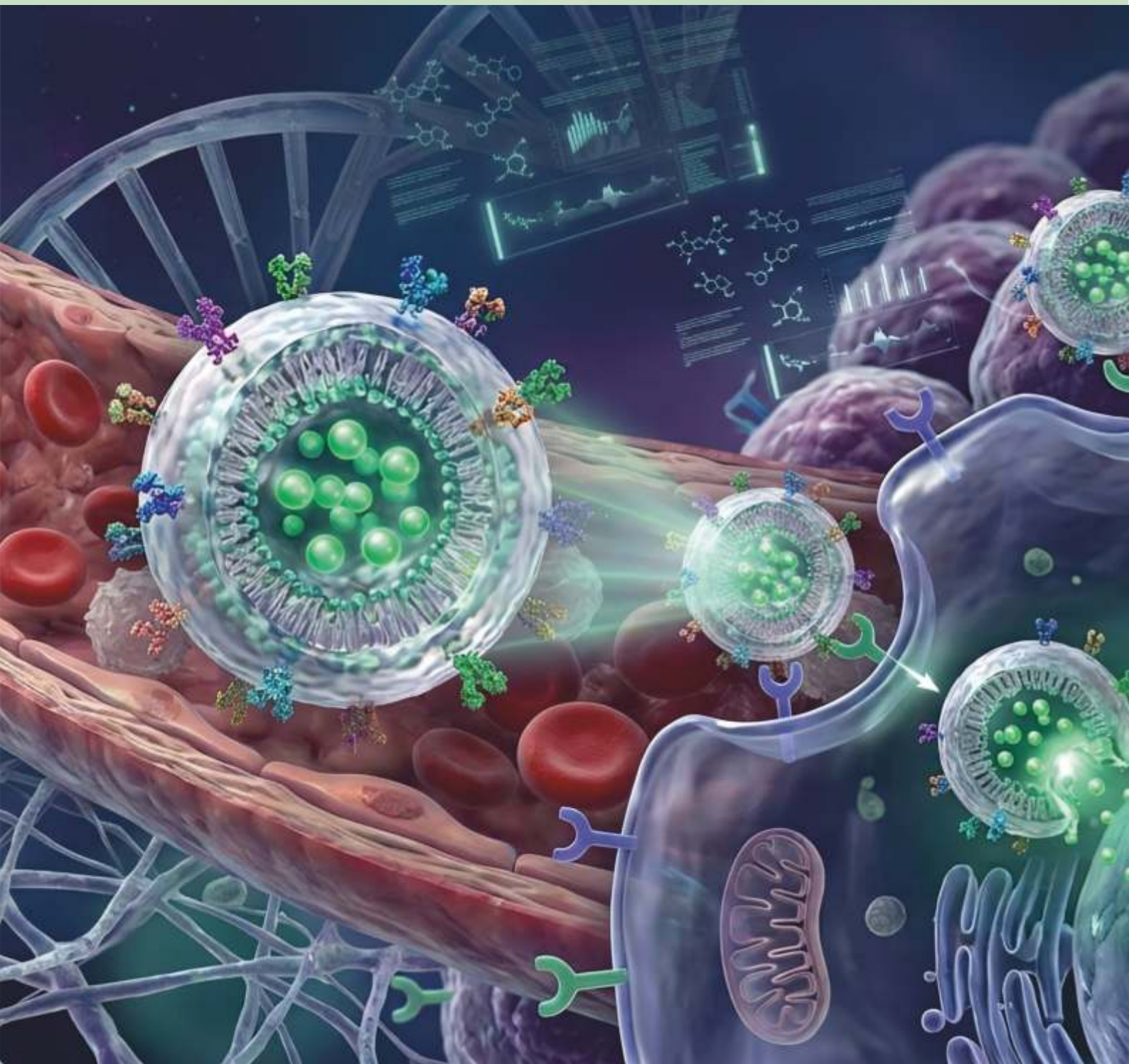


THE RECAP

Official Newsletter of NIPER-Ahmedabad

Department of Pharmaceuticals, Ministry of Chemicals & Fertilizers, Government of India



सर्व शक्ति आत्मनः

All power and strength reside within oneself

"It does not matter how slowly you go as long as you do not stop"

THE RECAP

Official Newsletter of NIPER-Ahmedabad

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Research
Highlights

Technology
Transfer

Institute
Highlights

ICPBS-2025
ICTDD-2026

Collaborations

Academic &
Professional
Activities

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Table of Contents

- 01 RESEARCH
HIGHLIGHTS
- 22 INSTITUTE
HIGHLIGHTS
- 32 EMERGING
COLLABORATIONS
- 34 ACADEMIC &
**PROFESSIONAL
ACTIVITIES**
- 40 CENTRE FOR
**MEDICAL DEVICES
(CMD)**
- 42 STUDENT
CORNER
- 45 INSTITUTIONAL
GROWTH
- 47 CULTURAL &
RECREATIONAL



Director's Message

It is a privilege to share with you the second issue of "THE RECAP" – NIPER-Ahmedabad's Official Newsletter. With each edition, we aspire to capture not only the milestones of our institute but also the evolving spirit of innovation and collaboration that drives our community forward.

Since the release of our inaugural issue, NIPER-Ahmedabad has continued to strengthen its position as a center of excellence in pharmaceutical education and research. Our journey has been enriched by new technology transfers, impactful collaborations, and academic initiatives that reflect our commitment to advancing healthcare solutions. The institute's vibrant ecosystem has been further energized through skill development programs, scientific conferences, and industry partnerships, ensuring that our students and researchers remain at the forefront of knowledge creation.

This issue marks a special milestone as we introduce, for the first time, a dedicated section on **Research Highlights**. Here, leading researchers from India and abroad share their insights and contributions, offering readers a glimpse into cutting-edge developments across diverse domains of pharmaceutical sciences. We believe this addition will inspire our community and foster greater dialogue between academia and industry at the global level. Equally important are the strides we have made in nurturing a dynamic campus culture. From academic forums to recreational gatherings, each initiative has contributed to building NIPER-Ahmedabad into a space where science, innovation, and community thrive together.

As we look ahead, our guiding principle remains steadfast: **Connect, Collaborate, and Cooperate**. I warmly invite you to engage with us, explore our campus, and be part of this journey of discovery, impact, and excellence.

Best regards,

Prof. Shailendra Saraf

Director, NIPER-Ahmedabad





Chemical Penetration Enhancers in Transdermal Drug Delivery: Techniques Employed in Enhancement Quantification and Analysis of Enhancement Mechanisms

Randa SH. Mansour

Zarqa University, Zarqa, Jordan
rmansour@zu.edu.jo

Abstract

Transdermal drug delivery offers a non-invasive route for systemic administration of therapeutics, yet its effectiveness is limited by the barrier properties of the stratum corneum. Chemical penetration enhancement is the most commonly used approach to overcome the permeability barrier of the stratum corneum, allowing higher flux of the drugs. This review highlights the techniques used to quantify the effect of chemical penetration enhancers on the amount of permeated drug through skin. It also summarizes commonly employed methods to acquire insight on possible enhancement mechanisms exerted by chemical enhancers on the biochemical composition of the stratum corneum.

Keywords: Transdermal Delivery, Chemical Penetration Enhancers, Stratum Corneum, Franz Diffusion Cell, Tape stripping, IR, DSC.

1 Introduction

Transdermal drug delivery refers to the administration of therapeutics through intact skin to achieve systemic effect (Pathan and Setty 2009). The stratum corneum is the outermost layer of the skin, with a thickness of 10-20 μm (Elias 1991). By virtue of its structure and organization, the stratum corneum provides the physical barrier that limits the transdermal delivery of drugs. The biochemical components of the stratum corneum that contribute to its barrier properties are mainly lipids (ceramides, cholesterol, fatty acids) and proteins (α -keratin) (Joo et al., 2010; Suhonen et al., 1999). The classic brick and mortar model describes the unique organization of these components as keratin-rich corneocytes embedded in a lipid intercellular matrix organized as lamellar lipid layers (Elias 1983; Elias 1991; Elias et al., 1977; Elias and Menon 1991).

Chemical penetration enhancers are chemicals, such as water, sulphoxides, azone, pyrrolidones, alcohols, fatty acids and surfactants amongst others that interact with skin constituents to reversibly overcome the barrier properties of the stratum corneum and facilitate

transdermal diffusion of drugs (Williams and Barry 2012, Barry 1988). Various direct mechanisms are proposed for this effect including:

1. Increase drug diffusivity through the skin by altering intracellular protein or intercellular lipid structures (Goodman and Barry 1988).
2. Increase the drug solubility/partitioning in the skin (Barry 1988).
3. Creation of diffusion pathways by lipid extraction lipids (Moser et al., 2001).
4. Phase separation within the SC lipids (Walker and Hadgraft 1991).

The effect of the penetration enhancers is evaluated from different aspects by a variety of techniques. Conventionally, permeation studies and physical characterization such as solubility and partitioning studies are used. Other techniques including Fourier-Transform infrared (FT-IR) spectroscopy and differential scanning calorimetry (DSC) are introduced which can help to elucidate the penetration enhancement mechanisms.

2 Methods used to quantify enhancement effect

Measuring the drug flux either in vivo or in vitro can be employed to quantify the effect of a penetration enhancer on transdermal absorption of drugs. Alternatively, measuring the drug response in vivo can be performed.

2.1 In-vitro methods

2.1.1 Diffusion cell

The diffusion cell method is the standard for measuring drug permeation across the skin. Franz diffusion cell (**Figure 1**) is a very widely used type. This cell is composed of a donor and a receiver compartment. The diffusion barrier is sandwiched between those compartments. The donor compartment contains the drug formulation so that the drug diffuses through the sandwiched barrier into the receiver solution. The amount of the diffused drug is quantified as a function of time (**Figure 2**) by analyzing samples of the receiver solution.

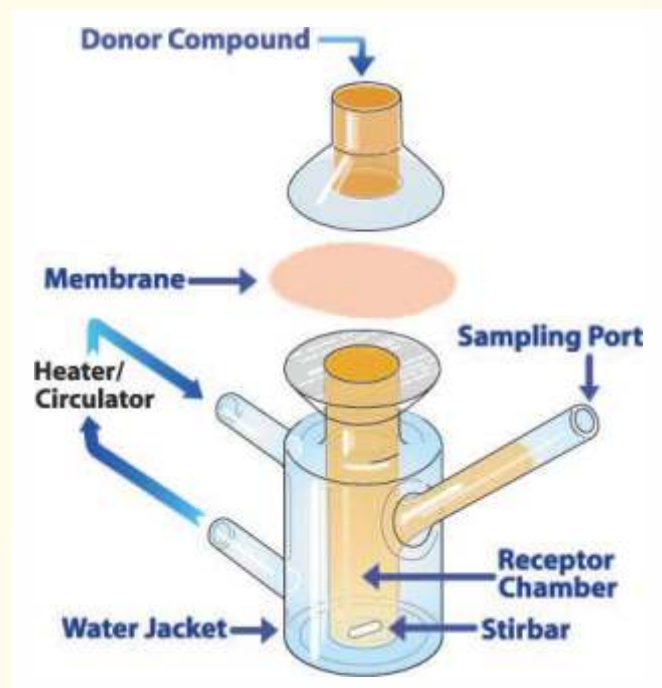


Figure 1: Vertical Franz diffusion cell (adapted from www.permeagear.com)

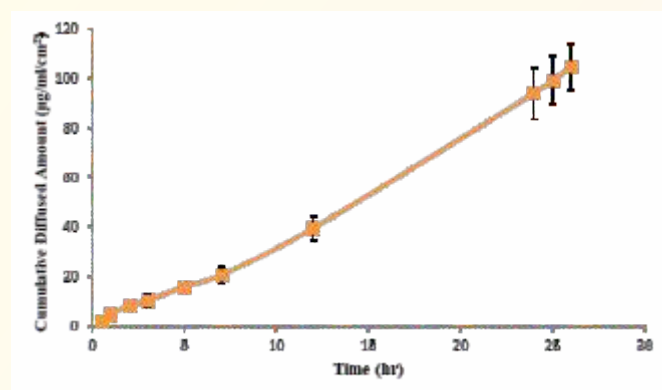


Figure 2: In vitro percutaneous diffusion profile

2.1.2 ATR-FTIR spectroscopy

In this method, the diffusion barrier is sandwiched between a reflectance and a drug donor solution. The increase of a drug-specific IR feature is employed to detect the drug into the deeper layers of the barrier as a function of time (Moser et al., 2001).

2.1.3 Tape stripping and determination of drug concentration profiles

The tape stripping of the stratum corneum is performed by using an adhesive tape to sequentially remove layers of the stratum corneum and subsequently analyze the removed layers. By this way, the drug concentration profile across the SC can be done (Tsai et al., 1999). This technique can be applied in vitro and in vivo (Moser et al., 2001).

2.2 In vivo methods

In addition to in vivo tape stripping technique, measuring the drug concentration in the plasma or its pharmacological response after application of the

formula on the skin surface can also be used to quantify the drug flux and permeability of the SC (Bach and Lippold 1998).

3 Methods used to analyze the effect of penetration enhancers on stratum corneum structure

To understand the mechanism by which a penetration enhancer affects stratum corneum biochemical structure, FT-IR spectroscopy and differential scanning calorimetry (DSC) (Babita et al., 2006) are commonly employed techniques.

3.1 FT-IR spectroscopy

Spectra of skin obtained from FT-IR studies are helpful in evaluating the molecular changes of skin lipids and proteins (Figure 3). IR spectrum of the stratum corneum can be used for the detection of structural modifications brought about by the application of penetration enhancers. Specific features of the IR spectrum of the stratum corneum are indicative to lipid chain conformational order/packing, and to the protein secondary structure and hydration (Saad et al., 2012). Accordingly, information can be obtained concerning alteration of the structural properties of the endogenous skin components and the mechanisms of penetration enhancement by observing changes in IR features peak area and shifting of frequency (Babita et al., 2006).

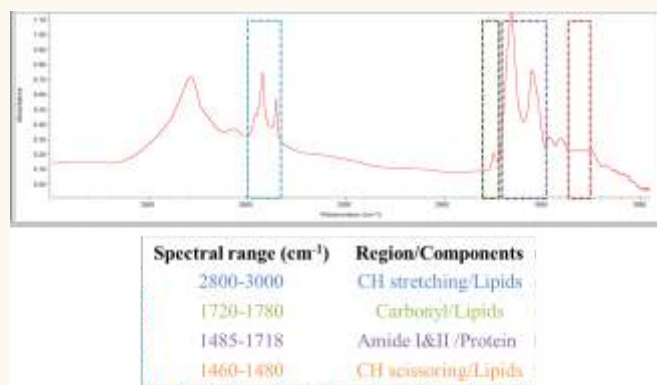


Figure 3: IR spectrum of stratum corneum with designation of spectral ranges.

3.2 Differential scanning calorimetry (DSC)

DSC thermogram of the stratum corneum exhibits characteristic endotherms of skin lipids and proteins (Figure 4). Major transitions near 40, 75, 85 and 107 °C assigned as T1, T2, T3 and T4 respectively (Babita et al., 2006) are usually analyzed. T1 and T2 are linked to lipids whereas T3 and T4 are related to the protein components (Van Duzee 1975).

The effect of penetration enhancers on the lipid and protein components can be analyzed by observing changes in enthalpies or shifting of peak transition temperatures of these endotherms. Thus, an insight on possible penetration enhancement mechanisms can be obtained.

