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# Health-Wilse magazine



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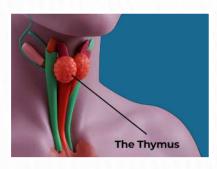














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# **HCOWAA:** Advancing Healthcare Standards in West Africa

The Health Community of West Africa Association (HCOWAA), based in Ghana, is a non-governmental organization dedicated to advancing healthcare across West Africa. Addressing the uneven distribution of medical resources, HCOWAA advocates for regional cooperation through a Health Alliance that unites healthcare stakeholders to create a cohesive health community.

With a mission to improve health outcomes in West Africa, HCOWAA facilitates collaboration, innovation, and research among professionals, leveraging collective resources to enhance healthcare services, policies, and access. HCOWA envisions a resilient West African healthcare system where institutions and professionals lead groundbreaking research, foster innovation, and influence policies that elevate regional healthcare.

Through initiatives like establishing a regional healthcare database, launching research projects, and hosting policy roundtables, HCOWA builds strong networks to drwive healthcare advancements. Advocacy efforts focus on equitable access, supporting vulnerable populations, and addressing healthcare disparities. The organization's objectives include fostering research and innovation, supporting health policy reforms, and integrating medical equipment manufacturers with healthcare facilities.

HCOWA also facilitates training programs, academic exchanges, and research grants, ensuring members are equipped with knowledge and skills to address regional health challenges effectively. Networking events like the HCOWA Medical and Health Industry Investment Summit & Expo connect professionals, offering a platform for partnership and knowledge sharing.

HCOWAA's commitment extends to partnerships with international health organizations and academic institutions, which amplify its impact by introducing global best practices and strengthening West African healthcare infrastructure. Collaborative efforts with international partners promote training, research, and infrastructure upgrades for health facilities, pharmaceutical establishments, and clinics.

In addition, HCOWAA's magazine partnerships, including an MoU with Health Pulse Magazine, provide platforms to publish relevant content, share insights, and enhance visibility for ongoing initiatives. Through these combined efforts, HCOWAA aims to foster a collaborative healthcare environment that not only addresses urgent health challenges but also builds a sustainable, inclusive healthcare future for West Africa.

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# Why Ghana Must Prioritize Mental Health & NCDs Now

In recent years, Ghana has made significant progress in tackling infectious diseases such as malaria, HIV, and tuberculosis. Yet, a silent crisis is growing in our communities—one that demands equal, if not greater, attention: the rise of **mental health disorders and non-communicable diseases (NCDs)** such as hypertension, diabetes, cancers, and cardiovascular conditions.

The World Health Organization's 2024 STEPS report revealed alarming figures: nearly one in four adults in Ghana is living with hypertension, while diabetes and obesity rates continue to rise. At the same time, mental health conditions, particularly depression and anxiety, are becoming increasingly prevalent, with limited access to care and widespread stigma preventing many from seeking help. Left unchecked, these challenges will place a heavy burden on families, the healthcare system, and the nation's economic productivity.

Mental health and NCDs are often described as "hidden epidemics" because they do not spread like infectious diseases but grow steadily in silence. Yet their impact profound. A young professional unable to stress manage and depression is just as much at risk of losing productivity as a farmer battling untreated hypertension. Both

situations weaken households, slow development, and ultimately erode national progress.

The solution lies in **policy action, prevention,** and community awareness. Ghana's **National Health Insurance Scheme (NHIS)** must expand its coverage to include comprehensive care for mental health and NCDs. Primary healthcare facilities need to integrate mental health screening and NCD checks as routine services, ensuring early detection. Public education campaigns, supported by media platforms like Joy FM, can play a critical role in breaking stigma, promoting healthy lifestyles, and encouraging regular check-ups.

Technology and innovation also offer hope. Telemental health platforms, mobile health apps, and community-based programs can bridge the gap between patients and professionals, particularly in underserved regions.

The time to act is now. Prioritizing mental health and NCDs is not just a health agenda it is a **national development imperative.** By investing today in prevention, education, and care, Ghana can safeguard its most valuable resource: the health and wellbeing of its people.

# The Thymus By Richeal Elikem Dovia

The thymus is a small but mighty organ that plays a central role in the development of the body's immune system. Often overlooked compared to the heart or lungs, this gland is essential for training and maturing the very cells that defend us against infection.

### **Location and Structure**

The thymus sits in the upper front part of the chest, tucked just behind the breastbone (sternum) and in front of the heart. Structurally, it consists of two lobes, each with an outer cortex and an inner medulla, all wrapped in a protective capsule. Inside these lobes, immature T cells—also called thymocytes—interact with specialized epithelial cells that guide their development. Here, they undergo a process of "training":

- Positive selection ensures T cells can recognize the body's immune receptors.
- Negative selection eliminates T cells that mistakenly target the body's own proteins.

This careful screening process is what equips the immune system to fight off foreign invaders without attacking itself.

### **Function**

The thymus is best known as the school for T-lymphocytes (T cells). These cells are born in the bone marrow but must pass through the thymus to mature. Once trained, they circulate through the blood and lymphatic system, ready to fight infection and disease.

Beyond this immune role, the thymus also has an endocrine function. It secretes hormones such as thymopoietin, thymosin, thymulin, and thymic humoral factor, all of which help regulate T cell development and broader immune activity.

### **Growth and Development**

e thymus is most active during childhood and adolescence. At birth, it measures about 4–6 cm in length, gradually enlarging until puberty when it weighs 40–50 grams. After this peak, it slowly shrinks through a process called involution, where functional tissue is replaced by fat. Even in adults, however, the thymus continues to contribute to immune function, albeit at a reduced level.

### **Clinical Importance and Disorders**

Several conditions can affect the thymus:

- •DiGeorge syndrome a congenital disorder where the thymus is underdeveloped or absent, leading to severe immune deficiency.
- Mediastinal masses including cysts, benign growths, or tumors.
- Thymoma and thymic carcinoma rare cancers of the thymus. Thymomas typically grow slowly, while thymic carcinoma is more aggressive.
- Associated conditions including myasthenia gravis, pure red cell aplasia, and hypogammaglobulinemia, all of which may be linked to thymus abnormalities.

### **Anatomical Relations**

The thymus extends from the base of the neck, just below the thyroid gland, to about the level of the fourth rib. It rests on the pericardium (the sac surrounding the heart) and lies close to major vessels such as the aortic arch and left brachiocephalic vein. In the neck, it borders the trachea and is covered by the sternohyoid and sternothyroid muscles.

### **Historical Perspective**

The thymus was known to Ancient Greek physicians as an anatomical structure, but its purpose remained unclear for centuries. It wasn't until the 1960s that scientists confirmed its vital role in T cell maturation and immune regulation, forever changing our understanding of the immune system.

