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Konyak Tribal Medicine: A Nagaland Herbal Formulation's Anti-Cancer Potential

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Konyak Tribal Medicine: A Nagaland Herbal Formulation's Anti-Cancer Potential

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WHY IN NEWS

A peer-reviewed study published in the ***Microchemical Journal*** (announced in April 2026) has decoded the anti-cancer potential of a **five-plant herbal formulation** used by the **Konyak Naga tribe** of **Mon district, Nagaland**. The research — led by **Nagaland University** with **Berhampur University** and **Saveetha Medical College** — identifies a specific compound that binds to **VEGFR2**, a cancer-related protein, with activity comparable to the FDA-approved drug **Axitinib**. The finding is a significant case for integrating indigenous tribal knowledge with modern biomedical research.

THE SCIENCE

The Formulation

The Konyak herbal preparation uses five plants in combination:

PLANT	SCIENTIFIC NAME	TRADITIONAL USE
1	***Persicaria maculosa***	Anti-inflammatory, wound healing
2	***Acorus calamus*** (Sweet flag)	Digestion, respiratory conditions, nerve calmer
3	***Erythrina variegata*** (Indian coral tree)	Fever, skin diseases, anti-bacterial
4	***Stereospermum chelonoides*** (Patala)	Fever, diabetes, skin disease; part of Ayurvedic *Dasamula*
5	***Oroxylum indicum*** (Indian trumpet tree)	Jaundice, cough, diarrhoea; also in Ayurvedic *Dasamula*

Used in combination, the formulation is traditionally given for persistent inflammation, tumour-like growths, and chronic wounds that don't heal — which today's biomedicine recognises as overlapping with cancer symptom clusters.

The Compound — 9,19-Cyclolanost-24-en-3-ol

- A **triterpenoid alcohol** isolated from the formulation

- Binds to **VEGFR2** (Vascular Endothelial Growth Factor Receptor 2) — the key receptor driving **angiogenesis** (the formation of new blood vessels that supply tumours)
- Binding affinity in molecular docking studies comparable to **Axitinib** — an FDA-approved kinase inhibitor used in advanced renal cell carcinoma

Why VEGFR2 Matters

- Tumours cannot grow beyond ~2 mm without developing their own blood supply — a process called **tumour angiogenesis**
- VEGFR2 inhibitors starve tumours by blocking this vessel formation
- Approved VEGFR2 inhibitors: Axitinib (Inlyta), Sorafenib, Sunitinib, Regorafenib, Cabozantinib
- These drugs cost **₹1-5 lakh per month** in India — often inaccessible for patients in lower-income brackets
- A plant-derived alternative, if clinically validated, could dramatically reduce cost

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THE KONYAK TRIBE — ETHNOGRAPHIC CONTEXT

Demographics

- **Population:** ~2.5 lakh (Census 2011, classified as Scheduled Tribe)
- **Area:** Primarily **Mon district**, Nagaland (northeastern tip of the state, bordering Arunachal Pradesh and Myanmar)
- **Language family: Sino-Tibetan** (Konyak language; also speak Nagamese and English)
- **Subgroup:** Northern Naga tribes (with Tangsa, Nocte)

Cultural Identity

- **Physical features:** Mongoloid descent
- **Religion:** ~95% Christian (majority Baptist; American Baptist missions from the 1870s)
- **Pre-Christian traditions:** Animism; *Hornbill Festival* participation preserves traditional dress, dance, and music
- **Body marking: Facial tattoos (Headhunter tattoos)** — historically given to warriors who took enemy heads; the last generation of tattooed warriors is fading (practice ended mid-20th century)

Traditional Medicine System

- Based on **empirical observation** passed through generations of healers (*Ahngs* in Konyak tradition)
- Draws on **specific forest plants** that grow in the rich biodiversity of Mon's tropical-to-montane forests

- Targeted at: wounds, digestive ailments, fevers, skin diseases, reproductive health
- Knowledge traditionally passed through **female healers** and clan elders