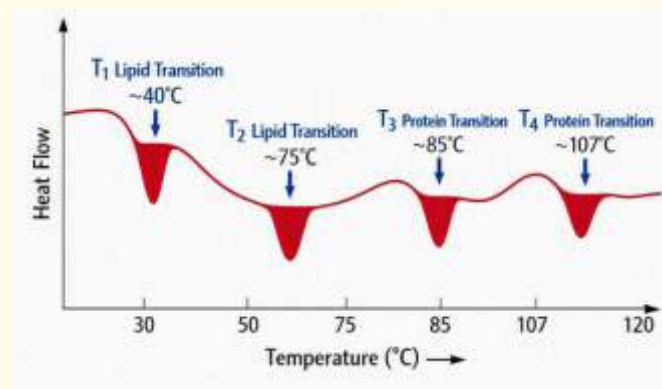


Figure 4: Illustrative DSC thermogram of stratum corneum (AI generated)

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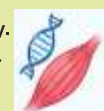
GUESS THE DRUG

Read the clues and choose the correct option.

- 1 I arrived in September 2026.
I am given once a week,
rather than once a day.
My mission is to help control
blood glucose in adults with type 2 diabetes
- A. Enlicitide B. Onswik
C. Tiratricol D. Apitegrombab



- 2 I am a novel therapy for spinal muscular atrophy.
My claim to fame is targeting muscle loss rather
than simply replacing the missing SMN protein.
- A. Isembyld B. Atebrioz
C. Juvmo D. Zanzastro



- 3 I was approved for a rare genetic disorder
called MCT8 deficiency. My active ingredient
is tiratricol.
- A. Emcitate B. Onswik
C. Mimrylo D. Lisraya



Answers:
1: B - Insulin ersitor alfa-gobe (Onswik) (FDA, Sept 2026).
2: A - Isembyld (apitegrombab) (FDA, Sept 2026).
3: A - Emcitate (tiratricol) (FDA, Sept 2026).



Microbes from Extreme Environments: Gold Mine of New Antimicrobial and other Bioactive Scaffolds

Dr. Girish B. Mahajan

Sr. Vice President, Microbiology department,
HiMedia Laboratories Pvt. Ltd.
gmahajan@himedialabs.com

Introduction

The accelerating global crisis of antibiotic resistance has emphasized the urgent need for truly new bioactive scaffolds (Quinn & Dyson, 2024). After the “golden era” of antibiotic discovery from terrestrial *Streptomyces* and fungi, new antibiotics stagnated by the 1970s as known compounds were repeatedly re-discovered (Lok Yung Hui et al., 2021; Chackaravarthi et al., 2023). Meanwhile, multidrug-resistant (“superbug”) infections are rising faster than new drugs (Quinn & Dyson, 2024). This gap has spurred bioprospecting in unusual microbiomes, including polar and Antarctic ecosystems that harbor novel bacteria with antimicrobial potential (Quinn & Dyson, 2024; Barrientos et al., 2018).

Extremophilic microbes (thermophiles, halophiles, acidophiles, piezophiles, psychrophiles, etc.) endure intense heat, salinity, pH, pressure, or cold, and often harbor distorted metabolic pathways (Chackaravarthi et al., 2023; Lok Yung Hui et al., 2021). The harsh selection pressures in these environments drive the evolution of unusual secondary metabolites – an untapped reservoir of antibiotics, antivirals, anticancers and other pharmaceuticals (Chackaravarthi et al., 2023; Barrientos et al., 2018). Indeed, extremophile natural products frequently show unique structures (e.g. extra cross-links, halogenations, lipid tails etc.) and bioactivities not seen in mesophilic analogues (Lok Yung Hui et al., 2021; Chackaravarthi et al., 2023). Exploring extremophiles thus addresses two critical issues: finding molecules with new mechanisms of action and escaping the chemical redundancy of well-known mesophilic sources (Quinn & Dyson, 2024).

Ecological Adaptations and Novel Metabolism in Extremophiles

It is revealed by now that extreme environments select microbes with extraordinary survival strategies (Lok Yung Hui et al., 2021; Chackaravarthi et al., 2023). For example, thermophiles stabilize proteins with unique chaperones and heat-stable enzymes, while psychrophiles maintain membrane fluidity via unsaturated lipids (Lok Yung Hui et al., 2021). These adaptations often arise from novel biosynthetic genes and biosynthetic gene clusters (Costantini et al., 2020). As Quinn and Dyson (2024) note, “the specific conditions encountered by extremophilic

microorganisms have likely provided an evolutionary pressure to diversify their antibiotic production capacity.” Likewise, acidophiles and alkaliphiles produce metabolites that buffer pH stress, and halophiles synthesize osmo-protectants (compatible solutes) and halogenated compounds in response to salt stress (Chackaravarthi et al., 2023).

In addition, extreme conditions favor production of protective pigments, antifreeze proteins, and antimicrobial peptides to outcompete neighbors (Chackaravarthi et al., 2023). For instance, haloarchaea secrete halocins (protein antibiotics) that are highly stable in high salt and broad pH (Chackaravarthi et al., 2023). In deserts or nutrient-poor hot springs, microbes often live in tight biofilms or consortia, intensifying competition for scarce resources (Chackaravarthi et al., 2023; Barrientos et al., 2018). As a survival strategy, many produce unusual antibacterial and antifungal metabolites to inhibit rivals (Chackaravarthi et al., 2023; Aede et al., 2024). Thus, ecology (competition, stress) and evolution (genetic divergence, horizontal gene transfer) together sculpt a wealth of novel metabolites in extremophiles (Costantini et al., 2020; Quinn & Dyson, 2024).

Notable Extremophile-Derived Bioactive Molecules

Many recent studies have uncovered exciting examples of extreme-environmental natural products (Chackaravarthi et al., 2023; Quinn & Dyson, 2024; Aede et al., 2024). A classic case is abenquines A–D, an aminobenzoquinone family from a *Streptomyces* isolated in Chile’s hyper-arid Atacama Desert (Imhoff, 2011). Schulz et al. recovered *Streptomyces* sp. DB634 from Atacama soil (~15 mm annual rain, Mars-like UV radiation) and discovered abenquines A–D in its fermentation broth (Imhoff, 2011). Abenquines A and D selectively inhibit phosphodiesterase PDE4B ($IC_{50} \approx 4-5 \mu M$), suggesting potent anti-inflammatory and immunomodulatory effects (Imhoff, 2011). These metabolites are structurally unique (aminoquinones not found in temperate actinomycetes) and highlight how desert extremophiles yield novel bioactivities (Imhoff, 2011; Lok Yung Hui et al., 2021).

Heat-loving bacteria also yield new antimicrobials. For example, the thermophile *Geobacillus thermodenitrificans* NG80-2 (from a Japanese hot spring) was found to encode two lantibiotics, geobacillin I and II

(Garg et al., 2012). Geobacillin I is a nisin-like peptide with seven thioether cross-links (more than conventional nisin's five), rendering it exceptionally stable at neutral pH; it has a broad spectrum similar to nisin and even higher activity against *Streptococcus dysgalactiae* (Garg et al., 2012). Geobacillin II, meanwhile, has a novel ring topology and is active primarily against *Bacillus* spp. (Garg et al., 2012). These structurally unusual lantibiotics demonstrate that thermophilic bacteria produce peptide antibiotics with improved stability and distinct activity profiles (Garg et al., 2012; Aede et al., 2024).

Other extremophile compounds include lasso peptides and unusual cyclic peptides. Using genome mining, Cortés Albayay et al. (2019) recently identified huascopeptin 1, a class II lasso peptide from a high-plateau hot-spring *Streptomyces*. Lasso peptides are "lasso"-shaped ribosomally synthesized and post-translationally modified peptides with remarkable stability; huascopeptin 1 represents a new scaffolding with potent antimicrobial activity (Cortés Albayay et al., 2019; Costantini et al., 2020).

In the deep sea, Gong et al. isolated desotamide B (a cyclic hexapeptide) from *Streptomyces scopuliridis* from ocean sediment. Desotamide B (and analogs) inhibit Gram-positive bacteria (e.g. *S. aureus*, *S. pneumoniae*, MRSE) with MICs in the low-mid micromolar range and feature an unusual amino acid (N-formyl-kynurenine), underscoring deep-sea novelty (Graña Miraglia et al., 2023). Likewise, many marine organisms yield halogenated and highly modified antibiotics (reflecting the Br/Cl-rich seawater) – for example, the marine bacterium *Salinispora* produces salinosporamide A, a highly cytotoxic proteasome inhibitor used as an anticancer lead (Nakanishi et al., 2006).

The marine sponge symbiont *Kocuria* sp. produced Kocurin (also known as Pm181104), a multi-thiazole cyclic peptide with nanomolar potency against MRSA and VRE (Mahajan et al., 2013). Kocurin's true structure was later elucidated, correcting the initial patent structure (Mahajan et al., 2013; US Patent 8,003,602 B2, 2011; NZ Patent 571636A, 2011). In murine infection models, PM181104 showed 100% efficacy (ED₁₀₀) at low mg/kg doses against MRSA/VRE (Mahajan et al., 2013). These examples illustrate that extremophiles – be they desert bacteria, hot-spring thermophiles, deep-sea actinomycetes, or polar microbes – continue to yield structurally novel and potent bioactives (Quinn & Dyson, 2024; Chackaravarthi et al., 2023).

Indian Marine Extremophiles: PM181104 and Pm181108

India's unparalleled microbial diversity – spanning ecosystems from the high-altitude Himalayas to the depths of its oceans – has served as fertile ground for bioprospecting novel bioactive compounds (Barrientos et al., 2018; Chackaravarthi et al., 2023). Among the notable discoveries, Dr. Girish Mahajan and colleagues at Piramal Enterprises made significant strides in marine actinomycete research.

Table-1: Selected bioactive metabolites from extremophilic microorganisms

Compound	Source (environment)	Reported bioactivity	References
Abenquines A–D	<i>Streptomyces</i> sp. DB634, hyper-arid Atacama Desert soil (Chile)	Phosphodiesterase-4B inhibition; anti-inflammatory activity	Imhoff, 2011
Geobacillin I	<i>Geobacillus thermodenitrificans</i> NG80-2, high-temperature oil reservoir/hot spring	Broad-spectrum Gram-positive activity; pH-stable lantibiotic	Garg et al., 2012
Geobacillin II	<i>Geobacillus thermodenitrificans</i> NG80-2, high-temperature oil reservoir/hot spring	Narrow-spectrum activity, mainly against <i>Bacillus</i> spp.	Garg et al., 2012
Huascopeptin 1	<i>Streptomyces</i> sp., Andean high-altitude hot spring	Class II lasso peptide; potent antimicrobial activity	Cortés-Albayay et al., 2019
Kocurin (PM181104)	<i>Kocuria</i> sp., marine sponge-associated symbiont (Indian coastal waters)	Nanomolar activity vs. MRSA and VRE; efficacy in murine sepsis	Mahajan et al., 2013; US Patent 8,003,602 B2; NZ Patent 571636A, 2011
Desotamide B	<i>Streptomyces scopuliridis</i> SCSIO ZJ46, deep-sea sediment	Antibacterial activity vs. Gram-positive pathogens (e.g. MRSE)	Graña-Miraglia et al., 2023

In 2013, the team reported the discovery of PM181104, subsequently named Kocurin, a thiazolyl cyclic peptide isolated from a *Kocuria* species, which was obtained as a sponge-associated symbiont from Indian marine waters (Mahajan et al., 2013; US Patent 8,003,602 B2, 2011; NZ Patent 571636A, 2011). PM181104 displayed remarkable potency, exhibiting single-digit nanomolar minimum inhibitory concentrations (MICs) against multidrug-resistant Gram-positive pathogens, including methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Enterococcus* (VRE) (Mahajan et al., 2013). The compound demonstrated robust efficacy in preclinical in vivo models; in mouse sepsis studies, PM181104 achieved 100% protection (ED₁₀₀) at low doses of 2.5–10 mg/kg, highlighting its therapeutic potential (Mahajan et al., 2013).

Mechanistically, PM181104 (Kocurin) is believed to inhibit bacterial protein synthesis by targeting elongation factors or ribosomal components, a feature characteristic of the thiazolyl peptide class (Mahajan et al., 2013; US Patent 8,003,602 B2, 2011). It also showed good stability and a favorable preliminary safety profile during early evaluations, and potent in-vitro activity against several strains of *Clostridioides difficile* (Mahajan et al., 2013). A related compound, PM181108, was concurrently identified from a *Streptomyces* species isolated from Antarctic soil – further underlining the power of extremophile-based discovery (Barrientos et al., 2018; NZ Patent 571636A, 2011). PM181108 demonstrated potent anti-tubercular activity, including against multidrug-resistant (MDR) and extensively drug-resistant (XDR) strains of *Mycobacterium tuberculosis*.

Together, these discoveries exemplify how strategic sampling of extreme marine and polar environments, coupled with advanced fermentation and purification technologies, can lead to promising drug candidates from

underexplored microbial sources (Barrientos et al., 2018; Mahajan et al., 2013).

Enabling Technologies for Extremophile Discovery

Advances in biotechnology now accelerate extremophile mining. Genome and metagenome mining allow in silico identification of biosynthetic gene clusters (BGCs) even from uncultured samples (Costantini et al., 2020). Modern algorithms (e.g. antiSMASH, PRISM) scan sequenced genomes for PKS, NRPS, ribosomally synthesized peptide clusters, etc. Such tools revealed huascopeptin 1 and countless others by finding novel BGCs in sequenced thermophiles (Cortés Albayay et al., 2019; Costantini et al., 2020). Genome mining is often paired with synthetic biology: large or silent BGCs from extremophiles can be cloned and refactored in heterologous hosts to express the metabolite (Costantini et al., 2020; Aede et al., 2024). In fact, “genome mining joined to synthetic biology are offering a significant help in drug discovery”, enabling production of compounds that are difficult to induce in the native strain (Costantini et al., 2020; Aede et al., 2024).

Metagenomics further broadens access by extracting DNA directly from extreme samples (soil, sea floor, hot springs) and capturing BGCs on vectors or via cell-free systems (Costantini et al., 2020). On the cultivation side, in situ cultivation (e.g. the iChip) has revolutionized access to previously uncultivable microbes (Chabib et al., 2025; Petersen et al., 2018). Teixobactin, a landmark new antibiotic, was discovered by in situ cultivation of a previously uncultured soil bacterium – a clear precedent for applying such methods to extreme soils or sediments (Chabib et al., 2025; Petersen et al., 2018). Similarly, microfluidic devices and high-throughput diffusion chambers let one grow extremophiles under near-natural conditions, eliciting production of novel metabolites (Aede et al., 2024).

Finally, AI-assisted dereplication and screening is emerging. Machine learning and database mining (e.g. DEREPLICATOR) rapidly match mass spectra or genome patterns against known compounds, letting researchers flag truly novel peaks (Mohimani et al., 2018). For example, DEREPLICATOR+ can automatically scan MS/MS data from microbial extracts and single out unknown scaffolds (peptides, polyketides, alkaloids, terpenes, etc.) (Mohimani et al., 2018). This avoids “rediscovery” of known molecules and prioritizes unique hits. Altogether, these tools – genomic, synthetic, in situ, and computational – are unleashing the drug-discovery potential of extremophiles (Costantini et al., 2020; Mohimani et al., 2018; Chabib et al., 2025; Petersen et al., 2018).

Challenges and Outlook

Despite the promise, extremophile bioprospecting faces hurdles. Legally, access to genetic resources is governed by the Convention on Biological Diversity and its Nagoya Protocol, requiring benefit-sharing and permits for collecting microbial samples (Barrientos et al., 2018).