### Takeaway

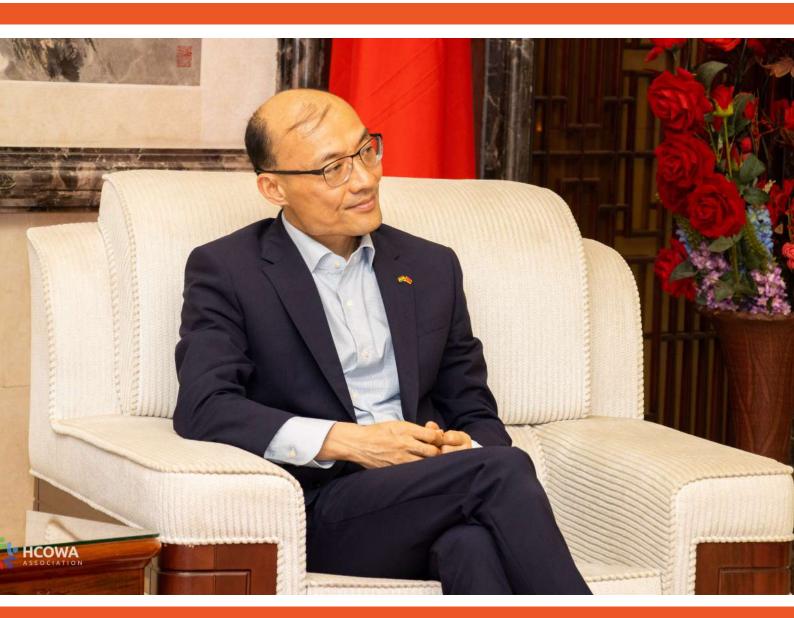
Though it may shrink with age, the thymus remains one of the most important organs for immune health, especially during early life. By shaping our body's T cells, it ensures a lifelong ability to recognize and fight disease.

The Thymus

# Courtesy Visit to the Chinese Embassy in Ghana Strengthens Health Collaboration

As part of the pre-Expo activities leading up to the 2025 China-West Africa Medical and Health Industry Expo, a high-level courtesy visit was paid to the Embassy of the People's Republic of China in Ghana. The delegation was led by the President of the Health Community of West Africa (HCOWA) Association, accompanied by a team of distinguished Chinese health professionals and medical exhibitors.

The visit formed an important part of the pre-Expo engagements, which also included tours of Ghanaian healthcare institutions, hospitals, and professional centers by Chinese exhibitors and medical experts. By stopping at the Embassy, the delegation reaffirmed the longstanding partnership between Ghana, West Africa, and China in the field of healthcare cooperation, innovation, and technology exchange.





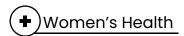
During the interaction, the HCOWA President highlighted the significance of the upcoming Expo as a platform not only for showcasing medical technologies but also for deepening strategic partnerships in clinical practice, research, and capacity building. The presence of the Chinese medical experts at the Embassy underscored the strong support from Chinese institutions and professionals toward building resilient health systems in West Africa.

Officials at the Chinese Embassy expressed appreciation for the visit and reaffirmed China's commitment to supporting Ghana and the West

African region in areas such as medical education, hospital cooperation, and joint research initiatives.

This symbolic courtesy visit reflected the shared vision of both parties to enhance cross-border health collaboration, foster people-to-people exchanges, and create sustainable healthcare partnerships. It also set the tone for the Expo itself, positioning it as more than an exhibition-rather, a milestone in the collective effort to transform healthcare delivery across West Africa through international cooperation and shared expertise.





# Domestic Violence

### More than just Bruises

### By Dovia Richeal Elikem

Domestic violence is not just a private family matter—it is a serious public health crisis that affects millions of women across the globe. The World Health Organization (WHO) reports that one in three women worldwide will experience physical or sexual violence in her lifetime, most often at the hands of an intimate partner. Its consequences extend far beyond visible injuries, leaving deep and lasting impacts on women's physical health, mental well-being, and social stability.

### **Causes and Risk Factors**

Domestic violence is rooted in a desire for power and control. Abusers dominate partners through fear, manipulation, and coercion. Several factors contribute to this behavior, including:

- Cultural beliefs that reinforce male dominance
- Childhood exposure to violence
- Substance abuse and financial stress
- Untreated mental health issues
- Weak laws or poor enforcement, allowing abusers to act with impunity

While these factors may explain patterns of abuse, they never justify it.

### **Health Consequences**

The effects of domestic violence on women's health are profound and far-reaching:

- Physical injuries: bruises, cuts, fractures, internal bleeding
- Chronic conditions: migraines, gastrointestinal problems, heart disease
- Reproductive complications: miscarriage, infertility, and pregnancy-related risks

Pregnant women are particularly vulnerable, with violence increasing the risk of severe complications that endanger both mother and child.

### **Emotional and Social Impact**

Beyond physical harm, abuse isolates women

from their support networks. Many are prevented from working, pursuing education, or maintaining friendships. This isolation makes it harder to break free from the cycle of abuse.

Survivors often experience depression, anxiety, and post-traumatic stress disorder (PTSD). Some turn to alcohol or drugs as a coping mechanism, which further harms their health. The ripple effects extend to children—witnessing domestic violence leaves lasting emotional scars and increases the risk of perpetuating the cycle in adulthood.

### **Barriers to Seeking Help**

Despite the serious consequences, many women do not seek help due to:

- Fear of retaliation
- Financial dependence
- Concern for their children
- Stigma, shame, or victim-blaming
- Lack of access to shelters, counseling, and legal protection

### **Breaking the Cycle**

Addressing domestic violence requires comprehensive action:

- Raising awareness to challenge stigma and victimblaming
- Enforcing strict laws and holding perpetrators accountable
- Expanding access to shelters, healthcare, and counseling services
- Empowering women with financial and educational opportunities

Domestic violence is a human rights violation and a public health emergency. By strengthening laws, support systems, and community awareness, societies can create safer homes where women are free to live, heal, and thrive.



# Reproductive Health and Family Planning: Building Healthier Families and Stronger Communities

By Dovia Richeal Elikem

Reproductive health is more than just a medical issue-it's a cornerstone of family well-being. It encompasses the physical, emotional, and social aspects of reproductive systems and processes, ensuring that individuals and couples have the knowledge and resources they need to make informed decisions about their reproductive lives. At the heart of reproductive health lies family planning—the ability for couples to decide if, when, and how many children to have. This not only promotes healthier pregnancies but also reduces the risks associated with closely spaced births,

The Way Forward

Improving outcomes requires greater awareness, education, and access to

creating stronger foundations for families and communities.

### **Why Family Planning Matters**

### Healthier Mothers and Children

Access to modern contraceptives, counseling, and education helps prevent unintended pregnancies and unsafe abortions. By allowing proper spacing between pregnancies, it reduces the risks of complications and lowers both maternal and infant mortality rates.

