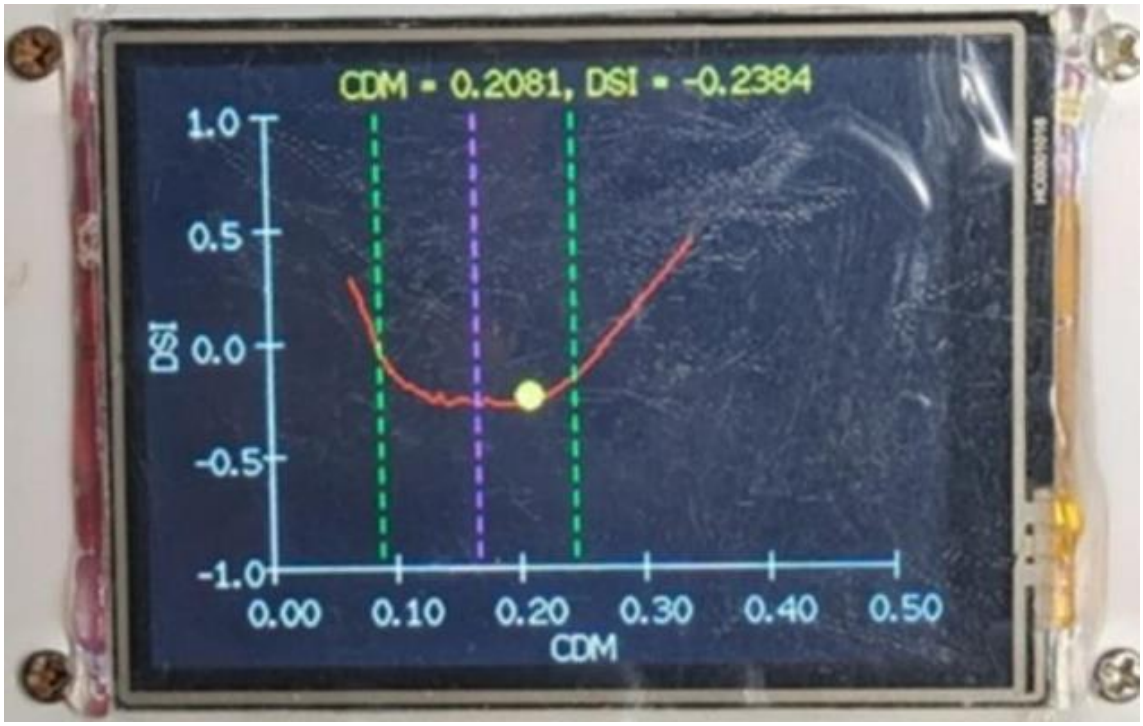
Indian Institute of Technology Bhubaneswar

Media/Publication	The Odisha Darpan		
Date	29th April, 2026	Language	Odia
Headline	Studying Schizophrenia through Chaos-Driven Dynamics: A Joint Achievement by IIT Bhubaneswar and NIMHANS, Bangalore		
Link	https://odishadarpan.org/odisha/20568		



ଭୁବନେଶ୍ୱର,:(ରାଜେନ୍ଦ୍ର ପ୍ରସାଦ ନାୟକ) ଏକ ଗୁରୁତ୍ୱପୂର୍ଣ୍ଣ ଆନ୍ତଃବିଷୟିକ ଗବେଷଣା ସହଯୋଗରେ, ନିମହାନ୍ସ (NIMHANS) ବାଙ୍ଗାଲୋର ଏବଂ ଆଇଆଇଟି ଭୁବନେଶ୍ୱରର ବୈଜ୍ଞାନିକମାନେ କେଓସ-ଚାଳିତ ଗତିଶୀଳ ପ୍ରଣାଳୀ ବ୍ୟବହାର କରି ସ୍କିଜୋଫ୍ରେନିଆକୁ ବୁଝିବା ପାଇଁ ଏକ ନୂତନ ପଦ୍ଧତି ବିକଶିତ କରିଛନ୍ତି। ଏହି ଅଗ୍ରଣୀ ଅଧ୍ୟୟନ ମସ୍ତିଷ୍କର କାର୍ଯ୍ୟ, ରୋଗର ଅଗ୍ରଗତି ଏବଂ ସବୁଠାରୁ ଜଟିଳ ମାନସିକ ସ୍ୱାସ୍ଥ୍ୟ ବ୍ୟାଧି ମଧ୍ୟରୁ ଗୋଟିଏ ପାଇଁ ସମ୍ଭାବ୍ୟ ଚିକିତ୍ସା ପଥ ବିଷୟରେ ପ୍ରତିଶ୍ରୁତିପୂର୍ଣ୍ଣ ଅନ୍ତର୍ଦୃଷ୍ଟି ପ୍ରଦାନ କରେ।ମାନସିକ ସ୍ୱାସ୍ଥ୍ୟ ବ୍ୟାଧି ବିଶ୍ୱ ଜନସଂଖ୍ୟାର ପ୍ରାୟ ୧ ୫%କୁ ପ୍ରଭାବିତ କରେ, ସ୍କିଜୋଫ୍ରେନିଆ ଏହାର ଅକ୍ଷମ ଲକ୍ଷଣ ଏବଂ ପ୍ରାରମ୍ଭିକ ଆରମ୍ଭ ହେତୁ ସବୁଠାରୁ ଗୁରୁତର ଅଟେ, ସାଧାରଣତଃ କିଶୋରାବସ୍ଥାର ଶେଷ କିମ୍ବା ପ୍ରାରମ୍ଭିକ ସମୟରେ। ଏହି ସମୟ ବ୍ୟକ୍ତିମାନଙ୍କୁ ସେମାନଙ୍କର ସର୍ବାଧିକ ଉତ୍ପାଦନକ୍ଷମ ବର୍ଷଗୁଡ଼ିକରେ ଗୁରୁତ୍ୱପୂର୍ଣ୍ଣ ଭାବରେ ପ୍ରଭାବିତ କରେ। ପ୍ରାରମ୍ଭିକ ରୋଗ ନିର୍ଣ୍ଣୟ ଏବଂ ପ୍ରଭାବଶାଳୀ ଚିକିତ୍ସା ବିକାଶ ପାଇଁ ଏପରି ବ୍ୟାଧିର ଅନ୍ତର୍ନିହିତ ଜୈବିକ ଏବଂ ସ୍ନାୟୁ କ୍ରିୟାକୁ ବୁଝିବା ଅତ୍ୟନ୍ତ ଜରୁରୀ।