Navigating these regulations (especially in multinational contexts like deep-sea or Antarctica) is nontrivial. Ethically, researchers must avoid exploitative “biopiracy” by collaborating with source-country scientists and communities (Barrientos et al., 2018).

On the technical side, scaling up extremophile compounds can be difficult. Many extremophiles grow slowly or require unusual media (high salt, special ions, extreme pH or pressure) that complicate fermentation. Some metabolites are produced only in trace amounts or under narrow conditions. Here synthetic biology offers partial answers: once a BGC is identified, it can be transplanted into a fast-growing industrial host (e.g. *Streptomyces* or *E. coli*) with optimized expression (Costantini et al., 2020; Aede et al., 2024). Nonetheless, producing complex cyclic peptides or halogenated structures at scale can be costly. Moreover, downstream chemical synthesis of extremophile molecules (especially peptides with multiple thioethers or non-standard amino acids) can be challenging and expensive (Aede et al., 2024).

Beyond antibacterial agents, marine bacteria have yielded potent anticancer metabolites such as salinosporamide A, a highly cytotoxic proteasome inhibitor from a marine *Salinispora* strain, illustrating the broader biomedical relevance of extreme-environment natural products (Nakanishi et al., 2006).

Future prospects are bright but will require continued innovation. On the science side, integrating multi-omics (genomics, transcriptomics, metabolomics) will reveal how extremophiles regulate their secondary metabolism in situ (Costantini et al., 2020). Adaptive laboratory evolution may coax higher yields (Costantini et al., 2020; Aede et al., 2024). On the policy side, international cooperation (e.g. open-sharing of biobank resources, standardized material transfer agreements) will facilitate responsible use of extremophile biodiversity (Barrientos et al., 2018). Finally, the ultimate proof is in new drugs: with recent successes like teixobactin and many emerging marine-derived scaffolds, as summarized by Quinn and Dyson (2024; see also Quinn & Dyson, 2024, Table 3), there is confidence that extremophiles will yield clinically useful drugs (Quinn & Dyson, 2024; Chackaravarthi et al., 2023). By combining ecological insight with modern biotechnology, researchers can tap the “gold mine” of extreme-environment microbes to discover the next generation of life-saving bioactive compounds (Quinn & Dyson, 2024; Chackaravarthi et al., 2023).

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Artificial Intelligence in Drug Discovery



Prof. Sushil Kumar Kashaw

Department of Pharmaceutical Sciences

Dr. Harisingh Gour University

(A Central University; 'A+' Grade by UGC-NAAC)

Sagar (M.P.)-470003

Email: sushilkashaw@gmail.com

Dr. Sushil Kumar Kashaw, Associate Professor in the Division of Medicinal and Computational Chemistry at Dr. Harisingh Gour Vishwavidyalaya (Central University), Sagar, Madhya Pradesh, is a distinguished academic and researcher in pharmaceutical sciences. With a career spanning over two decades, he has made significant contributions in drug design, nanotechnology, and controlled drug delivery systems. A Raman Postdoctoral Fellow at Wayne State University, USA, Dr. Kashaw has also held key administrative roles, including Chairman, Council of wardens and Nodal Officer of Community College and AISHE at DHSGSU. His research interests cover medicinal chemistry, nanoparticles, liposomes, and cancer immunotherapy, reflecting his commitment to advancing innovative therapeutic strategies. Widely recognized for his academic excellence, Dr. Kashaw has received numerous awards, including the Young Scientist Award and Best Teacher Award, alongside international travel grants from SERB-DST, DBT, and UGC. To his credit he has five granted Indian patents. He has authored and reviewed several publications in reputed journals and remains actively engaged in global scientific networks. His dedication to pharmaceutical education and research continues to inspire students and colleagues alike, positioning him as a leading figure in India's pharmaceutical sciences.

1. Introduction

The pharmaceutical sector has traditionally existed under the threat of a paradox known as "Eroom's Law." Named a reverse on Moore's Law (which explains the rate at which the capability for computing doubles exponentially), its importance in understanding a reality with sobering implications for the future is undeniable—the cost of developing a single drug doubles approximately every nine years when corrected for inflation since the 1950s despite large advances in high-throughput screening and genomic research. Another significant factor is the problem caused by low-hanging fruits being difficult to reach in the pharmaceutical industry. A study on the 100 Top Hospitals report by Solucia Solutions shows that low-hanging fruits pose a predictive problem to health institutions whose goal is to assess the future. Nevertheless, by the early 2020s, it takes about 10-15 years and, believe it or not, \$2.5 billions just to transfer a molecule from the laboratory bench to the pharmacy

shelf, with a failure rate over 90% in clinical Trials.³ However, as we are progressing in this year of 2026, everything is about to change dramatically and irrevocably. The "Eroom's Law" phenomenon is being turned upside down not incrementally but through the overall deployment of ARTIFICIAL INTELLIGENCE as the backbone of pharma R&D [1].

This new paradigm involves AI shifting from a research 'add-on' or a curiosity-driven interest in biotech startups to a backbone component within massive global pharma companies such as Pfizer, Novartis, or AstraZeneca.⁴ The classical process of drug development is more of a "brute force" exercise—it essentially consisted of a Rigorous Trial & Error experiment where wet lab biologists were simply inspecting millions of compounds manually, often on the basis of linear predictions. This approach is simply strained by the capabilities of the human brain and the idea of a "herd mentality" where firms were fixated on a few successful targets—which essentially spawned redundant work. This is now replaced by an "Informed Design" approach made possible by the use of LLMs & GNNs. This enables researchers to simply scan through the "chemical space" estimated to offer a nearly infinite 1060 compounds [2].

This changeover has mainly manifested itself in the current benchmarks for the year ranges 2025-2026. Evidence from current case studies involving clinical stages shows that the success rate among Phase I trials involving AI-forged medicines stands at 80-90%. This is a monumental difference from the past success indicator, which stood at a low 40-65%. This marked improvement in productivity is attributed to the fact that an AI system has the capacity to foresee a drug's or a chemical's ADME (Absorption, Distribution, Metabolism, Excretion, and Toxicity) characteristics, as well as binding affinities, well in advance of actually formulating the first dose to be tested. This concept of "failing fast" has helped weed out unwanted or toxic substances at a stage known as "hit-to-lead" for a low fee of \$5 per drug candidate compared to \$5,000 costs associated with actual chemical formulation [3].

Again, it is not just about speed because AI integration expands the frontiers of what's "druggable." For example, a number of diseases have always been considered intractable due to the complete lack of obvious "pockets" in their associated proteins, wherein a traditional small

molecule might fit. Currently, thanks to AI-driven platforms like AlphaFold 3 and different "Virtual Cell" initiatives, being able to simulate complex protein-ligand interactions at the atomic level is a reality. This especially has been a game changer in Oncology, accounting for nearly 30% of all AI drug discovery efforts in 2026. With the help of multi-omics analysis, like genomics, proteomics, and transcriptomics, AI is able to zero in on new biomarkers and stratify participants in clinical trials like never before. This makes sure that the population who will benefit the most from the particular drug are the ones who receive it, which slashes the cost of clinical trials and keeps patients protected [4].

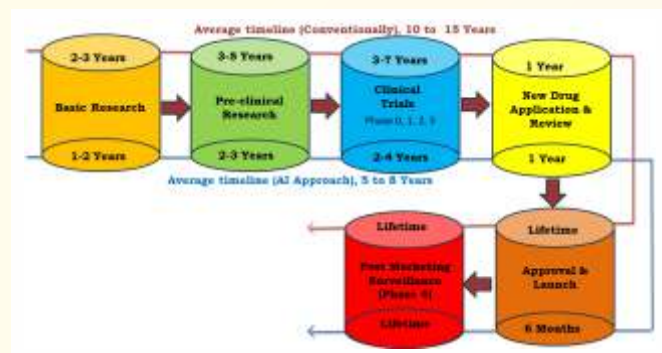


Figure 1. Comparative Analysis of AI's Impact on Drug Discovery and Approval Timelines Across Key Steps

As we now look towards the close of the decade, the pharma industry is set to transition from reactive reporting to proactive decision-making through the use of AI. The FDA's guidance on AI decision-making in the year 2025 has spurred the development of the "synthetic control arms" and virtual models that will complement the human data collected.¹⁰ Although issues related to data harmonization and the "black box" problem in Deep Learning exist in AI technology, the shift towards an AI-ready R&D environment is now unstoppable. The "informed design" paradigm is not only melting away a huge amount of dollars; it is accelerating the development of life-saving drugs for patients who otherwise lacked choices.

2. AI Drug Discovery Stages

The classic "funnel" approach to drug discovery has traditionally been very inefficient, likened to finding a needle in an infinite haystack. By 2026, AI has shifted from being a helpful tool towards becoming the main catalyst in every process within the funneled approach, as heuristic reasoning has been replaced by very accurate computer simulations.

2.1 Target Identification & Validation

Historically, target identification has been the "bottleneck" in which the industry has been grappling with what has been described as "herding," the phenomenon by which many pharmaceutical firms pursue the same very limited set of "validated biological targets." Instead, AI terminates the cycle by analyzing huge multimodal

datasets to identify entirely novel drivers of disease that lie hidden from human researchers. With the application of Large Language Models (LLMs) and Graph Neural Networks (GNNs), it becomes possible to assimilate and incorporate millions of scientific literature articles, patent applications, and "omics" data (genomics, proteomics, and metabolomics), developing "knowledge graphs" of the complex, non-linear interactions among genes, proteins, and disease phenotypes, and unambiguously identifying high-confidence targets for "undruggable" diseases [5].

A flagship example of this shift happened toward the end of 2025 at Novartis. Researchers there used AI-driven digital avatars of kidney cells to simulate the biological effect of "turning off" thousands of genes all at once in silico. The target was Autosomal Dominant Polycystic Kidney Disease, a disease with few effective treatments. In less than a year, the AI had picked out five promising new targets that nobody knew existed. That's a year, for targets whose single validation previously required more than three years of intensive wet-lab genetic screening. Even more fundamentally foundational is DeepMind's AlphaFold 3, which, as soon as a target is identified, immediately predicts its three-dimensional atomic structure and dynamic "folding" states. This is when medicinal chemists get to start designing specific molecules to fit that protein before a single test tube is touched [6].

2.2 Virtual Screening & Hit Identification

After having a target proven valid, the pursuit of a "hit," an effective binder of the target, ensues. Conventional high-throughput screening requires physically testing millions of compounds in a laboratory setting, an expensive and time-consuming affair through and through. Virtual screening powered by AI transforms this entire process from "wet lab" work to entirely computer-based "in silico" research. Sophisticated systems such as AI2BMD, built by Microsoft Research, have transformed the look of this step of the drug development pipeline altogether. AI2BMD uses its machine-learning "force field" approach to model biomolecular systems with true "ab initio" accuracy from first principles. Unlike older models of proteins that posited them to be fixed "locks," AI2BMD correctly models the reality of proteins as live and moving systems, correctly forecasting with unexampled accuracy how and where the proposed new drug would bind itself to the target biomolecular entity [7].

In 2025, it achieved a major breakthrough in the discovery of molecular glues for "neurodegenerative diseases such as Huntington's Disease." These are special molecules which 'glue' a toxic protein to a cellular trash removal system in order to be eliminated. The computational design and simulation based on Generative Adversarial Networks (GANs) was employed by researchers in developing 15 million potential molecules in the virtual library. The computational filter applied by their AI evaluated not only the binding affinity but also blood-brain barrier (BBB) permeability, which is a major landmark in

developing drugs, particularly in neurology applications, since in reality, thousands of candidates are normally synthesized, but in their discovery, they managed to reduce it to 60 priority molecules that should be synthesized in labs, developing a potent lead within record time[8].

2.3 Hit-to-Lead & Lead Optimization

Historically, the biggest hurdle to an "hit" becoming "lead" is where the vast majority of research projects usually get stuck. This step involves the simultaneous optimization of tens of contradictory factors like potency, solubility, and metabolism. For tackling this 'multi-parameter optimization' problem, scientists are currently using the approach of "Reinforcement Learning" or RL. According to this approach, the computer algorithm itself is considered an "agent" providing suggestions about chemical alterations, while "reward" is the model functioning as an "critic" awarding points on the amelioration of potency and toxicity. This makes it possible to "learn" the best possible chemical structure to attack the targeted disease.

A very interesting case study in 2025 was a mid-sized pharmaceutical company applying the COPTIC paradigm, a specific RL task environment. In this effort, the group designed 6,656 distinct molecular structures to attack a target in oncology. The learning system was able to generate lead compounds with 90 percent accuracy in predicting high potency, effectively "unlocking" the chemistry prior to any compounds being made. This negated the need to perform the "slow loop" sequence of chemists attempting to generate 50 compounds, waiting six to eight weeks to find out their potency, and repeating as needed. The new method short-circuited the development process by expediting the number of cycles of manual chemistry techniques in excess of 70 percent [9].

2.4 ADMET & Predictive Toxicology

A drug could be killing cancer cells in a petri dish but be toxic to human hearts or human livers once it gets into the bloodstream. These types of ADMET failures could be identified earlier with AI assistance on "Day One" for potential new discoveries. ADMET-AI models (revised in 2025) use Graph Neural Networks to identify molecules in a mathematicGraph format so that the system is able to pick up on minute "toxicophores," or patterns on a molecular level shown to be Toxic to human bodies but missed by other mathematic models.

A 2025 goal for platforms like Receptor.AI and ADMET-AI has been the ability to forecast cardiotoxicity ('heart risk'), or risk to the heart, within an Area Under the Curve (AUC) of 0.72. This occurs by simulating how a new compound interacts with certain metabolic enzymes, for instance, CYP2D6, as well as the hERG protein, which has been known in numerous instances to cause catastrophic heart arrhythmias, or heart palpitations, that can prove fatal. This has happened in a recent company's preclinical testing phase, for instance, when an AI computer model identified a "perfect" 'lead' candidate molecule as posing a

high risk for cardiotoxicity, meaning they were poised for catastrophic heart arrhythmias, after they had passed simplified lab tests, preventing the company from investing tens of millions in failed animal and human studies before opting to "kill" the molecule. "Fail fast, Fail Cheap" stands as the founding principle behind the new AI-led R&D paradigm [10].

3. Impact on R&D Timelines and Costs

Traditionally, financial and time costs of drug development were the main hindrances to innovation. By 2026, the crossover from manual and hypotheses-based research to data and AI-based research has intensified to a critical point, and for the first time, comprehensive data sets confirm the financial feasibility of AI applications within the pharmaceutical industry. Traditionally, the cost of innovation for new pharmaceuticals remained at \$2.6 billion or more because of the high costs of failure of compounds that had reached late stages of clinical testing before being shelved. AI-assisted innovation has overcome this hurdle by moving the point of failure much sooner and thus saving costs along the way. Present statistics indicate that this approach has led to 25% to 30% lower costs of innovation, and presently, the average innovation cost is approximately \$1.8 billion to \$2 billion per innovation. This is possible because of virtual innovation, wherein initial screenings of millions of compounds are done on computers for only pennies per test, as opposed to costly lab experimentation [11].

However, the biggest change is observed in the "Hit-to-Lead" stage. What used to take three to five years of tedious lab work is now shortened to an average period of 12 to 18 months. This is because artificial intelligence models are able to forecast changes that would make a drug more potent and safer at the same time. This acceleration of 60% is not only about time but also about the "quality of the lead." This is because GNNs, or Graph Neural Networks, have the ability to understand the whole structural map of a chemical. Leads selected for Phase I trials would be much stronger. As a direct result, the pass rates of Phase I have effectively doubled. Whereas the mean pass rate in the pre-AI pharmaceutical world was a mere 40-50%, their optimized counterparts utilizing the capabilities of AI now experience a staggering 80-90% pass rate in initial human studies because the hidden toxicity associated with a compound is effectively screened away through ADMET prediction [12].