### • Empowerment and Equality





# Machine Learning in Gastrointestinal Radiology:

### **Smarter Imaging for Better Care**

### By Richeal Elikem Dovia

Advances in medical technology are transforming how doctors diagnose and treat disease—and few areas are seeing this change more clearly than gastroenterology. Traditionally, one of the most important diagnostic tools in this specialty has been the ultrasound machine, used to examine the liver, pancreas, and other abdominal organs. But when paired with artificial intelligence (AI), this everyday device becomes a powerful partner in precision medicine.

Why Gastroenterology and Al Are a Perfect Match Gastroenterology relies heavily on endoscopic and radiologic imaging, which makes it an ideal field for Al. Spotting a small lesion in the stomach lining or identifying subtle changes in liver tissue can be difficult, even for highly trained specialists. Al and machine learning (ML) algorithms can sift through vast amounts of imaging data, highlight patterns, and flag abnormalities that might otherwise be missed—helping doctors catch problems earlier and make more confident decisions.

### **How Machine Learning Works in Imaging**

Machine learning, a subset of Al, allows computers to learn from examples:

- Supervised learning Systems are trained on images labeled by experts (e.g., identifying gastric intestinal metaplasia) so they can recognize the same condition in new cases.
- Unsupervised learning Algorithms group data without labels, such as clustering tissue samples with similar gene expression patterns.
- Deep learning (DL) Using artificial neural networks like convolutional neural networks (CNNs), computers can process complex imaging data with remarkable accuracy, similar to how the human brain interprets visual information.

### **Clinical Applications in Gastroenterology**

Al-enhanced imaging is already making a difference in multiple areas:

• Hepatology (liver care): Identifying liver disease, staging fibrosis, and distinguishing between benign





and malignant lesions.

Pancreatology: Supporting the detection of intraductal papillary mucinous neoplasms, staging pancreatic cancer, and diagnosing pancreatic ductal adenocarcinoma. Al can also quantify intrapancreatic fat, a marker linked to metabolic disorders.

### Reducing Variability and Human Error

One of the biggest advantages of AI is its ability to standardize interpretation. Traditionally, two doctors might view the same scan slightly differently. By integrating Al into imaging, results become more consistent, reproducible, and less subject to individual variation—ultimately improving patient outcomes.

### **Powering the Next Wave of Innovation**

The explosion of deep learning in medicine has been made possible by faster computing power (thanks to GPUs), along with sophisticated software and algorithms. Today's ultrasound machines are no longer just imaging devices-they are becoming part of a data-driven healthcare ecosystem that combines human expertise with computational intelligence.

### The Future of Smarter Care

The integration of AI and ML into gastrointestinal radiology is not only improving image quality but also transforming the patient journey. Faster, more accurate diagnoses mean earlier treatment, more personalized care plans, and better long-term outcomes.

In short, machine learning is redefining the future of gastroenterology—and with it, the promise of more precise, reliable, and life-saving care.



Côte d'Ivoire has taken a major step in the fight against poliovirus with the launch of an upgraded laboratory at the Institute Pasteur of Côte d'Ivoire, designed to speed up detection and improve response to outbreaks.

The facility will play a vital role in analyzing environmental surveillance and Acute Flaccid Paralysis (AFP) samples, enabling quicker interventions.

"This laboratory is a critical addition to our public health system," said **Dr. Pierre N'gou Dimba**, Minister of Health, Public Hygiene and Universal Health Coverage. "It strengthens our ability to stay ahead of the virus and protect our children."

### **Faster, Smarter Detection**

Among its new technologies is **Direct Detection through MinION sequencing**, a portable tool that allows scientists to read the virus's genetic code in real time. Until now, samples had to be sent to South Africa, delaying results and response.

"Effective detection is the backbone of eradication," noted **Dr. Lucien Manga**, WHO Representative in Côte d'Ivoire. "This modern facility is a major boost to our collective drive to halt polio transmission and protect children."

By 2026, Côte d'Ivoire will join the list of African countries with **full laboratory capacity for poliovirus detection.** 

The refurbishment was led by WHO, with support from the Bill & Melinda Gates Foundation and the Global Polio Eradication Initiative (GPEI). Alongside advanced equipment, staff training and expanded environmental surveillance sites ensure that wastewater samples better reflect where the virus may circulate.

In 2024, Côte d'Ivoire reported **31 detections of variant polio type 2.** This year, two cases were identified and contained quickly. Earlier in 2025, nearly **10 million children** were vaccinated across 113 districts with the novel oral polio vaccine type 2.

The new lab will also strengthen broader disease surveillance systems, putting the country at the frontline of epidemic preparedness in West Africa. "This facility is an invaluable asset," Dr. Manga emphasized. "It enhances Côte d'Ivoire's capacity to detect and stop outbreaks faster than ever before."

Côte d'Ivoire's upgraded laboratory is more than a national milestone it is part of the global effort to achieve a **polio-free world**, ensuring that no child grows up at risk of this preventable disease.

**SOURCE-WHO** 

# The 8-Glass Rule:

### Myth or Must for Hydration?

By Dovia Richeal Elikem



We've all heard the age-old advice: "Drink eight glasses of water a day." For decades, it's been repeated as a golden rule for good health. But here's the truth hydration isn't one-size-fits-all. You don't necessarily need to count cups, and your body already has a built-in system to tell you when you're running low: thirst.

### **Thirst Is Your Best Guide**

Your body is remarkably efficient at signaling when it needs water. Feeling thirsty is a natural reminder to drink, and for most healthy adults, responding to this cue is enough to stay hydrated. Instead of stressing over numbers, paying attention to your body's signals is often the simplest and most effective way to maintain balance.

### **Hydration Comes from More Than Just**

Water isn't the only source of hydration. In fact, much of your daily fluid intake comes from foods and other beverages,

- Water-rich foods: Fruits like watermelon, oranges, and strawberries, and vegetables such as cucumbers, lettuce, and celery, are packed with water. Soups and broths also contribute.
- Beverages: Coffee, tea, milk, and even juice all count toward hydration. While caffeinated drinks were once thought to dehydrate you, research shows their overall effect still contributes to your daily fluid balance.

So if you're enjoying a bowl of soup at lunch, snacking on fruit, and sipping on tea during the day, you're already supporting your hydration without even realizing it.

### When You Might Need More Water

That said, some circumstances require you to be more mindful of your fluid intake:

- Urine color check: Pale yellow is a good sign you're hydrated. Dark yellow or amber means you need more fluids.
- · Activity level: If you exercise intensely or sweat a lot, you lose more water and electrolytes that need to be replenished.
- Climate: Hot or humid weather increases fluid loss, as does living at higher alti-
- Illness: Fevers, diarrhea, or vomiting can quickly dehydrate the body, making extra fluids essential.

### Myths vs. Reality

- Myth: Only plain water counts. Reality: Hydrating foods and drinks all contribute.
- Myth: If you're thirsty, you're already dehydrated.