ଆଧୁନିକ ନ୍ୟୁରୋସାଇନ୍ସ ମାନସିକ ରୋଗକ ମସ୍ତିଷ୍କ-ଭିତ୍ତିକ ଅବସ୍ଥା ଭାବରେ ଚିହ୍ନଟ କରେ ଯାହା ନ୍ୟୁରାଲ ନେଟୱାର୍କରେ ଅକ୍ଷମତା, ନ୍ୟୁରୋଟ୍ରାନ୍ସମିଟର ଅସନ୍ତୁଳନ ଏବଂ ଗଠନାତ୍ମକ ଅସାଧାରଣତା ସହିତ ଜଡିତ। ଏହି ଜଟିଳତାଗୁଡ଼ିକର ଅଧ୍ୟୟନ

କରିବା ପାଇଁ, ଗବେଷଣା ଦଳ କାର୍ଯ୍ୟକ୍ଷମ ଚୁମ୍ବକୀୟ ଅନୁନାଦ ଇମେଜିଂ (fMRI) ନିଯୁକ୍ତ କରିଥିଲେ, ଏକ କୌଶଳ ଯାହା ରକ୍ତ ଅମ୍ଳଜାନ ସ୍ତରର ପରିବର୍ତ୍ତନ ଚିହ୍ନଟ କରି ମସ୍ତିଷ୍କ କାର୍ଯ୍ୟକଳାପ ମାପ କରେ – ଯାହାକୁ ରକ୍ତ-ଅମ୍ଳଜାନ-ସ୍ତର-ନିର୍ଭରଶୀଳ (BOLD) ସିଗନାଲ କୁହାଯାଏ।ଏହି ଅଧ୍ୟୟନ ମସ୍ତିଷ୍କ ନେଟୱାର୍କ ଡିସଫଙ୍କସନ୍ ଏବଂ ସିଙ୍କ୍ରୋନାଇଜେସନ୍ ପ୍ୟାଟର୍ଣ୍ଣ ପରୀକ୍ଷା କରିବା ପାଇଁ ବିଶ୍ରାମ-ଅବସ୍ଥା fMRI (rs-fMRI) ସିଗନାଲଗୁଡ଼ିକ ଉପରେ ଧ୍ୟାନ ଦେଇଥିଲା। ଏହି ସିଗନାଲଗୁଡ଼ିକୁ ଏକ ସ୍ୱତନ୍ତ୍ର ଭାବରେ ଡିଜାଇନ୍ କରାଯାଇଥିବା ବିଶୃଙ୍ଖଳିତ ଗତିଶୀଳ ସିଷ୍ଟମ ବ୍ୟବହାର କରି ବିଶ୍ଳେଷଣ କରାଯାଇଥିଲା। ପ୍ରତ୍ୟେକ ରୋଗୀଙ୍କ ମସ୍ତିଷ୍କ ସିଗନାଲ ସିଷ୍ଟମକୁ ଅନନ୍ୟ ଭାବରେ ପ୍ରଭାବିତ କରିଥିଲା, ଯାହା ଗବେଷକମାନଙ୍କୁ ସମୟ ସହିତ ମସ୍ତିଷ୍କ କାର୍ଯ୍ୟକଳାପ କିପରି ବିକଶିତ ହୁଏ ଏବଂ ଆଣ୍ଟିସାଇକୋଟିକ୍ ଔଷଧ, ଟ୍ରାନ୍ସକ୍ରାନିଏଲ୍ ମ୍ୟାଗ୍ନେଟିକ୍ ଷ୍ଟିମୁଲେସନ୍ (TMS), ଏବଂ ଇଲେକ୍ଟ୍ରୋ କନଭଲସିଭ୍ ଥେରାପି (ECT) ଭଳି ଚିକିତ୍ସା ପ୍ରତି ପ୍ରତିକ୍ରିୟା କରେ ତାହା ପର୍ଯ୍ୟବେକ୍ଷଣ କରିବାକୁ ସକ୍ଷମ କରିଥିଲା।