Enrollment in clinical trials has also been made easier by the AI revolution. The main challenge for clinical trials is the inability to engage the right patients. The use of AI to stratify patients for clinical trials involves using EHRs and genetic information to select patients for clinical trials with a high degree of accuracy. The cycles of patient enrollment for clinical trials, which took 18 months, are now further compressed into 4 to 6 months using this "intelligent stratification" of patients to allow analysts to get clear results on the efficacy of the drug.

Table 1: Quantifiable Gains in AI-Enabled R&D (2026 Data)

Metrics	Traditional R&D (Pre-AI)	AI-Augmented R&D (2026)	Change
Discovery Cost	~\$2.6 Billion	~\$1.8 – \$2.0 Billion	~25-30% Reduction
Hit-to-Lead Time	3–5 Years	12–18 Months	~60% Faster
Phase I Success Rate	40–50%	80–90%	~2x Improvement
Trial Enrollment	12–18 Months	4–6 Months	AI Patient Stratification

4. Specialized Application: Oncology (Cancer)

At the end of 2026, oncology remains the vanguard of AI adoption and represents almost 30% of all AI use cases in the pharmaceutical industry. Much of this has to do with the inherent complexity of cancer: treatment necessarily tends to be multi-faceted. One of the most radical developments is occurring in the form of precision dosing. Oncologists traditionally used the "maximum tolerated dose" method, which often induced severe toxicity and reduced quality of life. Systems such as CURATE.AI have revolutionized this by employing a patient's longitudinal data—such as tumor marker levels and drug response history—to create a personalized "dose-response profile." This enables dynamic adjustments to chemotherapy or immunotherapy doses so that the dose will be high enough to shrink the tumor but low enough to minimize the side effects and can effectively treat each patient as an individual biological system [13].

A very promising area is also AI-based Drug Repurposing. Creating a drug for cancer takes over a decade and is essentially placing a bet, but AI can look at the 'dark matter' of existing compounds already FDA-approved and repurpose them for anti-cancer therapies. By looking at millions of data points from low-impact publications and clinical records that would never be conceptualized by a researcher themselves, AI algorithms can pick out "unseen" relationships between a drug's mechanism and a particular pathway in cancer. For example, AI has already spotted that some beta-blockers and anti-diabetics could be used to turn off particular pathways for growth in tumors. Since these already demonstrate safety for human use, these compounds would go from step one to step two trials and be available to patients in a matter of months and not years [14].

5. Challenges:

Despite such massive strides made, the "Black Box" issue is still the biggest challenge for their acceptance by the regulatory bodies in 2026. The predictions made by Deep Learning models are simply unparalleled in power; however, they can be "unexplainable" since they fail to provide a reason for why a particular molecule needs to be selected or why a toxicity risk exists. The Explainable AI (XAI) frameworks are now a prerequisite for the FDA and the EMA. The logical explanations need to be provided by

the pharmaceutical companies for their decisions supported by AI for the purposes of patient safety. The model may predict a 90% Success Rate, after which the biologist needs to identify why such a decision was reached [15].

Data quality issues and the existence of "Data Silos" pose another set of challenges. After all, a system is only as good as its data, and much of the best biological data in the world is trapped in proprietary company databases. Fragmentation makes it difficult to develop "Foundation Models" for the benefit of the sector as a whole but is being replaced in 2026 with a focus on Standardization and New Approach Methodologies (NAMs). These are standardized models for toxicity and efficacy based on artificial intelligence that governments are beginning to accept as legitimate evidence for the first time in a decade and a half, thus ending animal testing for drug development.

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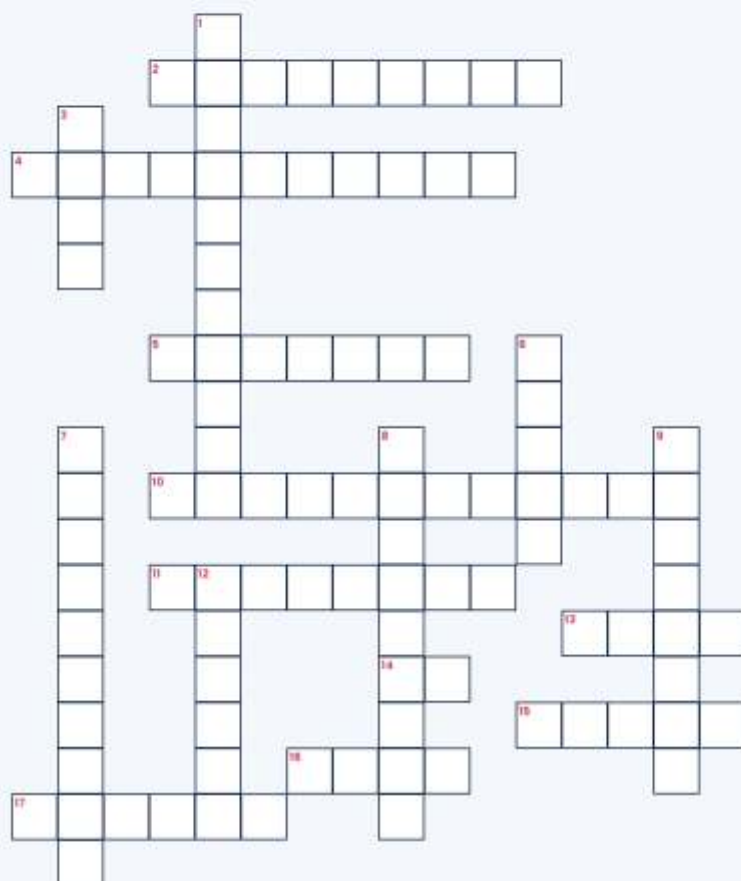
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PHARMA CROSSWORD

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Note: words are written without spaces or hyphens.

ACROSS

2. FDA designation to speed review of a drug (2 words)
4. Two drugs used together to fight resistant superbugs: ___ therapy
5. Inactive "sugar pill" used as a control in trials
10. Cholesterol-lowering statin; name starts with ATOR
11. Cell protein that a drug binds to
13. Amount of medicine taken at one time
14. Symbol for the 0-14 acidity scale
15. Brazilian pit viper's ___ inspired ACE inhibitors like Captopril
16. Global barcode number identifying each product pack
17. Taste whose receptors in the lungs can dilate airways

DOWN

1. Drug that hits one disease target only: _____ (2 words)
3. Metal in Auranofin, once used for rheumatoid arthritis
6. Unit of concentration: rearrange FORMULA after dropping F and U
7. Juice that blocks the CYP3A4 enzyme and can multiply a drug's effect
8. ACE inhibitor developed from snake venom
9. Continuous, steady delivery of a drug into the bloodstream, often by drip
12. Protein, like CYP3A4, that breaks down many drugs

ANSWER KEY

10A ATORVASTATIN
15A VENOM
3D GOLD
9D INFUSION

5A PLACEBO
14A PH
1D MAGCIBULET
8D CAPTOPRIL

4A COMBINATION
13A DOSE
17A BITTER
7D GRAPEFRUIT

2A FASTTRACK
11A RECEPTOR
16A GTIN
6D MOLAR

12D ENZYME



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Professor Abhay Pandit is the Established Professor in Biomaterials and Founding Director of a Science Foundation Ireland Centre for Research in Medical Devices (CÚRAM) hosted at the University of Galway. Professor Pandit's research focuses on utilizing glycosylation patterns from human pathological disease states to create innovative strategies for modulating these states using advanced reservoir delivery vehicles. These vehicles have a high payload capacity, programmable degradation profiles, and incorporate gradients of physical, chemotropic, and protective cues, which allow for the sustained delivery of multiple biomolecules to target injury mechanisms at the molecular and cellular levels. Professor Pandit's research emphasizes the application of glycobiology in this field. He is the author of 28 patents and licensed four technologies to medical device companies. He has published over 350 manuscripts, including esteemed journals such as *Science Translational Medicine*, *PNAS*, *Science Advances*, *Nature Communications*, *Biomaterials*, and other notable high-impact publications. He has been honored with the esteemed **George Winter Award 2022**, the **Chandra P Sharma Award 2023**, and the **Biomaterials Advances Innovation Award 2023** for his research contributions to biomaterials. He is also a fellow of the American Institute for Medical and Biological Engineering (AIMBE), Tissue Engineering, and Regenerative Medicine International Society (TERMIS), Irish Academy of Engineering, and the International Union of Societies for Biomaterials Science and Engineering (IUSBSE). He is currently the President Elect of TERMIS(Global).

The medical device sector is undergoing a profound global transformation propelled by technological breakthroughs and an increasing imperative for personalised healthcare. Across continents, researchers and industry leaders are converging to develop devices tailored to individual patient needs, acknowledging that the traditional "one-size-fits-all" model inadequately addresses the complexity of human biology and variability of disease.

Personalised medical devices integrate patient-specific data, from genetic profiles to real-time physiological metrics, to create adaptive solutions. This evolution is underpinned by key technological pillars, such as advanced biomaterials, miniaturised and wearable sensors, smart drug delivery systems, and artificial

intelligence (AI). Collectively, these innovations enable precise diagnostics, targeted therapies, and continuous health monitoring, ushering in a new era of patient-centric care.

Global research initiatives exemplify this progress in the field. Biodegradable materials for temporary implants are increasingly being explored to mitigate the risks associated with permanent implants and secondary surgeries. These materials safely degrade in vivo after fulfilling their therapeutic roles, reducing the patient burden and enhancing recovery. Similarly, nanotechnology-enabled sensors are gaining prominence for their ultrasensitive biomarker detection, facilitating the early diagnosis and proactive management of chronic diseases.

The integration of artificial intelligence (AI) and machine learning within medical device ecosystems represents a critical frontier. By analysing extensive datasets from wearable devices, electronic health records, and imaging, AI-driven models can personalise device performance, predict disease progression, and optimise therapeutic interventions for patients. This fusion of data science and biomedical engineering advances precision medicine, in which treatments are dynamically refined based on individual patient responses, maximising efficacy while minimising adverse effects. Despite these advances, the global community faces challenges in realising the full potential of personalised medical devices. Regulatory frameworks must evolve to address the complexity and variability inherent in these technologies while balancing patient safety with innovation. Equitable access and affordability remain pressing concerns, as disparities in healthcare infrastructure and resources risk widening these inequities. Collaborative efforts among academia, industry, and regulatory bodies are essential to establish standardised evaluation criteria, promote translational research, and ensure inclusive health care solutions.

Incorporating the Indian healthcare context into this global narrative highlights the critical importance of region-specific device designs. India's vast and diverse population exhibits significant genetic, anatomical, and pathological variabilities, necessitating devices that accommodate such heterogeneity to enhance diagnostic accuracy and therapeutic efficacy. Economic disparities and infrastructural limitations necessitate cost-effective, robust, and user-friendly devices capable of

reliable operation across urban, rural, and resource-constrained settings. Additionally, cultural factors and patient education influence device acceptance and adherence, highlighting the need for locally tailored solutions.

The Department of Medical Devices at NIPER-A exemplifies this integrated approach by advancing multidisciplinary research that combines materials science and biomedical engineering, focusing on the unique demands of the Indian population. Their work on biodegradable and bioactive implants, point-of-care biosensors, and wearable sensors, reflects a commitment to developing personalised medical technologies that are globally innovative and locally relevant. Among NIPER-A's notable projects is the development of biodegradable implants designed to provide temporary structural support in orthopaedic and neurological interventions. Utilising advanced biomaterials, these implants safely degrade within the body, obviating the need for secondary surgeries and reducing patient risk, thereby directly impacting recovery outcomes and healthcare costs. Another key initiative point-of-care and wearable sensor platforms capable of continuously monitoring vital physiological parameters, such as cancer, stress and kidney function. Employing nanotechnology for enhanced sensitivity and specificity, these sensors enable the early detection of disease exacerbations and timely clinical intervention. The integration of AI algorithms allows for the dynamic adaptation of monitoring thresholds based on individual patient profiles, thereby enhancing personalised care delivery.

Furthermore, NIPER-A is advancing smart drug delivery systems that leverage site-specific targeting and controlled-release mechanisms. Engineered to respond to physiological cues, such as pH changes or enzymatic activity, these systems ensure precise therapeutic dosing while minimising systemic side effects. This technology holds significant promise for managing chronic diseases prevalent in India, including diabetes and cardiovascular disorders.

The rapid evolution of personalised medical devices necessitates concurrent advancements in regulatory frameworks to safeguard patient safety while fostering innovation. Globally, regulatory bodies face the challenge of developing adaptive evaluation criteria that accommodate device complexity, patient-specific customisation, and AI integration. Harmonising standards across jurisdictions is vital for streamlining approvals and facilitating international collaboration. In India, regulatory agencies are progressively recognising the need for specialised guidelines that address local manufacturing capabilities, clinical trial requirements, and post-market surveillance tailored to personalised devices. Transparency in AI algorithms and data management is essential for maintaining patient trust and complying with data privacy regulations.

Ethical considerations are equally pivotal, particularly

with respect to equitable access and informed consent. Reliance on extensive patient data raises concerns about confidentiality and potential biases in AI models that could exacerbate health disparities. Addressing these issues requires inclusive stakeholder engagement, including ethicists, clinicians, and patient advocates, to develop frameworks that promote fairness, accountability, and inclusivity.

In summary, personalised medical devices constitute a transformative frontier in global healthcare, offering tailored solutions that improve patient outcomes and system efficiency. The global research landscape, including pioneering efforts at institutions such as NIPER-A, is driving progress toward smarter, safer, and more adaptive medical technologies. Sustained innovation, supported by harmonised regulatory strategies and equitable access initiatives, is essential to fully realise the promise of personalised medicine globally while addressing region-specific needs.



MATCH THE DRUG

Match the drug with its development/ therapeutic area.

- | | |
|-------------|--|
| 1. Onswik | A. Parkinson's disease |
| 2. Juvmo | B. Type 2 diabetes |
| 3. Isembyld | C. Spinal muscular atrophy |
| 4. Atebrioz | D. Fibrodysplasia ossificans progressiva |

Your answers:

1 → _____ 2 → _____ 3 → _____ 4 → _____

1 → B 2 → A 3 → C 4 → D

Answers:



30-SECOND CHALLENGE

How many can you answer in 30 seconds?

- 1 What does IND stand for?
- 2 What does PDUFA relate to?
- 3 What does PCSK9 stand for?
- 4 What is a biosimilar?
- 5 What does AI stand for?
- 6 What is Phase III of a clinical trial mainly designed to evaluate?



Quick Thinking Wins!

Answers:
 1. IND - Investigational New Drug
 2. PDUFA - Prescription Drug User Fee Act
 3. PCSK9 - Proprotein convertase subtilisin/kexin 9
 4. Biosimilar - A highly similar version of a biologic with no clinically meaningful differences
 5. AI - Artificial Intelligence
 6. Phase III - Efficacy and safety in large populations



AI in Healthcare: Emerging application and Challenges

Nirmal Kumar

Head of Chemistry, Manufacturing & Controls

Zydus Research Center,

Zydus Life sciences Limited, Ahmedabad, India, 382213

Email: Nirmal.Kumar@zyduslife.com

Abstract

AI is transforming healthcare through numerous emerging applications such as enhanced diagnostics, personalized medicine, and accelerated drug discovery [1][2], but its widespread implementation faces significant challenges related to data privacy, ethical concerns, and system integration [3][4].