THE LEGAL-INSTITUTIONAL FRAMEWORK

Protecting Tribal Knowledge — India's Architecture

FRAMEWORK	ROLE
Biological Diversity Act 2002	Regulates access to biological resources and traditional knowledge; Section 21 mandates benefit-sharing
National Biodiversity Authority (NBA)	Central regulator; approves ABS agreements
Biodiversity Management Committees (BMCs)	Local bodies under Section 41; maintain **People's Biodiversity Registers (PBRs)** documenting local biodiversity + traditional knowledge
Protection of Plant Varieties & Farmers' Rights Act 2001	Plant-breeder and farmer rights protection
Patents Act 1970, Section 3(p)	Excludes from patentability: "An invention which in effect, is traditional knowledge or which is an aggregation or duplication of known properties of traditionally known component or components"

Traditional Knowledge Digital Library (TKDL)

Created by **CSIR + Ministry of AYUSH** — the TKDL has documented **~290,000 formulations** from Ayurveda, Siddha, Unani, Yoga, and Sowa-Rigpa. This database is accessible to international patent offices — and has prevented multiple attempts to patent traditional Indian knowledge abroad (the **Neem (1997)**, **Haldi/Turmeric (1995)**, and **Basmati (2001)** cases were landmark revocations).

Gap: TKDL's coverage of **tribal knowledge systems** (Konyak, Bhil, Santhal, Gondi, etc.) is much thinner than codified systems like Ayurveda. The Konyak study illustrates both the opportunity and the protection gap.

THE NAGOYA PROTOCOL AND INTERNATIONAL OBLIGATIONS

The **Nagoya Protocol on Access and Benefit-Sharing (ABS)** — adopted 2010, in force 2014, under the **Convention on Biological Diversity (CBD)** — creates international rules for:

1. **Access** — researchers must obtain Prior Informed Consent (PIC) from the biodiversity-rich country
2. **Benefit-Sharing** — monetary and non-monetary benefits from commercial use of genetic resources must flow back to the source community

3. **Compliance** — importing countries must ensure their researchers/companies respect source-country ABS laws

India's position: Ratified 2014; the Biological Diversity Act 2002 (amended 2023) is India's domestic implementation. For the Konyak formulation, commercial use would require:

- Approval via **NBA**
- Benefit-sharing agreement with the Konyak community (likely via BMC in Mon district)
- Documentation in People's Biodiversity Register

THE RESEARCH COLLABORATION

Nagaland University

- Central university established **1994** (upgraded to central status 2005)
- Campuses at Lumami (HQ), Kohima, and Meriema
- Research strengths: biodiversity, ethnobotany, agricultural science (suited to NE biodiversity focus)
- The **Department of Botany** has been engaged in ethnobotanical documentation since the 1990s

Co-Investigators

- **Berhampur University, Odisha** — Dr Anil Kumar Das lab (bioinformatics)
- **Saveetha Medical College, Chennai** — Dr Rajasekar Balachandran (molecular docking)

The study represents **collaborative research across Indian institutions**, combining tribal consent, ethnobotanical knowledge, and modern pharmaceutical techniques.

WHY THIS FINDING MATTERS

Scientific Significance

- First peer-reviewed paper identifying a specific compound from Konyak traditional medicine targeting a cancer pathway
- Validates decades-old anecdotal reports of traditional medicines showing anti-tumour effects
- Provides a concrete lead compound (9,19-Cyclolanost-24-en-3-ol) for further development

Economic Significance

- Indian cancer treatment costs patients **₹5-15 lakh** in total for advanced cases
- Targeted therapies like Axitinib (₹1-5 lakh/month) are out of reach for most Indians
- A plant-derived VEGFR2 inhibitor, if developed and manufactured in India, could be **dramatically cheaper**

- The **Jan Aushadhi** generic pharma programme could potentially integrate such drugs into its catalogue

Social Significance

- **Recognition** of tribal knowledge as equal contributor to modern science (not just raw material)
- **Benefit-sharing** potential for Konyak community via NBA/BMC mechanisms
- **Preservation incentive** — peer-reviewed validation increases urgency of preserving elderly healers' knowledge before it is lost with generational turnover

THE LARGER PATTERN — TRIBAL MEDICINE & MODERN DRUG DISCOVERY

Several landmark modern drugs were developed from traditional plant knowledge:

DRUG	SOURCE	TRADITIONAL USE → MODERN INDICATION
Aspirin	Willow bark	Fever, pain → Anti-inflammatory, anti-platelet
Quinine	Cinchona bark (South American)	Fever → Malaria
Artemisinin	*Artemisia annua* (Chinese)	Fever → Malaria (Nobel 2015, Tu Youyou)
Vinblastine / Vincristine	Madagascar periwinkle	Traditional → Leukaemia, Hodgkin's lymphoma
Paclitaxel (Taxol)	Pacific yew bark	— → Ovarian, breast, lung cancer
Reserpine	*Rauvolfia serpentina* (Indian Ayurveda)	Mental illness → Antihypertensive

About **50% of approved cancer drugs** trace their origin to natural products or their derivatives. The Konyak study extends this pattern to Northeast India's tribal pharmacopoeia.

CONCERNS AND NEXT STEPS

Research Pathway

The study is at the **molecular docking + in-vitro** stage. To reach clinical use, the compound must pass:

1. **Preclinical validation** — animal studies for toxicity, efficacy, pharmacokinetics
2. **Phase I–III trials** — human safety and efficacy (typically 8-15 years)
3. **Regulatory approval** — CDSCO, USFDA, EMA depending on markets

4. **Manufacturing scale-up** — sustainable sourcing of plant material (or synthetic route)

Ethical & Legal

- **Community consent** must be formally documented (beyond the research-level consent already obtained)
- **Benefit-sharing agreement** must be operationalised before any commercial development
- **Patent filing strategy** must navigate Section 3(p) of the Patents Act — only novel derivative compounds can be patented, not the traditional formulation itself

Sustainability

- Plant species collection must not threaten wild populations
- *Oroxylum indicum* is IUCN Least Concern but regionally vulnerable; *Stereospermum chelonoides* has limited wild distribution
- Cultivation protocols for bulk pharma supply will need development

UPSC RELEVANCE

PAPER	ANGLE
GS1 — Society	Konyak tribe; tribal cultural practices; Scheduled Tribe status
GS2 — Governance	Biological Diversity Act 2002 (amended 2023); NBA; BMCs; PBRs
GS2 — IR	Nagoya Protocol; CBD; ABS framework; international IP
GS3 — S&T	Drug discovery; VEGFR2; Patents Act Section 3(p); traditional medicine validation
GS3 — Environment	Biodiversity conservation; ethnobotany; sustainable harvesting
Prelims	Konyak tribe — Mon district, Nagaland; Sino-Tibetan language family · Study plants: *Persicaria maculosa, Acorus calamus, Erythrina variegata, Stereospermum chelonoides, Oroxylum indicum* · Compound: **9,19-Cyclolanost-24-en-3-ol** · Target: **VEGFR2** · Comparable drug: **Axitinib** · BDA 2002; NBA; BMCs; PBRs; TKDL; Section 3(p) Patents Act
Interview	"Does India's Biological Diversity Act 2002 framework adequately protect tribal knowledge from biopiracy, or does the Konyak case show gaps that need reform?"

*Published in **Microchemical Journal** · Led by* **Nagaland University** *with Berhampur University + Saveetha Medical College · 5 plants: Persicaria maculosa, Acorus calamus, Erythrina variegata, Stereospermum chelonoides, Oroxylum indicum · Active compound:* **9,19-Cyclolanost-24-en-3-ol** *(a triterpenoid) · Binds* **VEGFR2** *· Comparable efficacy to* **Axitinib**.

Mon district, **Nagaland** *·* **~2.5 lakh** *population ·* **Sino-Tibetan** *language · ~95% Christian (Baptist majority) · Facial (Headhunter) tattoos · Scheduled Tribe.*

Biological Diversity Act 2002 *(amended 2023) ·* **NBA** *regulator ·* **BMCs** *+* **PBRs** *at local level ·* **Section 3(p) Patents Act 1970** *— excludes traditional knowledge from patentability ·* **TKDL** *(CSIR + AYUSH) — ~290,000 formulations documented.*

Nagoya Protocol 2010 *(in force 2014) under* **CBD** *· India ratified 2014 · Access + Benefit-Sharing (ABS) framework.*

Drives tumour angiogenesis · Approved inhibitors: Axitinib, Sorafenib, Sunitinib, Cabozantinib · Current price: ₹1-5 lakh/month · GS3: S&T + Environment; GS2: Governance + IR.

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