ଏହି ଗବେଷଣାର ଏକ ପ୍ରମୁଖ ଉଦ୍ଭାବନ ହେଉଛି ଏକ ଚାଓଟିକ୍ ଡାଇନାମିକ୍ସ ମାର୍କର (CDM) ବିକାଶ, ଯାହା ରୋଗ ପୁନରୁଦ୍ଧାର ମୂଲ୍ୟାଙ୍କନ କରିପାରିବ ଏବଂ ଚିକିତ୍ସା ରଣନୀତିକୁ ମାର୍ଗଦର୍ଶନ କରିପାରିବ। ଉଲ୍ଲେଖନୀୟ ଯେ, ଅଧ୍ୟୟନରୁ ଜଣାପଡିଛି ଯେ ଏକ ନିର୍ଦ୍ଦିଷ୍ଟ ସୀମା ବାହାରେ, କିଛି ଚିକିତ୍ସା ମସ୍ତିଷ୍କ ଉତ୍ତେଜନା ଉପରେ ବିପରୀତ ପ୍ରଭାବ ପକାଇପାରେ, ଯାହା ବ୍ୟକ୍ତିଗତ ଔଷଧ ପାଇଁ ଗୁରୁତ୍ୱପୂର୍ଣ୍ଣ ଅନ୍ତର୍ଦୃଷ୍ଟି ପ୍ରଦାନ କରେ।ଏହି ଗବେଷଣା ୟୁ-କେବିବିସି (U-KBBC) ନାମକ ଏକ ଅନନ୍ୟ ଗତିଶୀଳ ପ୍ରଣାଳୀ ପ୍ରଚଳନ କରେ, ଯାହାକୁ ଆଇଆଇଟି ଭୁବନେଶ୍ୱରର ମାନସିକ ଚିକିତ୍ସା (NIMHANS ରେ), ଏବଂ ରସାୟନ ବିଜ୍ଞାନ, ସାମଗ୍ରୀ ଇଞ୍ଜିନିୟରିଂ, ଇଲେକ୍ଟ୍ରୋନିକ୍ସ ଇଞ୍ଜିନିୟରିଂ ଏବଂ ଉଚ୍ଚ ପ୍ରଦର୍ଶନ କମ୍ପ୍ୟୁଟିଂ ବିଶେଷଜ୍ଞଙ୍କ ଦ୍ୱାରା ମିଳିତ ଭାବରେ ବିକଶିତ କରାଯାଇଛି। ଏହି ପ୍ରଣାଳୀ "ସୁଦର୍ଶନ" ନାମକ ଏକ ସ୍ୱତନ୍ତ୍ର ଆକର୍ଷଣକାରୀ ପ୍ୟାଟର୍ନ ଉତ୍ପାଦନ କରେ, ଯାହା ବ୍ୟକ୍ତିଗତ ମସ୍ତିଷ୍କ ସଙ୍କେତ ଉପରେ ଆଧାରିତ ଆକାର ପରିବର୍ତ୍ତନ କରେ। ଏହି ପରିବର୍ତ୍ତନଗୁଡ଼ିକ CDM ଏବଂ ଏକ ସିଙ୍କ୍ରୋନାଇଜେସନ ମାପ (SyncSZ) ସମେତ ରୋଗୀ-ନିର୍ଦ୍ଦିଷ୍ଟ ମାର୍କର ସୃଷ୍ଟି କରେ, ଯାହା ରୋଗ ମୂଲ୍ୟାଙ୍କନ, ପ୍ରଗତି ଏବଂ ପୁନରୁଦ୍ଧାରର ବିସ୍ତୃତ ଟ୍ରାକିଂକୁ ସକ୍ଷମ କରିଥାଏ।