Introduction

Global healthcare systems are strained by aging populations, growing numbers of chronically ill patients, rising treatment and drug costs, and personnel shortfalls. Meanwhile, burdensome documentation requirements are contributing to physician and nurse burnout [2].

Rapid advances in predictive and generative AI are already improving how medical professionals, clinical researchers, and administrators at hospitals and insurers work, and they're poised to deliver even more transformative changes in the coming years [1]. These AI systems excel at spotting hidden patterns in large data sets, zeroing in on hard-to-discern details in medical images, supporting diagnoses in complex cases, and recommending operational improvements that may be applied to pare costs. These advances could lead to process reforms, productivity gains, and improved patient outcomes [3]. Read on to learn about the benefits, challenges, and applications of AI in healthcare.



What is AI?

AI uses complex statistical prediction models and large amounts of computing to help solve complex problems, understand and respond to natural language queries,

create videos and other forms of online content, classify images, and more. Neural networks, including large language models, are trained on large amounts of historical data to construct AI models that can make predictions to help users anticipate and solve a range of problems. These models can also go back through their statistical parameters to correct errors and transfer their knowledge to draw inferences about new problems and domains. Large investments in the data centers and chips needed to train AI models and power their inferencing have fueled the AI boom.

What Is AI in Healthcare?

Physicians, clinical researchers, pharmaceutical companies, and medical staff are using artificial intelligence technology to aid diagnoses, patient exams, drug development, and hospitals efficiency [2]. Electronic health records (EHRs) have come into widespread use in US hospitals and medical practices over the past 15 years, in large part because of billions of dollars in federal incentives. While they have made recordkeeping more accurate and reduced medical errors, their unwieldy note-taking requirements, hard-to-navigate screens, and often superfluous alerts and inbox messages have also created extra work for healthcare professionals [3]. AI agent enhanced EHRs can help save clinicians time and increase patient face time by requesting that they generate summaries of patients conditions, medications, and lab results before exams, quickly jump to key functions, and speak or type natural language commands [1].

In radiology, AI systems can help spot areas of scans with the highest probability of abnormal tissue growth or measure specific indicators, such as changes in kidney volume, that can help physicians predict function declines before they show up in blood tests [3].

Many AI healthcare applications, however, are aimed at easing hospitals and medical practices administrative burdens for example, by automating billing and scheduling, helping write prior authorization letters to insurance companies, or reminding a patient that it's time for a mammogram [2]. The healthcare IT sector is building GenAI systems that support diagnoses by analysing patients' histories, exam findings, and lab test results alongside reviews of existing bodies of knowledge about

diseases and reaching conclusions that can assist physicians on complex cases.

Key Insights

- EHRs in development are incorporating generative AI that lets doctors see summaries of patients' charts and lab results and filter information relevant to specific ailments[1].
- Diagnostic tools using AI can save radiologists time and boost their accuracy by showing scan areas with the highest probability of cancerous tissue growth, or by measuring indicators that can help predict organ function declines before they show up in blood tests[3].
- AI can help draw conclusions from data in disparate sources including EHRs, medical device outputs, and genomic test results that could be relevant to research and care[1].
- In the back office, AI is can help billing departments maximize revenue, automate scheduling, remind patients of screenings, and draft prior authorization requests[2].

Benefits of AI in Healthcare

AI is poised to deliver a range of benefits in medical research, drug development, clinical diagnoses and care, and healthcare administration.

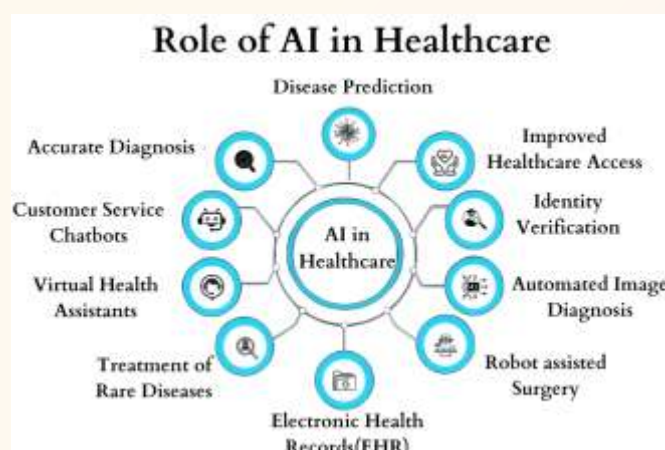
- **EHRs:** Electronic health record systems enhanced with generative AI can save physicians time by helping them prepare for appointments with concise patient summaries, simplifying system navigation, and automating note-taking[1][3].
- **Diagnostic imaging:** Hospital radiology departments are using AI to analyze medical images in order to help identify organ and other problems and aid in predicting diseases faster and more precisely than they could before [3][4].
- **Hospital scheduling and planning:** AI-enhanced scheduling systems can help administrators allocate personnel and equipment to where they're needed most [1]. Robots with onboard AI can learn new routines for the efficient delivery of medicines, lab samples, food, and other supplies.
- **Clinical trials:** Pharma companies are sifting EHR data on health outcomes and demographics to find clinical trial participants [2]. Research work at the Cambridge Centre for AI in Medicine aims to find subgroups of patients among those in failed trials who did benefit from a treatment. Drug development in labs is benefiting from AI models that can spot patterns in the ways molecular compounds interact with pathogens that may make them suitable as candidates for further study[2].
- **Medical research:** EHRs contain copious typed notes with valuable information about treatments and outcomes, but that unstructured data has been hard to extract for research [4]. Natural language processing can pull data from those clinical notes to help reveal drugs' side effects or identify early warning signs of diseases.

Industry standards such as Minimal Common Oncology Data Elements (mCODE) for cancer can make EHR data from different software platforms available to researchers so they can compare treatment options.

- **Drug safety:** The field may soon benefit from AI systems that mine clinical data stored in EHRs to measure medicines' efficacy and risk among different demographic groups [5]. Large language models, assisted by a technique called retrieval-augmented generation (RAG), can combine pharmaceutical company data sets to help find patients with a higher risk of adverse drug reactions.

Challenges of AI in Healthcare

Applying AI to EHR data doesn't automatically result in improved insights, patient care, and hospital processes [3][4]. Clinicians, administrators, and other staff need to trust the technology enough to use it regularly and be aware of the potential for mistakes. Financially strapped hospitals need to understand the high cost of cleaning up and anonymizing patient data so it's ready to train AI models [4][5]. Read on for more on these and other challenges.



- **Doctor trust:** Medical practitioners can be reluctant to use systems that could result in errors or replace their work [3]. AI-based systems need to serve as assistants that help them improve care, moving carefully from low-risk use cases to higher-risk ones.
- **Privacy rules:** Strict rules for how healthcare data can be shared and accessed have limited the data available for AI model training [4]. But global regulations are changing to let more healthcare data be used to train models and support medical decisions.
- **Data quality:** Complete, and standardized medical data is essential to effective AI-based diagnoses and treatments [3]. But the process of cleansing data to help ensure its quality can strain the finances of healthcare providers, especially hospitals and other practices with slim profit margins[5].
- **Data silos:** The lack of interoperability among EHRs from different vendors has limited data sharing among different healthcare providers [4]. So has the lack of

interoperability across systems at clinical research groups, pharma companies, and government organizations. Industry standards and government data exchanges are helping.

Applications of AI in Healthcare

Medical professionals are applying AI across a range of applications to improve diagnostic insights and clinical decisions, predict patient outcomes, and accomplish so much more. Here are the most common AI use cases in healthcare and life sciences.

1. Medical imaging: AI analysis of X-rays, MRIs, and CT scans can assist physicians in their diagnoses for example, by identifying changes in kidney volume to predict function declines early [3]. AI tools can help spot areas of scans with the highest probability of abnormal tissue growth.

2. Predictive decision-making: One operator of rehabilitation hospitals in the US is using AI models to help predict patient falls and flag discharged patients who may be at higher risk for readmission [1]. Healthcare providers are also using AI to help make better decisions based on forecasts of disease risks and patient outcomes.

3. Clinical decision support: In a limited study published in 2024 in JAMA Network Open, medical diagnoses based solely on feeding six cases to OpenAI's GPT-4 GenAI chatbot were far more accurate than those rendered by doctors using the chatbot only for assistance and those not using it at all [3].

4. Natural language processing: AI algorithms can automate note-taking during patient exams through voice recognition [3]. They can also help extract insights from clinical notes.

5. Drug discovery: By screening molecular compounds in a pharma company's library for efficacy, AI can help accelerate the identification of new treatments and therapies [2]. It can also be used to help predict drugs' safety and side effects.

6. Personalized medicine: AI algorithms can provide insight into individual patients' responses to drugs based on their genetics, helping practitioners determine the optimal timing and dosage [1][2].

7. Administrative automation: AI-based software can simplify patient scheduling, follow-ups, billing, and documentation, as well as help providers cut costs by predicting needs for medical staff and equipment [1].

8. Remote patient monitoring: AI-enabled sensors and devices worn by patients can help doctors monitor patients' cardiac, diabetes, cancer, and other conditions so they can intervene when patients don't adhere to treatment, exercise, dietary, and other plans [2].

9. Virtual health assistants: AI-based chatbots can help advise patients on conditions and treatments and recommend lifestyle or dietary changes [2]. Providers can also use chatbots to help patients schedule and prepare for appointments.

10. Robotic surgery: Surgeon-controlled, computer-guided systems of cameras, mechanical arms, and instruments, augmented by AI, can operate in some cases with greater precision than doctors using hand-held instruments, potentially leading to fewer complications, less bleeding, and faster recovery times [3]. AI algorithms can also help plan robotic surgical steps, position instruments, and classify medical images.

Future of AI in Healthcare:

Further development and adoption of national and industry standards will help healthcare organizations and governments share more data, providing a stronger basis for AI-driven insights [1][4]. But financially pressured hospitals will need to find ways to invest in the latest tools and prepare their data for AI analysis.

Likely to come into wider use are hospital robots that nurses and other staff control from their phones to help ferry lab samples, medical equipment, and supplies to shorten delivery times and free up staff time [1]. EHRs that use GenAI to quickly get pertinent information to physicians at the right time and cut down on complex screen navigation are also starting to come to market.

Within the next decade, doctors will likely benefit from AI systems that help support medical decision-making during patient visits, suggesting diagnoses via a PC or tablet based on what the doctor has said, the existing literature, and data about similar past cases [1][2]. The systems could also help recommend tests and medicines.

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General Awareness

The Rx Symbol: The traditional prescription sign (Rx) is widely believed to trace back to the Eye of Horus or an ancient sign for Jupiter.





Indian API Industry – A Success Story

Dr. Abhijit Roychowdhury

Director,

Emcure Pharmaceuticals Ltd.

Email: A.Roychowdhury@emcure.com

Dr. Abhijit Roychowdhury is the Senior Director at Emcure Pharmaceuticals Ltd., where he brings over 17 years of international experience in pharmaceutical research and development, having led multidisciplinary teams across India and the United States. A Ph.D. in Synthetic Organic Chemistry and a committed research leader, Dr. Roychowdhury has contributed extensively to drug discovery and development, with a special focus on medicinal chemistry, process development, and scalable synthesis of complex small molecules. His work has been instrumental in advancing multiple drug candidates from laboratory benches to clinical trials, demonstrating a consistent ability to translate scientific innovation into therapeutic outcomes.

The dominance of India as a supplier of generic drugs is a known fact for over last two decades [1][2]. Approximately 40% of generic drugs consumed in the US is supplied by various Indian companies either in the form of finished formulations or in the form of active pharmaceutical ingredients [3]. This dominance is primarily supported by India having a large number of US-FDA approved manufacturing facilities supplying drugs at reasonable cost and meeting ICH quality standards. India has over 2000 US-FDA approved plants which is the highest outside of the US [2]. When it comes to WHO prequalified APIs, India supplies close to 57% of the total share and close to 20% of the entire global API market by volume producing more than 500 APIs [2].

In the last two decades Indian active-pharmaceutical-industry (API) industry has grown from 3-4 billion dollars to about 15-16 billion in 2025 [1]. New reports suggest that the total number of players in the API pharma space has tripled in this time frame. From being a primarily domestic market-oriented industry about two decades back the companies have matured to an export-oriented market in recent times [3]. This transition has been fuelled by upgrading infrastructure, meeting regulatory compliance and catering to a wide range of customer demand [2].

The choice of India being a natural player in the global supply chain for generic medicines did not come overnight, it was a journey supported by policies, talent, investments by visionary entrepreneurs and relentless hard work by a group of highly skilled and talented workforce [1][2]. The game of delivering a generic drug

from bench to bed-side is no mean feat. At the backbone of it lies an interplay between chemistry, chemical engineering and formulation science. Additionally, the entire procedure requires a plethora of documentation ensuring quality, good-manufacturing-practice (GMP) and compliance to the regulation of the country of the filing [3].

A generic drug in true sense is a carbon copy of the innovator drug. It has the same API as the innovator, same dosage form and route of administration [1]. It must be proven through that it delivers the same amount of drug in the bloodstream via a bioequivalence study in most cases. A generic drug is normally launched after the patent expiry of the innovator drug substance or the drug product in a specified country. The entry of various relevant players typically drives down the price of the drug which leads to better patient access [2]. The generic drug at times can be more than ten times cheaper than the innovator drug while ensuring same quality as of the innovator product. Thus, in price sensitive countries this ensures that the drug is available for the masses and also ensures patient compliance because of affordability [3].

For a drug to become cheaper multiple driving factors act as determinants like cost of raw materials (API), cost of excipients, supply chain integration, packaging material, labour cost, utility cost etc [1]. Driving down the cost of goods is a perfect combination of strategy and science. For the purpose of this narration let's focus on the science of driving down an API cost.

The real levers of cost reduction lie deep within the realms of chemistry and engineering. Everything starts with the selection of the route of synthesis. Often times this turns out to be the most important exercise [1]. This typically requires a robust knowledge of organic and analytical chemistry. One needs to select a route that is convergent, has the best atom economy, produces the least amount of waste and produces the highest yield [4]. Scientists skilled in the art know that this is easier said than done. High conversion rates typically means less number of downstream purifications which improves the batch cycle time along with high quality of desired products. One definitely needs to make an effort to make the process as green as possible which means to minimise the organic solvent load and also use greener solvents where ever it's feasible [4][5]. Sustainability index for each step of the transformation has become quite important for the

pharmaceutical industry nowadays. To control costs it's also important to choose reagents wisely. For example a simple ester hydrolysis can be achieved by various inorganic bases like sodium hydroxide, potassium hydroxide, lithium hydroxide. The choice of lithium hydroxide sometime leads to a cleaner reaction but lithium bases are significantly more expensive than the sodium or potassium bases. Thus, one needs to carefully evaluate the need of any expensive reagent vis-à-vis its advantage, in obtaining a crude intermediate which will need fewer purifications [1]. Another example will be the use of precious metals in carbon-carbon bond formations. While traditional organic chemistry has always advocated the use of palladium/platinum salts for such transformations the emerging trends of using non-precious metals for such transformations also needs to be considered to achieve lower raw material costs [1]. Enzymatic transformations have also taken centre stage in process chemistry in recent times [4]. This is mainly because these reactions are highly stereo-selective, generate fewer by-products, avoid the use of organic solvents and sometimes even result in higher yields. This probably clearly exemplifies why a thorough understanding of chemistry is required to design the most appropriate route of synthesis which will eventually lead to a lower cost of the API.

Engineering designs play a significant role in the commercial production of APIs [1]. Engineering solutions for effluent treatment and solvent recycling contribute to both cost savings and environmental compliance. Energy efficient reactor designs bring down operational expenses. Incorporation of proper process controls and critical process parameters leads to scalable process which avoids any failures during commercial campaigns. Sometimes the choice of appropriate equipment for both the reaction and downstream processing is quite critical and lead to a more efficient batch cycle time [1].