Reality: Thirst is an early and reliable sign not necessarily a sign of severe dehy-

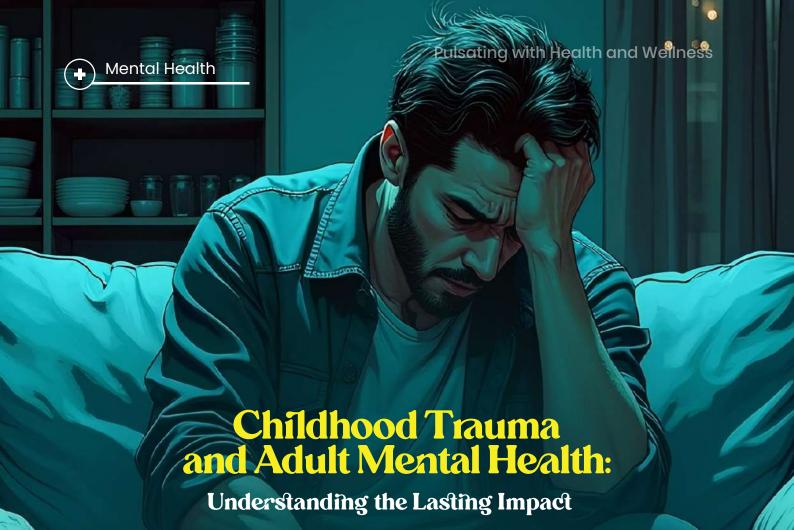
• Myth: More water is always better.

Reality: While rare, drinking excessive amounts of water in a short time can lead to a dangerous condition called hyponatremia (low sodium levels in the blood). Balance is key.

### The Bottom Line

You don't have to obsess over eight glasses a day. Instead, let your body guide you. Drink when you're thirsty, eat water-rich foods, and adjust your intake based on your activity level, climate, and health needs. For most people, this approach ensures optimal hydration - no calculator required.

Hydration isn't about chasing a magic number. It's about balance, awareness, and listening to your body.



By Dovia Richeal Elikem

Childhood is often seen as a time of innocence, growth, and joy. But for many, it is overshadowed by painful experiences abuse, neglect, loss, or exposure to violence. These experiences, known as **childhood trauma**, don't simply disappear as children grow older. Instead, they can leave deep emotional scars that influence mental health, relationships, and even brain development well into adulthood.

### What Is Childhood Trauma?

Childhood trauma refers to deeply distressing experiences that overwhelm a child's ability to cope.

### It can take many forms:

- Abuse Physical abuse (hitting, burning) may lead to fear, aggression, and trust issues. Sexual abuse can trigger PTSD, shame, and intimacy struggles. Emotional abuse (criticism, humiliation) often damages self-esteem and emotional regulation.
- **Neglect** When caregivers fail to provide basic needs, whether physical (food, shelter, medical care) or emotional (love, support, validation), children may grow up feeling unsafe and unseen.
- Witnessing Violence Exposure to domestic violence, bullying, or community conflict can create lasting anxiety, depression, or social withdrawal.
- Loss and Grief The death or separation from a loved one disrupts emotional development and can trigger feelings of abandonment.
- Other Traumas Natural disasters, accidents, or

war may overwhelm a child's coping mechanisms, leaving them fearful and unstable.

### **How Trauma Affects Adult Mental Health**

Unresolved childhood trauma can echo into adulthood in profound ways. It may increase vulnerability to mental health conditions like depression, anxiety, post-traumatic stress disorder (PTSD), and substance abuse. Trauma can also affect self-worth, attachment styles, and the ability to build healthy relationships.

### **Pathways to Healing**

The good news: healing is possible. Early intervention plays a critical role. Evidence-based therapies such as cognitive-behavioral therapy (CBT), play therapy, and trauma-focused counseling help children process painful memories, regulate emotions, and build resilience. Just as important are supportive environments at home and in schools, where children feel safe, validated, and cared for.

### **Why Early Action Matters**

By recognizing and addressing trauma early, we can prevent deep wounds from defining a child's future. Providing the right tools and support not only promotes recovery but also strengthens long-term mental health, giving children the chance to grow into thriving, emotionally healthy adults.

### Skin Care Health

# Glow Goals? Start With

### The Skincare Ingredient That **Does It All**

By Dovia Richeal Elikem

When it comes to skincare, a few ingredients have earned superstar status - and niacinamide is one of them. Also known as Vitamin B3. niacinamide is a water-soluble vitamin that offers multiple benefits for skin health, making it a favorite among dermatologists and skincare enthusiasts alike.

### What is Niacinamide?

Niacinamide is a form of Vitamin B3, an essential nutrient that supports skin barrier function, cell repair, and overall health. Unlike harsher active ingredients, niacinamide is generally well-tolerated by most skin types, including sensitive skin.

### **Benefits of Niacinamide for Skin**

Strengthens the Skin Barrier Niacinamide helps the skin retain moisture, reducing dryness and sensitivity.

### **Reduces Redness and Inflammation**

Its anti-inflammatory properties make it effective for calming irritated skin, including conditions like rosacea or acne.

### **Minimizes Pores and Oiliness**

Regular use can regulate production, leading to smoother skin and a more refined appearance.

#### Fades Dark **Spots** and Hyperpigmentation

Niacinamide inhibits melanin transfer, making it a powerful ally against uneven skin tone.

### **Boosts Collagen Production**

It supports skin elasticity and reduces the appearance of fine lines and wrinkles.

### How to Use Niacinamide

- Concentration matters: Most products contain between 2%-10% niacinamide. Beginners should start with a lower concentration.
- Layering: It pairs well with most ingredients, including hyaluronic acid and peptides. However, be cautious when combining with strong acids (like vitamin C or AHA/BHAs) — introduce them gradually.
- Rout ine fit: You can use niacinamide in serums, moisturizers, or even toners, once or twice daily.

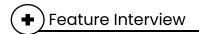
### Who Can Use Niacinamide?

Almost everyone! Whether your concern is acne, aging, hyperpigmentation, or sensitive skin, niacinamide adapts to different needs. It's especially useful for people who want results without irritation.

### **Final Thoughts**

Niacinamide is one of the most versatile, research-backed skincare ingredients available today. Gentle yet powerful, it can transform your skin by improving tone, texture, and resilience. Adding it to your routine could be the simple step that makes a big difference.





# World Pharmacists Day 2025:

# Honoring the vital role pharmacists play that safeguard patient health



# Dr. Daniel Ako Charway (PharmD)

Registered Pharmacist, Member of the Pharmaceutical Society of Ghana, Member of Diabetes, Endocrine and Metabolic Society of Ghana (DEMSOG) and Member of Parkinson Support Group.



### 3. Challenges

## Q: What are the biggest challenges in educating patients about safe medicine use?

A: Three stand out. First, health literacy — simplifying complex information without losing accuracy. Second, time constraints in busy practice settings. Third, adherence, especially for long-term therapies where benefits aren't immediate. Clear messaging, repetition, and patient-friendly materials are key. In regulatory work, I've seen how essential it is to design leaflets that are understandable, not just compliant. Overcoming these barriers requires empathy and creativity.