ଆଇଆଇଟି ଭୁବନେଶ୍ୱରର ଦଳ ଏକ ପୋର୍ଟେବଲ ଇଲେକ୍ଟ୍ରୋନିକ୍ ଡିଭାଇସ୍, "ଚିନମୟ" ମଧ୍ୟ ବିକଶିତ କରିଛନ୍ତି, ଯାହାକୁ ୟୁ-କେବିବିସି (U-KBBC) ସିଷ୍ଟମ ସହିତ ଏମବେଡେଡ୍ କରାଯାଇଛି, ଯାହା ବାସ୍ତବ-ବିଶ୍ୱ କ୍ଲିନିକାଲ୍ ପ୍ରୟୋଗର ସମ୍ଭାବନାକୁ ବୃଦ୍ଧି କରିଛି। ଏହି ଉଦ୍ଭାବନକୁ ସୁରକ୍ଷା ଦେବା ପାଇଁ ନିମ୍ହାନ୍ସ (ନିମ୍ହାନ୍ସ) ବାଙ୍ଗାଲୋର ଏବଂ ଆଇଆଇଟି ଭୁବନେଶ୍ୱର ଦ୍ୱାରା ଏକ ମିଳିତ ପେଟେଣ୍ଟ ଦାଖଲ କରାଯାଇଛି।ଏହି ଅଧ୍ୟୟନ ବିଶ୍ୱ ସ୍ତରରେ ଏହି ପ୍ରକାରର ପ୍ରଥମ ଏବଂ କ୍ଲିନିକାଲ୍ ନ୍ୟୁରୋସାଇନ୍ସ ସହିତ ଉନ୍ନତ କେଓଟିକ ଗତିଶୀଳତା ଆଧାରିତ ମଡେଲଗୁଡ଼ିକୁ ଏକୀକୃତ କରିବା ଦିଗରେ ଏକ ପ୍ରମୁଖ ପଦକ୍ଷେପ ପ୍ରତିନିଧିତ୍ୱ କରେ। ଏହି ଫଳାଫଳ ଗୁଡ଼ିକ ପ୍ରତିଶ୍ରୁତିପୂର୍ଣ୍ଣ ହୋଇଥିଲେ ମଧ୍ୟ, ବଡ଼ ଧରଣର ଅଧ୍ୟୟନ ମାଧ୍ୟମରେ ଆହୁରି ବୈଧତା ଜାରି ରହିଛି। ସ୍କିଜୋଫ୍ରେନିଆ ବ୍ୟତୀତ, ବିଶୃଙ୍ଖଳିତ ଗତିଶୀଳତାର ପ୍ରୟୋଗ ଡିପ୍ରେସନ୍, ମୃଗଶିରା, କର୍କଟ ଏବଂ ହୃଦ୍‌ରୋଗ ବିକାର ସମେତ ଅନ୍ୟାନ୍ୟ ଚିକିତ୍ସା କ୍ଷେତ୍ରରେ ବିସ୍ତାରିତ ହେଉଛି।ଏହି ସହଯୋଗ ଜଟିଳ ସ୍ୱାସ୍ଥ୍ୟ ଚ୍ୟାଲେଞ୍ଜର ମୁକାବିଲାରେ ବହୁବିଧ ଏବଂ ବହୁ-ସାଂସ୍ଥାଗତିକ ଗବେଷଣାର ଶକ୍ତିକୁ ଉଦାହରଣ ଦିଏ। ଏହି ଦଳ ଭାରତ ଏବଂ ବିଶ୍ୱସ୍ତରରେ ଚିକିତ୍ସା ପ୍ରତିଷ୍ଠାନଗୁଡ଼ିକରେ ଏହି କାର୍ଯ୍ୟକୁ ବିସ୍ତାର କରିବାକୁ ଲକ୍ଷ୍ୟ ରଖିଛି, ଯାହା ଦ୍ୱାରା ମାନସିକ ସ୍ୱାସ୍ଥ୍ୟ ବ୍ୟାଧିର ଉନ୍ନତ ନିର୍ଣ୍ଣୟ, ଚିକିତ୍ସା ଏବଂ ବୁଝାମଣାରେ ଯୋଗଦାନ ମିଳିବ।