In any science driven field innovation is the name of the game. Latest advancement in continuous flow chemistry has led a significant shift in process engineering [5]. Flow chemistry involves conducting reactions in a continuous stream through small tubular reactors. This enable micro scale reactions whereas products can be obtained on a continuous basis for mass production [5]. Unlike a batch process this significantly reduces the risk of failure of a large batch at one go if any unforeseen failure happens thus reducing any cost liability. Flow systems are highly scalable, amenable to automation, and can even alter the energy required for achieving proper reaction kinetics [5]. The initial reluctance of adopting a full scale flow setup is because of the cost of the set-up but with mass acceptance of this innovation cost of set-up will definitely come down. Various organizations are adopting a combination of batch and flow processes for supply of commercial API [1].

India's journey from a domestic API player to a leader in global supply chain is a testament to its scientific rigor, regulatory maturity, and entrepreneurial spirit [1][2]. As

we adopt various technological shifts, innovative chemistry-based solutions and process engineering along with digital innovations we are poised to march ahead in consolidation of our prowess as a trustworthy player in the global supply chain of API manufacturing [2]. The cornerstone of this journey is and will always be the talent pool we have. This has taken years of perseverance, hard work and staying abreast with the latest developments in science and technology. The future will be shaped by how effectively India integrates science, technology sustainability, ever changing regulatory landscape, supply chain issues and adopts the economy of scale – and all signs point to a leadership role that is both enduring and transformative.

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QUIZ TIME

What is the antidote of Digoxin?

- a Protamine sulfate
- b Digiband
- c Vitamin K
- d Naloxone



Recycling Medical Devices and Adopting Biodegradable Materials to Minimize Environmental Impact

Prof. Long Chiau Ming

Deputy Dean (Research and Sustainability)
Faculty of Medical and Life Sciences
Sunway University, Malaysia

Healthcare systems worldwide are under increasing pressure to balance clinical excellence with environmental responsibility. The traditional linear model of “produce–use–dispose” in medical devices has led to significant ecological burdens, including biomedical waste accumulation, greenhouse gas emissions, and resource depletion. In response, the concept of circular healthcare systems has emerged, emphasizing recycling, re use, and the adoption of biodegradable materials. This manuscript explores the principles, practices, and potential of circular healthcare systems, with a focus on medical device recycling and biodegradable innovations.

Modern healthcare relies heavily on single use devices and plastics, from syringes and catheters to packaging materials. While these ensure sterility and patient safety, they also generate vast amounts of waste. According to WHO estimates, hospitals produce millions of tons of biomedical waste annually, much of which is incinerated, contributing to air pollution and carbon emissions. The COVID 19 pandemic further amplified this issue, with unprecedented consumption of personal protective equipment (PPE) and disposable devices (WHO, 2022). The challenge is clear: healthcare must evolve from a linear consumption model to a circular sustainability model.

Why Circular Healthcare Matters

- Hospitals generate millions of tons of biomedical waste annually.
- The COVID 19 pandemic magnified the problem with unprecedented PPE usage.
- Circular systems shift from produce–use–dispose → reduce–recycle–replace.

“Healthcare must evolve from a waste intensive model to a sustainable ecosystem that protects both patients and the planet.”

Principles of Circular Healthcare Systems

Circular healthcare systems are built on three pillars: (i) Reduce: Minimize unnecessary consumption of disposable devices through better design and optimized

usage; (ii) Recycle: Recover valuable materials (metals, polymers) from used devices for re manufacturing, and (iii) Replace: Transition toward biodegradable and eco friendly materials that naturally degrade without harming ecosystems. This framework aligns with the United Nations Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well Being) and SDG 12 (Responsible Consumption and Production) (UN, 2020).

Recycling Medical Devices

Recycling in healthcare requires specialized protocols to ensure safety and compliance: Metals and alloys: Surgical instruments and orthopedic implants can be sterilized, refurbished, and re used (Kumar et al., 2021). Plastics: High grade polymers from catheters, syringes, and tubing can be chemically recycled into raw materials (Lee et al., 2020). Electronics: Diagnostic devices and monitoring equipment can be disassembled, with components repurposed for new devices (Patel et al., 2022). Pilot programs in Europe and North America have demonstrated that device recycling reduces waste by up to 40%, while lowering procurement costs (European Commission, 2021). Importantly, recycling must be accompanied by strict sterilization and regulatory oversight to maintain patient safety.

4. Biodegradable Materials in Healthcare

Biodegradable materials represent the next frontier in sustainable healthcare:

- **Biopolymers:** Polylactic acid (PLA), polycaprolactone (PCL), and starch based polymers are being developed for sutures, implants, and packaging (Sharma et al., 2021).
- **Natural fibers:** Cellulose and chitosan offer eco friendly alternatives for wound dressings and drug delivery systems (Zhang et al., 2020).
- **Smart biodegradable composites:** Materials engineered to degrade at controlled rates, ensuring functionality during treatment but safe disposal afterward (Singh et al., 2022).

These innovations not only reduce environmental impact but also enhance patient safety, as biodegradable implants eliminate the need for surgical removal.

Challenges and Opportunities

Despite its promise, circular healthcare faces challenges primary being regulatory barriers. Current medical device regulations prioritize sterility and safety, often limiting recycling and re use (FDA, 2021). Then comes the cost considerations, wherein initial investment in biodegradable materials and recycling infrastructure can be high. The cultural resistance, wherein clinicians and patients may hesitate to adopt recycled or biodegradable devices without clear evidence of safety.

Opportunities, however, are immense. Circular healthcare can reduce hospital waste management costs, foster green innovation in medical technology, and position healthcare institutions as leaders in sustainability.

Case Studies and Global Initiatives

The European Union's Circular Economy Action Plan includes healthcare as a priority sector, promoting eco design and recycling standards (European Commission, 2021). In India, pilot projects under the Swachh Bharat Mission have explored biodegradable packaging for pharmaceuticals (Government of India, 2022). Academic institutions are developing biodegradable sutures and implants that combine clinical efficacy with environmental responsibility (Ming et al., 2023). These initiatives demonstrate that circular healthcare is not a distant vision but an emerging reality.

Conclusion

Circular healthcare systems represent a transformative approach to minimizing environmental impact while maintaining clinical excellence. By recycling medical devices and adopting biodegradable materials, healthcare can transition from a waste intensive model to a sustainable, resilient ecosystem. For institutions like NIPER and global academia, embracing circular healthcare is both a scientific responsibility and a moral imperative. The future of medicine must be not only

innovative and patient centered but also environmentally sustainable.

Sustainability in Healthcare = Triple Benefit

- Protects the environment
- Reduces costs
- Enhances patient safety

"The future of medicine must be not only innovative and patient centered but also environmentally sustainable."

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PHARMA FACT #1 NEWSLETTER

The Bitter Pill Advantage

- Taste receptors for "bitter" exist not just on the tongue, but also inside the lungs and intestines.
- When bitter drug compounds bind to lung receptors, airways dilate – opening new pathways for asthma treatments.

Bitter = breathing relief

PHARMA FACT #2 NEWSLETTER

Grapefruit: The Ultimate Drug Multiplier

- Grapefruit juice blocks CYP3A4, a gut enzyme that breaks down many oral medications.
- With certain drugs, a single glass can cause a 300%–500% spike in absorption into your bloodstream!

Always check before mixing



INSTITUTE HIGHLIGHTS

The year has been remarkably **productive and transformative for NIPER Ahmedabad**, marked by a series of impactful achievements. The institute successfully executed **technology transfers**, including the Fat Burner Gummies formulation, alongside filing and granting of **patents** that strengthen its innovation portfolio. Faculty members earned global recognition in the **Top 2% Scientists list by Elsevier and Stanford University**, underscoring the institute's research excellence. In addition, NIPER Ahmedabad proudly hosted **international conferences under the NIP-ICON banner**, bringing together eminent voices from academia and industry to deliberate on future frontiers in pharmaceutical sciences. The institute also initiated the **Friday 4 Initiative**, fostering collaborative discussions and knowledge exchange among faculty, researchers, and students. Together, these milestones reflect NIPER Ahmedabad's unwavering commitment to advancing pharmaceutical education, translational research, and global outreach.

UnPile™ Technology Transfer – A Breakthrough in Academic–Industry Collaboration



Innovation fuels progress, and progress ensures sustainability. In line with this ethos, the National Institute of Pharmaceutical Education and Research–Ahmedabad, under the leadership of Prof. (Dr.) Shailendra Saraf, Director, achieved a landmark in translational research with the technology transfer of UnPile™.

On 27 March 2026, NIPER Ahmedabad signed an exclusive technology transfer agreement with Shree Divyanand Herbals Pvt. Ltd., represented by Dr. Kapilesh Dave (Director) and Dr. Ashish Agrawal (Advisor, R&D). Developed in the laboratory of Prof. Rakesh Kumar Tekade, in consultation with Prof. Swarnlata Saraf, Professor at Pt. Ravishankar Shukla University, Raipur, UnPile™ is a novel herbal therapeutic formulation designed for the management of piles (hemorrhoids). The agreement grants exclusive rights to the formulation and associated scientific know how, enabling the industry partner to pursue translational pathways for industrial scale up and commercialization. Positioned within the healthcare and wellness segment, UnPile™ belongs to the

category of herbal nutraceutical formulations. It is not a conventional pharmaceutical drug but an herbal OTC (over the counter) therapeutic supplement, developed by integrating traditional herbal actives with modern pharmaceutical formulation science.

From a market perspective, UnPile™ represents the nutraceuticals and functional herbal healthcare segment, offering a patient friendly, natural solution for piles management. Its unique positioning bridges academic innovation with industry application, making it suitable for scalable commercialization and broader therapeutic impact. The inventors credited Prof. Shailendra Saraf for his visionary leadership and encouragement, noting his pivotal role in channeling academic research into solutions that directly address unmet clinical needs. This milestone underscores NIPER Ahmedabad's commitment to advancing translational healthcare innovation, industry partnerships, and patient centric wellness solutions, further strengthening its role as a national leader in pharmaceutical education and research.

Reli-Pile Forte™ Technology Transfer – Advancing Herbal Healthcare Innovation

The National Institute of Pharmaceutical Education and Research (NIPER), Ahmedabad, under the leadership of Prof. (Dr.) Shailendra Saraf, Director, achieved another milestone in translational research with the successful technology transfer of Reli Pile Forte™. On 27 March 2026, the institute signed a formal agreement with Shree Divyanand Herbals Pvt. Ltd., granting exclusive rights to the developed formulation and associated scientific know how, thereby ensuring readiness for industrial scale up and commercialization.

Reli Pile Forte™ was developed in the laboratory of Prof. Rakesh Kumar Tekade, in consultation with Prof. Swarnlata Saraf, Professor at Pt. Ravishankar Shukla University, Raipur, as a multi component essential oil based preparation for the therapeutic management of hemorrhoidal disease (piles). The formulation leverages natural actives with complementary properties—anti inflammatory, venotonic, analgesic, and wound healing—to provide symptomatic relief while minimizing side effects.

Preclinical studies demonstrated significant improvements in rectal bleeding scores, reduced inflammation, and enhanced rectoanal indices, with no toxicity observed in vital organs. The product also exhibited excellent stability, pourability, and safety, making it suitable for oral administration and ensuring patient compliance.

From a market perspective, Reli Pile Forte™ is positioned within the healthcare and wellness segment, specifically under herbal nutraceutical formulations. It is not a conventional pharmaceutical drug but rather an herbal OTC (over the counter) therapeutic supplement, designed to bridge traditional herbal wisdom with modern formulation science. This positioning makes Reli Pile Forte™ a patient friendly, natural, and effective alternative to conventional hemorrhoid therapies, while ensuring scientific credibility and regulatory compliance.

The inventors acknowledged the visionary leadership of Prof. Shailendra Saraf, whose encouragement and strategic guidance have been pivotal in transforming laboratory research into market ready innovations. This technology transfer underscores NIPER Ahmedabad's commitment to advancing academic innovation, industry partnerships, and patient centric healthcare solutions in the herbal nutraceutical domain.



Fat Burner Gummies Technology Transfer

Obesity is becoming one of the biggest health challenges worldwide, affecting both children and adults. Rising obesity rates are linked to serious health problems such as diabetes, high blood pressure, fatty liver disease, and even cancer or heart disease.

Beyond health, obesity also creates a massive financial burden, with costs projected to reach trillions of dollars globally in the coming decades. In India alone, the economic impact is expected to increase nearly thirtyfold by 2060, making it not just a medical issue but also a



national concern. While medicines and dietary supplements exist, they are often difficult to use for children and older adults. Gummies offer a promising alternative because they are easy to consume, pleasant-tasting, and can carry multiple active ingredients. Among several tested compositions, Prof. Rakesh Tekade's lab has achieved success with herbal gummies targeting different aspects of obesity. Preclinical studies showed positive results, including improved cholesterol, reduced fat, and enhanced activity, with no harmful effects—suggesting them to be a safe and effective option for managing obesity.

NIPER Ahmedabad has successfully transferred the Fat Burner Gummies technology, developed in Prof. Rakesh Tekade's lab, to Shree Divyanand Herbals Pvt. Ltd. under a formal agreement on 27 March 2026. The transfer includes exclusive rights to the developed formulation, along with the associated scientific and technological know how, ensuring translational readiness for industrial scale up and commercialization.

Fat Burner Gummies are a multi component nutraceutical formulation designed for obesity management. Formulated with a low-glycemic-index sweetener, the gummies are safe for diabetic patients and suitable for pediatric and geriatric populations. Preclinical studies demonstrated improved lipid profiles, reduced abdominal fat, enhanced motor activity, and no toxicity on vital organs. The product also passed stability and quality

control tests, confirming its suitability for commercialization. The product is positioned under the segment of Healthcare & Wellness, Functional Healthcare product, categorized as an OTC (over the counter) nutraceutical formulation for obesity management. This positioning bridges traditional herbal knowledge with modern formulation science, offering a patient friendly, palatable, and effective alternative to conventional obesity treatments. Its OTC status ensures accessibility to consumers while maintaining scientific credibility and regulatory compliance, making it a strong candidate for commercialization in the herbal nutraceutical market.

The tech transfer of Fat Burner Gummies technology from NIPER Ahmedabad to Shree Divyanand Herbals Pvt. Ltd. carries the spirit of a plantation drive, where a sapling is planted with faith that it will grow into a tree offering shade and relief to passersby in the scorching sun. In the same way, this technology has been nurtured in NIPER Ahmedabad and is now entrusted to industry for growth, scale up, and service to society. Designed as a safe, patient friendly nutraceutical for obesity management, the gummies embody the vision of combining traditional herbal wisdom with modern formulation science. Just as a tree's shadow provides comfort to many, this innovation is expected to extend its benefits widely—improving health outcomes, ensuring accessibility through its OTC status, and contributing to the wellness of diverse populations.