### 4. Technology

## Q: How is technology changing the way you practice pharmacy?

A: Technology is reshaping pharmacy from a product-centered to a knowledge-centered role. Robotics streamline dispensing and reduce errors, freeing us for clinical care. Al strengthens pharmacovigilance by spotting adverse reactions quickly. Digital health tools like adherence apps and remote monitoring shift us toward proactive patient management. Today, pharmacists are becoming interpreters of health data, not just suppliers of medicines.

### 5. Future Skills

### Q: What new skills will pharmacists need in the next decade?

A: Beyond pharmacology, future pharmacists must master:

- **Data literacy** for interpreting wearables, genomic tests, and electronic health records.
- **Clinical specialization** in fields like pharmacogenomics or chronic disease care.
- Digital proficiency with telehealth, apps, and Alassisted tools
- **Business acumen,** especially for independent practice.

Most importantly, adaptability — the ability to evolve with new technologies and patient needs

### 6. Public Health

### Q: Can you share an example where pharmacistled education made a difference in a community?

A: Hypertension management is a strong example. In community clinics, pharmacists ran BP checks, counseled on medication and lifestyle, and followed up with patients. The results were clear: improved control rates and reduced complications. It proved pharmacists aren't just dispensers — we are frontline public health workers reducing system-wide burdens

### 7. Counterfeit Medicines

## Q: What role do pharmacists play in protecting the public from counterfeit drugs?

A: We are the final line of defense. This involves:

1. Securing supply chains with strict distribution

standards.

- **2. Spotting red flags** at dispensing from packaging errors to suspicious pricing.
- **3. Educating patients** about the risks of unverified online or informal vendors.

Every safe pack dispensed is a barrier against counterfeit harm.

As this World Pharmacists Day reminds us, pharmacists are not only custodians of medicines but also educators, innovators, and advocates for safer, healthier communities. Their evolving role from dispensing drugs to managing data, guiding public health, and embracing new technologies - highlights the profession's adaptability and Whether enduring relevance. confronting counterfeit medicines, leading public health initiatives, or championing patient-centered care, pharmacists remain at the heart of healthcare delivery. Looking ahead, their expertise, accessibility, and commitment will continue to transform lives and strengthen health systems worldwide.



# HCOWA Partners COA to Build West Africa's First Traditional Medicine Teaching Hospital in Ghana



In what has been described as a groundbreaking step for healthcare on the continent, the Health Community of West Africa (HCOWA) Association has signed a strategic agreement with COA Research and Manufacturing Company Limited (COA-RMCL) on Friday, September 26, 2025 to establish the first National Teaching Hospital for Traditional and Alternative Medicine in West Africa.

The project, which will be based in Ghana, is envisioned as a Centre of Excellence that will blend traditional medicine with modern healthcare systems, transforming both practice and perception of African herbal and alternative medicine.

The signing ceremony marked a historic partnership between two institutions deeply invested in advancing the health sector. Under the

Memorandum of Understanding (MoU), HCOWA and COA will jointly develop, finance, and operate the facility.

The hospital will not only provide clinical care but also serve as a teaching and research institution, setting new standards in the validation, production, and regulation of traditional medicine.

### A Bold Vision for Integrated Healthcare

The Teaching Hospital is designed to be a state-of-the-art complex. Plans include inpatient and outpatient wards, diagnostic centres, and specialized departments in oncology, nephrology, gastroenterology, paediatrics, women's health, orthopaedics, dermatology, rehabilitation, and physiotherapy — all adapted for traditional and alternative therapies.



Complementing the clinical facilities will be advanced research laboratories in pharmacology, toxicology, phytochemistry, microbiology, and molecular biology. These will provide the foundation for rigorous testing, quality control, and clinical trials of traditional medicine products, ensuring that herbal remedies meet international health and safety standards.

Academic infrastructure will also form a major component. The hospital will feature lecture halls, simulation laboratories, e-learning centres, training pharmacies, and libraries. These facilities are aimed at training the next generation of healthcare professionals, with programmes ranging from diplomas to postgraduate degrees in traditional and alternative medicine. Importantly, the academic curriculum will be developed in collaboration with Ghana's Ministry of Health, Ministry of Education, and international experts mobilized by HCOWA, including from China.

### Global Partnerships and Local Leadership

Speaking at the signing, Madam Sihong Jiang, President of HCOWA, described the agreement as a defining moment for West Africa's health sector.

"This is not just a hospital; it is a platform for international cooperation. By bringing together Ghanaian herbal medicine, Traditional Chinese Medicine, and conventional medical practices, we are creating a model for integrated healthcare that the world can look to. Our aim is to make Ghana a reference point for Africa's healthcare innovation while connecting the continent with global best practices," she said.

On his part, Prof. (MH) Samuel Ato Duncan, CEO of COA-RMCL, emphasized that the hospital would be a first of its kind, not only in Ghana but across the entire West African sub-region.

"This project is timely and historic. It will be the first of its kind in West Africa, transforming the traditional medicine sector into a modern, globally competitive industry. Beyond providing treatment, it will validate traditional products, protect intellectual property, and create opportunities for innovation and commercialization. Ghana will not just be consuming knowledge but exporting it to the world," Prof. Duncan noted.

### **Technology at the Core**

Jiang explained that a defining feature of the hospital will be the integration of artificial intelligence and digital systems through HCOWA's Hospital Online

Network (HON) platform.

According to her, the system is expected to power hospital operations with Al-driven demand forecasting, real-time inventory management, expiry control, and waste reduction. It will also provide transparent payment systems, e-invoicing, and dashboards for regulators, auditors, and management, ensuring efficiency and accountability.

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### A New Era for Traditional Medicine in Africa

For decades, traditional medicine in Africa has played a critical role in community health but has often lacked formal recognition and rigorous validation. By establishing this hospital, Ghana and its partners aim to change that narrative, building a structure where indigenous knowledge meets scientific validation.

The project positions Ghana as a regional hub for traditional and alternative medicine, ensuring that local therapies are not only preserved but refined, documented, and scaled for both domestic and international markets.

As construction preparations begin, stakeholders are confident that the Teaching Hospital will become a regional referral centre, a research powerhouse, and a knowledge hub that will redefine healthcare delivery in Africa.

## +

## Chinese Medical Experts Deepen Ties with Ghanaian Hospitals Ahead of 2025 China-West Africa Medical Expo

A delegation of Chinese medical experts and exhibitors, led by the Changchun Group, visited Ghana between 18th and 22nd August 2025 to deepen healthcare collaboration ahead of the upcoming 2025 China-West Africa Medical & Health Industry Summit and Expo.

The visit included high-level meetings with professional associations, hospitals, and government agencies, focusing on knowledge sharing, technology transfer, and public health cooperation.

On **18th August**, the Changchun Group held talks with the **Pharmaceutical Society of Ghana (PSGH)**, which represents over 7,000 pharmacists nationwide. Discussions centered on drug registration, distribution networks, equipment supply, and expertise exchange. Later, a follow-up session with the PSGH Executive Board addressed regulatory processes and opportunities for pharmaceutical imports.

Hospital-level engagements began on 19th August. At Korle Bu Teaching Hospital, Ghana's leading referral center, the delegation met with CEO Dr. Yakubu Seidu and senior staff to explore research collaborations, training, and clinical technology adoption. Meetings at Eden Family Hospital, Lekma Hospital, The Bank Hospital, and the University of Ghana Medical Centre (UGMC) reviewed patient services, equipment needs, and potential facility upgrades.

Policy discussions took place on **21st August** with the Ghana Health Service, led by Director Dr. Boakye Boateng, under the theme "Building Stronger Collaborations, Sharing Ideas & Creating Sustainable Solutions." Talks explored joint projects in public health and sustainable healthcare systems. The delegation also met with the Greater Accra Regional Coordinating Council, where discussions extended to agriculture and nutrition initiatives, including beef, mushroom, ginseng, and tiger nut production.

On **22nd August,** another team of Chinese medical experts toured healthcare facilities, focusing on infrastructure, patient care, and specialist exchanges.

BothGhanaianinstitutions and the visiting delegations expressed a strong commitment to expanding partnerships in healthcare, pharmaceuticals, and research. Officials emphasized that these engagements mark a critical step toward advancing Ghana's healthcare capacity through international cooperation.

The visit forms part of preparations for the **2025 China-West Africa Medical & Health Industry Summit and Expo,** expected to serve as a major platform for innovation, collaboration, and investment in the region's health sector.

Source: Healthpulseonline



# Cyber Security and Data Privacy in Healthcare

In today's digital age, the healthcare sector has become increasingly dependent on technology for storing, accessing, and sharing patient information. From electronic health records to telemedicine platforms and cloud-based hospital systems, digital solutions have transformed care delivery by improving efficiency, reducing paperwork, and enabling faster

communication between patients and providers. While this transformation has created countless benefits, it has also made healthcare systems a prime target for cyberattacks. Sensitive data such as medical histories, insurance details, and even genetic information is highly valuable to hackers, often being sold on the black market for financial gain.

Cybersecurity breaches in healthcare can have devastating consequences—not only financially but also for patient safety and trust. For instance, ransomware attacks on hospitals can delay urgent procedures, disrupt access to critical care systems, and even endanger lives. Beyond immediate harm, breaches can lead to identity theft and unauthorized use of personal health information, raising serious ethical and legal concerns. Patients who lose trust in the confidentiality of their records may also hesitate to share vital information with doctors, which can compromise the quality of care.

To combat these threats, healthcare organizations are investing in stronger security measures such as encryption, multi-factor authentication, and secure cloud storage. Regulations and policies provide clear standards for protecting patient information, but compliance alone is not enough. Continuous staff training, regular system audits, and robust incident response strategies are equally vital to safeguarding digital health systems. Human error remains one of the biggest vulnerabilities, so building a culture of cybersecurity awareness is just as important as investing in advanced technology.

At the same time, the rapid adoption of new technologies such as wearable devices, mobile health apps, and artificial intelligence tools brings fresh challenges for protecting data. These innovations collect enormous amounts of sensitive information, making privacy concerns even more pressing. Striking a balance between embracing innovation and ensuring strong data protection will be crucial as healthcare becomes increasingly digital.

Ultimately, protecting patient data must remain at the heart of digital health transformation. Only by combining innovation with security can healthcare systems truly serve patients while safeguarding their privacy, trust, and safety in an interconnected world.





A Gentleman's Guide to Vitality, Balance  $\mbox{\ensuremath{\wp}}$ 

**Aging Well** 

By Dovia Richeal Elikem

When people hear the word testosterone, they often think of muscles or masculinity. But this hormone plays a far bigger role in men's health than many realize. From energy levels to heart health, testosterone influences almost every system in the body.

### **Why Testosterone Matters**

Testosterone is produced mainly in the testes and helps regulate:

• **Reproductive health** (sperm production, libido, fertility)

Muscle and bone strength

Mood and mental clarity

Energy and metabolism

Healthy testosterone levels are essential not only for reproductive health but also for overall well-being and healthy aging.



### Signs of Imbalance

Low testosterone, or hypogonadism, can show up as:

- Fatigue or low energy
- Reduced muscle mass
- Low libido or erectile dysfunction
- Mood swings, depression, or "brain foq"
- Weight gain or changes in body composition

High levels, on the other hand, can cause acne, aggression, or health risks if not monitored.

### Testosterone Replacement Therapy (TRT)

For men with clinically low testosterone, TRT can restore balance. It comes in different forms – gels, injections, or patches – and can improve mood, energy, and sexual health.

But TRT isn't a quick fix. It requires regular monitoring to track hormones and potential side effects, such as changes in cholesterol, prostate health, or fertility.

### **Beyond the Basics: Modern Insights**

- Biomarkers: Doctors now use blood tests, imaging, and even genetic tools to get a clearer picture of hormone health.
- Al in healthcare: Artificial intelligence is being explored to help predict hormonal imbalances and personalize treatments.
- Holistic approach: Lifestyle changes like sleep, exercise, and nutrition — remain key to supporting healthy testosterone levels.

The Future of Testosterone and Men's Health Researchers are moving toward **personalized medicine** — tailoring hormone therapies to each individual's genetics, lifestyle, and health risks. The goal is not just to correct imbalances but to promote healthy aging and quality of

### **Takeaway**

Testosterone is more than just a "male hormone." It's central to men's physical, mental, and emotional health. Whether through lifestyle changes, medical therapy, or future innovations, understanding and supporting testosterone levels is a vital step toward healthier living.

# Varicella (Chickenpox)

By Larsey Hilda Kai

What if a seemingly innocent childhood illness—just a few itchy red spots—had the power to leave lasting effects for life? This is the story of **varicella**, better known as **chickenpox**. While often dismissed as a routine childhood infection, varicella is a **highly contagious viral disease** caused by the **varicella-zoster virus (VZV)**. It typically begins with mild symptoms such as fever, fatigue, and loss of appetite, followed by its hallmark: an itchy red rash that develops into fluid-filled blisters.

Though usually mild, chickenpox is far from harmless. It can lead to serious complications in newborns, pregnant women, and individuals with weakened immune systems. Even more striking, the virus never truly leaves the body—it lies dormant in nerve cells and can reawaken years later as **shingles (herpes zoster)**, a painful and potentially debilitating condition.

### **How Varicella Spreads**

Varicella is among the most contagious of viral infections. It spreads through:

- · Airborne droplets from coughing or sneezing
- Direct contact with blister fluid
- Contaminated surfaces touched by infected individuals

This explains why outbreaks are common in households, schools, and other crowded environments where close contact is unavoidable.