Verinostat Technology Transfer

NIPER Ahmedabad, an institute of National Importance under department of pharmaceuticals, Govt of India, has made a strategic alliance with Trident Lifeline Limited, a dynamic and rapidly expanding Small and Medium Enterprise (SME). This partnership, formalized through a technology transfer agreement, marks a significant milestone in bringing the critical cancer drug Vorinostat to Indian patients. Currently, Vorinostat is not manufactured within India, forcing patients to rely on expensive imported versions, such as ZOLINZA. The team comprising Dr. Ravi P Shah, Dr. Dinesh Kumar, Dr. Derajram Benival, Dr. Amol Dikundwar, Dr. Pinaki Sengupta, and Dr. Rajesh Nadiminti, along with enthusiastic NIPER students, meticulously worked on developing a generic version of Vorinostat. Their efforts encompassed the entire drug development process, from the synthesis of the Active Pharmaceutical Ingredient (API) to the precise formulation of the capsule. Vorinostat is one of the crucial medications for treating Cutaneous T-Cell Lymphoma (CTCL), a rare blood originated skin cancer. CTCL originates in T cells or T lymphocytes, vital components of the body's immune system. In CTCL, these cells undergo abnormal transformations, leading them to attack the skin. The

disease manifests as scaly patches or bumps known as lesions, often mimicking eczema, which contributes to diagnostic challenges. The lack of readily available and affordable specialized treatment for CTCL in India has resulted in many patients being prescribed steroids, which offer compromised treatment with potential side effects.

This collaboration aims to revolutionize the treatment landscape for CTCL patients by providing access to a high-quality, domestically produced Vorinostat. Furthermore, demonstrating a profound commitment to social responsibility, Mr. Ashish Bafna, CFO of the Trident group, has promised to provide Vorinostat free of charge to economically disadvantaged patients. This compassionate initiative underscores the partnership's dedication to ensuring that life-saving medications reach those who need them most. In essence, this collaboration between NIPER Ahmedabad and Trident Lifeline exemplifies a powerful synergy between academic research and industrial innovation, driven by a shared vision of improving healthcare access and outcomes for the Indian population, particularly for those battling rare diseases.



NIPER Ahmedabad Faculty Honored in Global Top 2% Scientists List

NIPER Ahmedabad is proud to announce that Prof. Shailendra Saraf (Director, NIPER Ahmedabad), Prof. Rakesh Tekade (Professor, Associate Dean, R&D), Dr. Pinaki Sengupta (Associate Professor), and Dr. Suveen Kumar (Assistant Professor) have been recognized in the prestigious Top 2% Scientists list published by Elsevier and Stanford University.

This global recognition is based on standardized citation indicators, reflecting the quality, impact, and consistency of scientific contributions across disciplines. Being featured in this list places NIPER Ahmedabad's faculty among the world's leading researchers, underscoring their pioneering work in pharmaceutical sciences, drug delivery, regulatory strategy, and healthcare innovation.

The achievement is a testament to the research culture and academic excellence nurtured at NIPER Ahmedabad. It highlights the institute's growing international stature and reinforces its commitment to advancing cutting edge research, translational science, and global collaborations.

By earning this distinction, NIPER Ahmedabad continues to inspire its students, collaborators, and industry partners to pursue innovation with rigor, integrity, and global relevance. This recognition also reflects the institute's vision of contributing meaningfully to India's leadership in pharmaceutical education and healthcare research.



NIPER-A *is proud to share that*



Prof. Shailendra Saraf
Consecutive 5 years



Dr. Rakesh Kumar Tekade
Consecutive 5 years



Dr. Pinaki Sengupta
Debut



Dr. Suveen Kumar
Consecutive 2 years

has been recognized among the **Top 2% Scientists**
in the World in the prestigious list published by Elsevier and Stanford University (2025)

This prestigious recognition is a testament to their pioneering research and outstanding contributions to the scientific community.

We celebrate this milestone & look forward to your continued success!

"Science is the engine of progress—let's fuel it together."

Prof. Akshay Srivastava Elected Fellow by the Society for Biomaterials and Artificial Organs (India)

NIPER Ahmedabad proudly announces that Prof. Akshay Srivastava, Head of the Department of Medical Devices, has been elected as a Fellow (FBAO) by the Society for Biomaterials and Artificial Organs (India). This prestigious recognition honors his significant contributions to biomaterials, tissue engineering, medical device innovation, and leadership in advancing healthcare technologies.



International Conference on Pharmaceutical and Biomedical Sciences (ICPBS 2025)

The International Conference on Pharmaceutical and Biomedical Sciences (ICPBS 2025), organized by the Department of Pharmaceutics, NIPER Ahmedabad, commenced with an inspiring inauguration ceremony led by eminent dignitaries including Prof. Shailendra Saraf, Dr. Radha Rangarajan, Dr. M.E. Kannan, Prof. Rakesh K. Tekade, and Dr. Aakanchha Jain. The event witnessed enthusiastic participation from 227 attendees and featured 105 poster presentations, reflecting the institute's commitment to advancing pharmaceutical and biomedical sciences. Special appreciation was extended

to the organizing committee, whose dedicated efforts ensured the success of this impactful gathering.

Day one featured sessions on AI, smart devices, and emerging therapeutic technologies, with keynote and plenary lectures by distinguished experts such as Dr. Radha Rangarajan, Dr. M.E. Kannan, Prof. Long Chiau Ming, Dr. Randa Shehdeh Mansour, and Prof. Swarnalata Saraf. Discussions highlighted AI enabled antibiotic development, drug device combination products, spectroscopy, bio manufacturing, and electro driven therapeutics. The day also included a Publisher's Talk by

Elsevier showcasing NIPER A's strong research impact, followed by a dynamic panel discussion on gene therapy,

global collaboration, and technology integration in pharmaceutical research.



The second day focused on global perspectives, nanotechnology based therapies, and advanced therapeutics, with sessions chaired by Dr. Bashar Altaani, Dr. Randa Shehdeh Mansour, and Dr. Ajay Khopade. Key highlights included microneedle formulations for transdermal drug delivery, nanocrystal modifications, e lysine nanofibrous dressings, pharmaceutical 3D printing, DNA based nanodevices, and GLP1 receptor agonists. The conference also hosted a Poster Presentation

Competition, recognizing outstanding contributions across student, research scholar, and faculty categories. The valedictory function, graced by eminent dignitaries, concluded the event with reflections on its success and acknowledgment of the collective efforts of speakers, participants, organizers, and sponsors. ICPBS 2025 stood as a testament to interdisciplinary innovation and collaboration in shaping the future of pharmaceutical and biomedical sciences.





International Conference for Translational Molecular Medicine and Diagnostic Devices (ICTDD-2026)

The Department of Biotechnology, NIPER Ahmedabad, successfully organized the International Conference for Translational Molecular Medicine and Diagnostic Devices (ICTDD-2026) on 12th and 13th January 2026. The two-day conference focused on cutting-edge themes, including genomics, proteomics, non-coding RNA, exosome biology, precision oncology, and the application of AI and ML in drug

discovery. The event featured insightful lectures by eminent national and international experts, highlighting recent advances in translational cancer research, and provided a vibrant platform for researchers and students through interactive scientific discussions and poster presentations, fostering knowledge exchange and collaborative opportunities in the field of molecular medicine and diagnostics.



NPFT-2026

The National Institute of Pharmaceutical Education and Research, Ahmedabad (NIPER-A) successfully hosted NPFT-2026 from 4-6 February 2026, bringing together academicians, scientists, clinicians, and industry experts to deliberate on innovations in natural products research and therapeutics. The conference featured an exceptional lineup of speakers, including Srinivasa Reddy, Director, Indian Institute of Chemical Technology; Surat Laphookhieo, Professor & Dean, Mae Fah Luang University, Thailand; Babu UV, Director R&D, Himalaya Wellness Company; Sandip B. Bharate, Chief Scientist, Indian Institute of Chemical Technology; Ashok Omray; Baidyanath Mishra, R&D Head, Dabur India Ltd.; Arvind Saklani, VP, Sami Labs Limited; Professor Dhudhmal, Institute of Teaching and Research in Ayurveda; Sanjay P. Chhajed; Swarnlata Saraf, Former Director, Pt. Ravishankar Shukla University; Amit Kumar Goyal, Professor, Central University of Rajasthan; Girish Tillu, Savitribai Phule Pune University; Lal Hingorani, Founder, Pharmanza Herbal Pvt. Ltd.; Narender T., Central Drug Research Institute; Srinivas Nanduri, National Institute of Pharmaceutical Education and Research, Hyderabad; Mukesh Nariya and Tanuja Nesari, Institute of Teaching and Research in Ayurveda; and Mohendra Roy, Pandit Deendayal Energy University, who addressed themes spanning drug discovery, phytopharmaceuticals, nutraceuticals, regulatory science, translational research, metabolomics, and artificial intelligence. The conference also showcased promising research by young investigators Bency Baby T, D. Vijayasarithi, Vishal G. Beldar, and Akshay Dilip Bagwe, reinforcing strong academia-industry collaboration and highlighting future directions in natural products-based healthcare innovation.



Launching of the '4 Friday 4' (4F4) Lecture Series Initiative



NIPER Ahmedabad proudly launched the '4 Friday 4' (4F4) Lecture Series, a visionary academic initiative designed to foster interdisciplinary learning and intellectual exchange. Scheduled monthly on the fourth Friday at 4 PM, the series embodies the institute's commitment to creating a vibrant platform where knowledge, innovation, and collaboration converge. Conceived under the leadership of Prof. Shailendra Saraf, Director, NIPER A, and supported by Prof. Rakesh K. Tekade, the initiative seeks to bring together distinguished voices from academia, industry, and policy to deliberate on emerging trends in

pharmaceutical sciences and allied disciplines.

The inaugural lecture was delivered by Prof. Swarnalata Saraf, who spoke on "Empowering Bharat's MedTech Revolution through Research and Innovation." Her address highlighted the transformative role of innovation, collaboration, and translational research in advancing healthcare solutions for India and beyond. By emphasizing the synergy between research and industry, Prof. Saraf underscored the importance of nurturing indigenous technologies and fostering a culture of innovation that can drive Bharat's MedTech revolution. The lecture set a

powerful precedent for the series, inspiring participants to think critically about the future of pharmaceutical and biomedical sciences.

The 4F4 Lecture Series has already garnered enthusiastic participation from students, faculty, and researchers, who view it as an opportunity to broaden their horizons and engage with real world challenges. Beyond academic enrichment, the initiative aims to cultivate critical

thinking, collaborative spirit, and translational impact, ensuring that NIPER Ahmedabad continues to serve as a hub for thought leadership and innovation. By institutionalizing this monthly dialogue, NIPER A is not only strengthening its academic ecosystem but also contributing to the larger vision of advancing pharmaceutical education, research, and societal well being.

Hosted an Inspiring Friday 4 Lecture by Dr. Dhirajlal Katodia

Ahmedabad, 26 February 2026, NIPER-A proudly hosted Dr. Dhirajlal Katodia as part of its Friday 4 Lecture Series, which is one of the thoughtful initiatives of Prof. Shailendra Saraf, Director NIPER-A. Delivering a thought-provoking talk titled "Science with Soul: Turning Research into Hope for Humanity", Dr. Katodia captivated students, faculty, and scientists with his vision of science as a force for compassion and transformation. He emphasized the deeper purpose of scientific inquiry—moving beyond data and experiments to touch lives and create meaningful impact.

Dr. Katodia emphasized that research must go beyond laboratories, urging young scientists to see themselves as custodians of hope. Dr. Katodia reminded the audience that science is not merely about discovery but about

service. He urged researchers to integrate compassion and empathy into their work, ensuring that innovations reach those who need them most. Dr. Katodia illustrated how breakthroughs in pharmaceuticals and medical devices can directly alleviate human suffering. He highlighted the importance of aligning research goals with societal needs, particularly in healthcare and sustainability. Dr. Katodia's lecture beautifully captured the essence of science as a soulful pursuit. His words resonated deeply with NIPER Ahmedabad's commitment to advancing pharmaceutical sciences not only as a discipline of knowledge but also as a beacon of hope for humanity. His message was clear: every experiment carries the potential to heal, uplift, and inspire.



Industry–Academia Day 2026 – Connect & Collaborate

On Tuesday, 03 February 2026, NIPER Ahmedabad successfully organized the 2nd Industry–Academia Day under the theme "Connect & Collaborate", reaffirming its commitment to fostering meaningful partnerships between academic research and the pharmaceutical and medical device industries. The event highlighted the belief that innovation does not happen in isolation; it thrives when the brightest minds in academia engage with visionary leaders from industry. The day featured a technology showcase, where faculty members presented 25 cutting edge technologies and proof of concepts (PoCs), while PhD scholars contributed 80 research posters. This vibrant exchange of ideas resulted in 13 expressions of interest from industry participants, underscoring the translational potential of NIPER Ahmedabad's research.

The program provided a platform for knowledge sharing, networking, and collaboration, enabling industry representatives to explore opportunities for technology transfer, joint research, and commercialization pathways. It

also offered students and researchers valuable exposure to real world industry perspectives, strengthening their readiness for future careers in pharmaceutical innovation. NIPER-A extends its sincere gratitude to IDMA, AiMED, ADMI, and FDCA for their partnership and support, which played a pivotal role in making the event impactful. This initiative reflects NIPER Ahmedabad's vision of becoming a hub for translational science and industry engagement, ensuring that academic innovations are effectively transformed into solutions that address healthcare challenges and societal needs.



PHARMA FACT #3
NEWSLETTER

Inspiration from Snake Venom

- ACE inhibitors (like Captopril) – a famous class of blood pressure drugs – were born from studying the lethal venom of the Brazilian Pit Viper (*Bothrops jararaca*).
- Result: a landmark drug class still used to treat high blood pressure today.

From venom to the cure

PHARMA FACT #4
NEWSLETTER

The Tears of Gold

- Gold compounds (Auranofin) were historically used to treat severe rheumatoid arthritis.
- Biologically, gold acts as an anti-inflammatory by inhibiting specific immune cell enzymes.

Gold standard of its day



EMERGING COLLABORATIONS

Memorandum of understanding (MOU)

Strategic collaborations are the cornerstone of innovation and translational impact. In the past year, NIPER Ahmedabad has actively expanded its network of partnerships by signing a series of **Memoranda of Understanding (MoUs)** with leading academic institutions, research organizations, and industry partners.

Between **May 2025 and March 2026**, NIPER Ahmedabad formalized **nine MoUs** with diverse organizations, including **CSIR-CSIO Chandigarh, CSIR-IICT Hyderabad, IIT Kanpur, IIIT Vadodara, NITTTR Bhopal, O2h Pvt Ltd Ahmedabad, Dishman Carbogen Amcis Ltd., Biotech Consortium India Ltd. (BCIL), and Shree Divyanand Herbals Pvt. Ltd.**

These collaborations are designed to foster **joint research, technology development, faculty and student mobility, and industry-academia engagement**, thereby strengthening NIPER Ahmedabad's role as a hub for **pharmaceutical innovation and medical device research**. The signing of these MoUs reflects the institute's commitment to building **synergistic alliances** that accelerate the translation of laboratory discoveries into **real world healthcare** solutions. By partnering with both national laboratories and industry leaders, NIPER Ahmedabad continues to reinforce its vision of **global relevance, societal impact, and excellence in pharmaceutical education and research**.

Sr. No	Name of Partner Organization	Date of Signing
1	CSIR – Central Scientific Instruments Organisation (CSIO), Chandigarh	23-05-2025
2	O2h Pvt Ltd, Ahmedabad	23-05-2025
3	MoU with NITTTR, Bhopal	21-05-2025
4	MoU with CSIR-IICT Hyderabad	04-07-2025
5	IIIT vadodara	17-10-2025
6	DISHMAN CARBOGEN AMCIS LTD	11-12-2025
7	Biotech Consortium India Ltd. (BCIL)	09-03-2026
8	Shree Divyanand Herbals pvt Ltd, Mandsaur, MP	27-03-2026
9	IIT Kanpur	30-03-2026



Collaborative Meeting Between NIPER-Ahmedabad and CSIR Innovation Complex, Mumbai

On October 28, 2025, NIPER Ahmedabad had the privilege of hosting a delegation from the CSIR Innovation Complex, Mumbai, marking an important step towards strengthening collaborative research and innovation networks.