### **Symptoms and Complications**

Symptoms usually appear **10–21 days after exposure** and may include:

- Fever and fatigue
- Loss of appetite
- Itchy rash that progresses to fluid-filled blisters before scabbing

While most recover fully, chickenpox can sometimes cause:

- Skin infections from scratching
- Pneumonia
- Encephalitis (brain inflammation)
- Severe illness in vulnerable groups such as newborns, pregnant women, and immunocompromised individuals Even after recovery, the risk of shingles later in life remains.

### **Prevention and Care**

The best defense against chickenpox is **vaccination.** Two doses in childhood provide strong protection and dramatically reduce cases and complications. Other preventive measures include:

- Practicing good hygiene
- · Isolating infected individuals until all blisters have healed
- Avoiding close contact with vulnerable groups

### **Key Takeaway**

Varicella may look like a harmless childhood rash, but its impact can last a lifetime—sometimes reappearing decades later as shingles. With effective vaccination programs and proper care, chickenpox is now a largely **preventable illness**, underscoring the truth that **prevention is always better than cure**.



## **(+**)

# **Lucid Dreaming:**

### Unlocking the Conscious Mind in Sleep.

By Latif G. Adams

Have you ever wished you could fly, revisit an old memory, or solve a problem in your sleep? With lucid dreaming, it's possible. This fascinating phenomenon happens when you realize you're dreaming and, in some cases, gain the ability to shape the dream itself. What once seemed like fantasy is now recognized as a unique psychological state that blends waking awareness with the subconscious mind.

### **What Is Lucid Dreaming?**

Lucid dreams occur during REM (Rapid Eye Movement) sleep, the stage when our dreams are most vivid. The key feature is self-awareness: some dreamers simply recognize that they are dreaming, while others can fully control dream settings, characters, or even their own actions within the dream.

### A Brief History and Science Behind It

The concept of lucid dreaming is ancient. Buddhist monks practiced it as part of spiritual training, and even Aristotle noted awareness within dreams in his work On Dreams. Modern scientific validation came in the 20th century, when researchers proved its link to REM sleep.

In the 1970s and 1980s, pioneers like Stephen LaBerge developed techniques—such as using pre-arranged eye movements—to show when a sleeper had become lucid. Today, brain scans like EEG and fMRI confirm that lucid dreaming activates the prefrontal cortex, the region responsible for decision—making and self-awareness, making it a unique hybrid of sleep and waking consciousness.

### Why Try Lucid Dreaming?

Lucid dreaming isn't just about fun adventures. It can have meaningful benefits:

• Overcoming nightmares by consciously reshaping frightening dreams.

- Boosting creativity for artists, writers, and innova-
- **Skill rehearsal** for athletes or performers who use dreams as mental practice.
- Emotional exploration in a safe, imaginative space.

### **How to Get Started**

Some people naturally experience lucid dreams, but others can train their minds:

- **Reality checks:** Regularly ask yourself, "Am I dreaming?" or look for inconsistencies.
- **Dream journaling:** Record dreams immediately after waking to boost awareness and recall.
- Mnemonic induction (MILD): Repeat a phrase before sleep, like "Tonight, I will realize I'm dreaming."
- Wake-back-to-bed method: Wake after 5–6 hours of sleep, stay awake briefly, then return to bed—this increases chances of conscious dreaming.

### **Risks and Misconceptions**

Lucid dreaming is generally safe. The main risk is disrupted sleep if practiced excessively. Occasionally, people may experience sleep paralysis, a temporary state of being awake but unable to move—but it's harmless and passes quickly. Importantly, lucid dreaming is not mystical or supernatural—it's a mental skill anyone can develop with patience.

### Conclusion

Lucid dreaming offers more than entertainment—it can be a tool for self-discovery, creativity, and empowerment. Whether you use it to conquer fears, practice new skills, or simply enjoy the thrill of flying across the skies, lucid dreaming opens the door to one of the mind's most fascinating frontiers.

# No More Wilted Herbs:

## Preserve Flavor with Olive Oil Freezer Cubes

Fresh herbs like basil, parsley, rosemary, and thyme can instantly elevate any meal. But if you've ever bought a bunch of herbs, only to watch half of them wilt in the fridge, you know how frustrating food waste can be. The good news? There's an easy solution: freeze your herbs in olive oil. This simple method locks in flavor, extends shelf life, and makes cooking easier.

### Why Olive Oil?

Freezing herbs on their own can sometimes leave them limp and less flavorful once thawed. Olive oil acts as a natural preservative, protecting delicate leaves from freezer burn and helping retain their vibrant taste and aroma. Plus, when you toss the frozen cubes into your cooking, the oil adds richness and blends seamlessly into soups, sauces, sautés, and stews.

### **Step-by-Step Guide**

1. Choose and Clean Your Herbs – Wash fresh herbs like basil, cilantro, thyme, or rosemary under cold water, then pat them dry completely. Moisture can cause freezer burn.

- **2. Chop Finely –** Chop herbs into small pieces to make them easier to portion and use later.
- 3. Prepare an Ice Cube Tray Place the chopped herbs into each section of a clean

ice cube tray, filling each about halfway.

- **4. Add Olive Oil –** Pour extra virgin olive oil over the herbs until the sections are nearly full. The oil should completely cover the herbs.
- **5. Freeze** Place the tray in the freezer until solid, then pop the cubes out and store them in a labeled freezer bag or airtight container.

### **How to Use Herb Cubes**

When you're ready to cook, simply drop a cube (or two) into your dish. They work wonderfully in:

- Soups & Stews For instant depth of flavor.
- Pasta Sauces A cube of basil or oreganoinfused oil can elevate your tomato sauce.
- **Stir-Fries -** Toss in a garlic-parsley cube to season vegetables or rice.
- Roasts & Marinades Rub thawed cubes onto chicken, fish, or veggies before roasting.

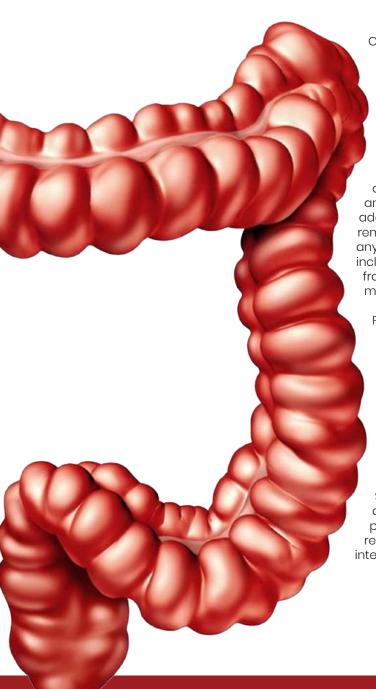
### Extra Tips

- Mix herb combinations like rosemary + thyme or parsley + basil for ready-made blends.
- For stronger flavors, try infusing cubes with garlic or chili flakes.
- Use within 3-6 months for the best flavor.



# Colon Cleanses: Helpful or Harmful?

By Richeal Elikem Dovia



Colon cleanses, whether through hydrotherapy, laxatives, herbal supplements, or detox kits, are widely marketed as methods to improve digestion, increase energy, reduce bloating, promote weight loss, and even prevent colon cancer. However, current medical evidence does not support most of these claims.

The human body already has an effective detoxification system. The liver, kidneys, lungs, and colon work continuously to eliminate waste and maintain internal balance without the need for additional interventions. Research on colon cleansing remains limited, and the potential risks often outweigh any unproven benefits. Reported complications include dehydration, electrolyte imbalances, infections from unsterile procedures, and disruption of the gut microbiome, which may actually impair digestion.

For individuals seeking to improve digestive health, safer and evidence-based approaches are recommended. A diet rich in fiber from fruits, vegetables, legumes, and whole grains, combined with adequate hydration and regular physical activity, provides natural support for colon function. Limiting processed foods and excess sugar also contributes to a healthier digestive system.

In conclusion, colon cleanses are generally unnecessary and may present health risks. Sustainable digestive and overall wellness is best achieved through consistent healthy lifestyle practices and regular medical consultations when required, rather than through short-term detox interventions.

# Occupational Therapy?



**Donald Yaw Gaviston** 

Occupational Therapist
University of Ghana Medical Centre
(UGMC)

Good health is not just about avoiding sicknessit's about being able to do the things that make life meaningful. Whether it's getting dressed in the morning, cooking a family meal, learning at school, or enjoying a hobby, these everyday activities are what give our lives rhythm and purpose. But when illness, injury, or age makes those activities difficult, life can feel frustrating and limiting. That's where occupational therapy, often called OT, comes in. Occupational therapy is a type of health care that focuses on helping people do the activitiesor "occupations"—that matter most to them. The word "occupation" doesn't just mean a job. It covers all the daily things we do: caring for ourselves, learning, working, playing, and connecting with others.

An occupational therapist works with people of all ages to build skills, adapt their environment, or use tools and strategies so they can live more independently. In short, OT is about finding ways for people to do what they want and need to do, even if health challenges stand in the way.

For children, the main "occupations" are play, learning, and growing. Occupational therapists can help by turning therapy into fun activities. For example, a child who has trouble with balance might practice on a play obstacle course. A child with handwriting difficulties might build finger strength by playing with clay or using special pencils. These playful exercises build the skills children need for school, friendships, and independence.

Adults often face sudden changes in their ability to work or care for themselves after accidents, surgeries, or illnesses. Imagine someone who has broken an arm and needs to return to their job, or a person with arthritis struggling to cook and clean. Occupational therapists step in to make recovery smoother and daily living easier.

As people grow older, staying independent becomes especially important. Occupational therapists help older adults remain active and safe in their homes and communities. For example, they might suggest grab bars in the bathroom, teach safe ways to move around the house, or create routines that reduce the risk of falls.

### The Benefits of Occupational Therapy

The beauty of occupational therapy lies in its focus on the person, not just the illness or condition. It asks, "What do you want or need to do?" and then works toward making that possible. Some of the key benefits include:

Independence: People gain the skills or tools to care for themselves without relying too much on others.

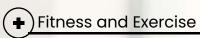
Quality of Life: Everyday tasks become easier and more enjoyable, whether that means buttoning a shirt or cooking a meal.

Confidence: Achieving small goals builds selfesteem and encourages people to try new activities. Participation: OT helps people engage in school, work, community, and family life, keeping them connected and active.

Life is made up of simple, meaningful moments sharing a meal, writing a note, gardening, or playing with grandchildren. When health challenges make these moments difficult, occupational therapy offers a path forward. It reminds us that living well is not only about healing, but also about participating fully in the world around us.

So whether it's a child learning to hold a crayon, an adult returning to work after injury, or an older adult staying safe at home, OT helps people live life to the fullest. It is a hopeful and practical reminder that with the right support, everyone can continue to do the things that matter most.







The Brain-Boosting Power of Strength Training

When most people think about weight training, they picture toned muscles, stronger bones, or better athletic performance. But new research shows that the benefits of lifting weights go far beyond the body—they extend to the brain. Scientists are discovering that strength training may play an important role in protecting against cognitive decline, including conditions like dementia and Alzheimer's disease.

### **The Brain-Body Connection**

Cognitive decline often comes with aging, affecting memory, focus, and problem-solving. While aerobic exercise like walking or cycling has long been praised for supporting brain health, weight training is emerging as a powerful ally. Studies suggest that resistance exercises help improve blood flow to the brain, increase levels of brain-derived neurotrophic factor (BDNF)—a protein that supports the growth and survival of brain cells-and reduce inflammation that contributes to cognitive impairment.

### **More Than Just Muscles**

Weight training doesn't only build strength; it also enhances coordination and balance. These benefits reduce the risk of falls and injuries, which can otherwise limit independence in older adults. Just as importantly, regular strength training has been linked to sharper memory, better executive function (the brain's ability to plan and organize), and even improved mood.

### **Science in Action**

A growing body of research supports this connection. One study from the University of Sydney found that older adults who engaged in weight training twice a week not only built muscle strength but also showed significant improvements in cognitive function compared to those who did not. Other findings reveal that even moderate resistance training can slow brain shrinkage—a natural part of aging—and keep neural pathways more resilient.

### **Getting Started**

The good news is that you don't need heavy gym equipment to reap these brain-boosting benefits. Simple bodyweight exercises like squats, lunges, and push-ups, or light resistance bands and dumbbells, can make a difference. Experts recommend two to three sessions per week, targeting major muscle groups, and gradually increasing intensity over time.

### **The Bottom Line**

Weight training is more than a tool for physical fitness—it's a form of mental insurance. By incorporating resistance exercises into your weekly routine, you not only strengthen your muscles but also safeguard your brain against the challenges of aging. In the long run, lifting weights may help you stay sharp, independent, and resilientboth in body and mind.





# Health Terms



Basal Body Temperature (BBT): Your body's temperature at rest, measured right after waking up.

Blood Alcohol Content (BAC): The concentration of alcohol in your bloodstream, measured as grams per 100 ml of blood.

Blood Pressure: The force of blood against artery walls as the heart pumps. Recorded as systolic/diastolic (e.g., 120/80 mmHg).

**Blood Type:** Classification of blood based on markers (A, B, AB, O) and Rh factor (positive or negative).

Body Mass Index (BMI): A measure of body fat based on height and weight.

Heart Rate (Pulse): The number of times your heart beats per minute.

**Respiratory Rate:** The number of breaths taken per minute.

**UV Exposure:** Amount of ultraviolet radiation absorbed from the sun.

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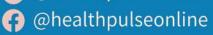








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