The meeting was centered on exploring future research collaborations, joint innovation strategies, and translational pathways that can accelerate the development of impactful healthcare solutions. Discussions focused on leveraging the complementary strengths of both institutions—NIPER Ahmedabad's expertise in pharmaceutical sciences and medical devices, and CSIR's leadership in scientific instrumentation and innovation ecosystems. The interaction provided a platform to identify synergistic

opportunities in drug delivery, medical devices, biotechnology, and translational research, while also emphasizing the importance of industry-academia partnerships for scaling innovations. Both teams expressed enthusiasm for initiating joint projects, technology showcases, and knowledge sharing initiatives that will contribute to India's growing innovation landscape.

This meeting reflects NIPER Ahmedabad's vision of becoming a national hub for collaborative science, where partnerships with premier institutions like CSIR help transform academic research into real world applications. The institute looks forward to building on this dialogue and advancing joint efforts in science, technology, and healthcare innovation.

An infographic with a pink background. On the left, a teal syringe and a teal container with a white swab are shown. In the center, a stylized teal female torso is depicted with a red and white polka-dot sphere representing a cell or virus near the cervix. Below the torso, a dark blue circle contains the text 'Screening and vaccination are key to prevent the disease' and a cluster of red and white polka-dot spheres. On the right, a dark blue circle contains the text 'Yet in 2020, more than 600 000 women were diagnosed with cervical cancer worldwide and almost 350 000 died from the disease' and a white silhouette of the African continent. At the bottom right, the logos for the International Agency for Research on Cancer and the World Health Organization are displayed.

Cervical cancer is one of the most preventable and treatable types of cancer

Yet in 2020, more than **600 000** women were **diagnosed** with cervical cancer worldwide and almost **350 000** died from the disease

Screening and vaccination are key to prevent the disease

International Agency for Research on Cancer
World Health Organization



ACADEMIC AND PROFESSIONAL ACTIVITIES

One-Day Rashtriya Karmayogi Workshop at NIPER-Ahmedabad

On 25 July 2025, the National Institute of Pharmaceutical Education and Research (NIPER), Ahmedabad successfully conducted the **Rashtriya Karmayogi Program, Phase-2, Cascade-3**, as part of the Government of India's flagship Mission Karmayogi initiative.

The workshop was attended by **all faculty members and staff**, reflecting the institute's strong commitment to fostering a **citizen-centric, performance-driven work culture** within academic and research institutions. The sessions were facilitated by **Master Trainers Dr. Pinaki Sengupta and Dr. Aakanchha Jain**, who guided participants through structured modules designed to enhance **self-awareness, accountability, and purpose-driven professional conduct**. The program began with an introduction to the objectives and framework of

Mission Karmayogi, emphasizing the importance of aligning institutional practices with the values of efficiency, transparency, and service excellence. Interactive discussions and reflective exercises encouraged participants to explore ways of integrating these principles into their daily responsibilities. The workshop concluded with an assessment and feedback session, enabling participants to evaluate their learning outcomes and share perspectives on how the program could further strengthen institutional culture.

Overall, the event proved to be a **thought-provoking and inspiring experience**, reinforcing NIPER Ahmedabad's dedication to nurturing a **progressive, value-driven workforce** that contributes meaningfully to the nation's vision of excellence in public service.



One Day Workshop on LC HRMS & LC MS/MS for Pharmaceutical Characterization

On March 6, 2026, the Department of Pharmaceutical Analysis, NIPER Ahmedabad, successfully organized a one day workshop titled "Utilization of LC HRMS & LC MS/MS for Pharmaceutical Characterization." The program brought together 13 scientists from leading pharmaceutical industries,

reflecting the growing interest in advanced analytical technologies for drug development and quality assurance.

The workshop featured a series of technical lectures delivered by departmental faculty, focusing on the principles, capabilities, and applications of High Resolution Mass Spectrometry (HRMS) and tandem mass

spectrometry (LC MS/MS) in modern pharmaceutical analysis. Topics included structural elucidation, impurity profiling, metabolite identification, and bioanalytical quantification, highlighting the critical role of these techniques in ensuring drug safety, efficacy, and regulatory compliance.

A distinctive highlight of the event was the intensive hands on training sessions, where participants engaged directly with state of the art LC HRMS and LC MS/MS instrumentation. These sessions provided practical exposure to sample preparation, method development, data acquisition, and interpretation of complex spectra, enabling participants to translate theoretical knowledge into real world analytical skills. The workshop fostered industry-academia interaction, offering a platform for



knowledge exchange and collaborative learning. By equipping participants with advanced analytical expertise, the program reinforced NIPER Ahmedabad's commitment to capacity building, skill development, and translational research in pharmaceutical sciences.

Two-day Workshop on Diagnostic Devices

The Department of Medical Devices, NIPER Ahmedabad, conducted a two-day workshop on "Diagnostic Devices" on 8-9 January 2026, in collaboration with PalmSens BV



and Class One Systems S&T Pvt. Ltd. The workshop aimed to provide focused theoretical knowledge and hands-on experience with diagnostic device technologies.



Visit of Shri Manoj Joshi, IAS, Secretary, Department of Pharmaceuticals

On March 23, 2026, Shri Manoj Joshi, IAS, Secretary, Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, Government of India, visited NIPER Ahmedabad. He was warmly received by Prof. (Dr.) Shailendra Saraf, Director, NIPER Ahmedabad, who presented a comprehensive overview of the institute's academic, research, and innovation activities. The presentation highlighted NIPER Ahmedabad's contributions in pharmaceutical sciences, medical devices, translational research, and industry collaborations, underscoring its role as a leading national institute in advancing healthcare technologies.

During the visit, Shri Joshi toured the state-of-the-art laboratory facilities, gaining first-hand insights into ongoing research projects and infrastructure development. He also interacted with faculty members and researchers, appreciating their efforts in fostering innovation and skill development aligned with national healthcare priorities. The visit reaffirmed the institute's commitment to excellence in pharmaceutical education, cutting-edge research, and industry-academia partnerships, while strengthening its engagement with the Department of Pharmaceuticals in shaping India's healthcare and innovation ecosystem.



Visit of Delegation from the Embassy of the Netherlands to NIPER Ahmedabad

On October 30, 2025, NIPER-A was honored to host a distinguished delegation from the Embassy of the Netherlands. The delegation included Mr. Nico Schiettekatte, Counselor for Health, Welfare, and Sport, and Ms. Ravleen Pal, Deputy Head of Economic Section and Sector Lead – Lifesciences & Health.

The visit provided an excellent platform for dialogue on collaborative opportunities in pharmaceutical sciences, medical devices, and healthcare innovation. Discussions centered on strengthening academic-industry partnerships, translational research pathways, and global cooperation in areas of mutual interest. The delegation also gained insights into NIPER Ahmedabad's research strengths, infrastructure, and ongoing projects,

highlighting the institute's role in advancing cutting edge healthcare solutions.

This engagement reflects NIPER Ahmedabad's commitment to building international collaborations that foster knowledge exchange, innovation, and capacity building. By connecting with global partners such as the Netherlands, the institute continues to expand its international footprint, reinforcing its vision of becoming a hub for globally relevant pharmaceutical education and translational research. The visit concluded with a shared enthusiasm for future joint initiatives, underscoring the importance of cross border collaboration in addressing emerging healthcare challenges and promoting sustainable innovation ecosystems.

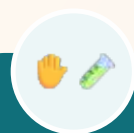


An Interaction with Padma Shri Dr. Kiran Seth and SPIC MACAY

On October 2025, NIPER-Ahmedabad had the honor of hosting Padma Shri Dr. Kiran Seth, the visionary founder of SPIC MACAY (Society for the Promotion of Indian Classical Music and Culture Amongst Youth), along with members of the regional team. The interaction provided a unique opportunity to engage with the mission and philosophy of SPIC MACAY, an organization dedicated to inspiring youth through India's rich cultural heritage. Dr. Seth emphasized the importance of integrating classical music, dance, yoga, and traditional art forms into the lives of young people, fostering values of discipline, mindfulness, and cultural appreciation.

SPIC MACAY has been a transformative movement, conducting nearly 5,000 events annually across India and

abroad, ranging from concerts and lecture demonstrations to workshops and heritage walks. These initiatives aim to connect students with India's timeless traditions, nurturing a sense of identity, continuity, and respect for cultural diversity. The session at NIPER Ahmedabad was both thought provoking and inspiring, encouraging faculty, staff, and students to reflect on the role of cultural heritage in shaping holistic education. The institute expressed its appreciation to Dr. Seth and the SPIC MACAY team for their efforts in bridging tradition with modern education, and looks forward to future collaborations that enrich the academic environment with cultural and spiritual dimensions.



PHARMA FACT

Thalidomide & Handedness

-  Thalidomide's (R)-form is a safe sedative, but its (S)-form causes severe birth defects.
-  Human enzymes turn the safe form into the toxic one inside the body, so in vivo behavior must be tracked.
-  Mirror-image molecules matter

Prof. N.C Gautam, Former Vice Chancellor of MGCGV Chitrakoot University, visited NIPER Ahmedabad

Prof. N.C Gautam, Former Vice Chancellor of MGCGV Chitrakoot University, visited Niper Ahmedabad. Dr. Gautam engaged in discussions with various stakeholders during the brainstorming session, during which he

received an overview of the research being conducted by the Natural Product and Medicinal Chemistry departments at the institute. He has also visited the institute's central facilities.



Prof. Anil D Sahasrabudhe, Chairman NETF, Chairman EC-NAAC, and NBA. Visited NIPER Ahmedabad, toured the facilities, and interacted with stakeholders



Visit of Prof. Bikramjit Basu, Director, CGCRI Kolkata, to NIPER Ahmedabad

Prof. Bikramjit Basu, Director of the Central Glass and Ceramic Research Institute (CGCRI), Kolkata, visited the Center for Medical Devices at NIPER Ahmedabad. His visit marked an important step in strengthening collaborations between two premier national institutions working at the interface of materials science, medical devices, and translational healthcare technologies. During the interaction, Prof. Basu engaged in productive discussions with faculty and researchers, focusing on potential areas of joint research, testing, and development. Special emphasis was placed on implants and diagnostic devices, where CGCRI's expertise in advanced materials and NIPER Ahmedabad's strengths in pharmaceutical sciences and medical device innovation can create powerful synergies.

Prof. Basu also shared valuable insights on emerging R&D opportunities, regulatory pathways, and testing strategies that could accelerate the translation of prototypes into clinically relevant solutions. His suggestions highlighted the importance of interdisciplinary collaboration in addressing unmet needs

in healthcare and advancing India's self reliance in medical technologies.

The visit reaffirmed NIPER Ahmedabad's commitment to building strategic partnerships with leading national research organizations, ensuring that innovations are supported by robust scientific validation, industrial scalability, and regulatory compliance. The institute looks forward to future collaborative projects with CGCRI, aimed at advancing implantable and diagnostic technologies for the benefit of patients and society.



Industry–Academia Interaction: NIPER Ahmedabad Hosts IDMA Leadership Team

NIPER Ahmedabad had the privilege of hosting the leadership team of the Indian Drug Manufacturers' Association (IDMA) for an enriching Industry–Academia Interaction. The meeting served as a dynamic platform to explore collaborative opportunities in pharmaceutical research, innovation, and workforce development, reinforcing the institute's commitment to bridging the gap between academia and industry.

The discussions highlighted NIPER Ahmedabad's research capabilities, including strengths in drug delivery systems, medical devices, regulatory science, and translational healthcare solutions. IDMA leaders shared valuable insights into industry priorities, emerging trends, and regulatory challenges, paving the way for joint initiatives that can accelerate technology transfer, skill development, and commercialization pathways.

This engagement underscored the importance of synergistic partnerships in driving pharmaceutical innovation and ensuring that academic research translates into real world healthcare solutions. Both sides expressed enthusiasm for developing structured collaboration models, including internships, joint research projects, and industry focused training programs, aimed at enhancing student employability and advancing India's pharmaceutical ecosystem. By hosting the IDMA leadership team, NIPER Ahmedabad reaffirmed its vision of becoming a national hub for industry linked pharmaceutical education and innovation, where knowledge, expertise, and resources converge to address pressing healthcare challenges and strengthen India's global competitiveness in the pharma sector.



17th CII Global MedTech Summit 2025 – NIPER Ahmedabad's Contribution to Workforce Readiness

Dr. Shailendra Saraf, Director of NIPER Ahmedabad, participated in the prestigious 17th CII Global MedTech Summit 2025, a flagship event that brought together leaders from academia, industry, and policy to deliberate on the future of medical technology in India. Dr. Saraf was invited as a distinguished panelist in the session on "Enhancing Skill Development & Workforce Readiness in MedTech." His contribution emphasized the critical need for structured training programs, industry aligned curricula, and hands on exposure to cutting edge technologies to prepare the next generation of professionals for the rapidly evolving MedTech sector.

The summit provided a platform to discuss emerging trends in medical devices, regulatory pathways, and innovation ecosystems, while highlighting the importance of industry–academia collaboration in bridging skill gaps. Dr. Saraf underscored NIPER Ahmedabad's initiatives in capacity building, translational research, and specialized training modules, which align with national priorities to strengthen India's MedTech workforce. Participation in this global forum reinforced NIPER Ahmedabad's role as a thought leader in pharmaceutical and medical device education, committed to advancing skill development, innovation, and healthcare solutions that meet both domestic and international needs.



Visit of Shri Bipin Talati, IAS – Commissioner, to NIPER Ahmedabad

On 24 November 2025, NIPER Ahmedabad had the honor of welcoming Shri Bipin Talati, IAS, Commissioner, who visited the institute's various facilities. The visit provided an excellent opportunity to showcase NIPER Ahmedabad's state of the art laboratories, research centers, and innovation hubs, particularly in the areas of pharmaceutical sciences, medical devices, and translational research.

During the tour, Shri Talati interacted with faculty members, researchers, and students, gaining insights into the institute's ongoing projects, technology transfer initiatives, and industry collaborations. His keen interest

in the institute's work underscored the importance of academic excellence and innovation in strengthening India's pharmaceutical and healthcare ecosystem.

The visit also opened avenues for future cooperation and support, reinforcing NIPER Ahmedabad's vision of contributing to national healthcare priorities, skill development, and innovation driven growth. The institute expressed its gratitude to Shri Talati for his encouragement and valuable perspectives, which will further inspire its mission of advancing research, education, and translational impact.



More than 99% of cases of cervical cancer are caused by infection with **human papillomavirus (HPV)**



HPV16

HPV18

Vaccines exist that protect against carcinogenic HPV types



International Agency for Research on Cancer



World Health Organization

Screening programmes can detect **early signs of disease**, allowing time for effective treatment





CENTRE FOR MEDICAL DEVICES (CMD)

Arena of Centre for Medical Devices (CMD)

The Centre for Medical Devices (CMD) at NIPER-Ahmedabad, officially launched on August 16, 2023, under the PRIP scheme by the Department of Pharmaceuticals, Ministry of Health and family Welfare, Government of India, is fast emerging as a cornerstone of MedTech innovation in India. Virtually inaugurated by Prime Minister Shri Narendra Modi on October 29, 2024, the Centre is poised to reshape the medical devices landscape with its cutting-edge infrastructure, pioneering research, and industry-aligned training.

Functioning as a vibrant hub for research, development, and skill-building, CMD supports startups, SMEs, and established enterprises through sponsored R&D, technology transfer, and product development—from ideation to Technology Readiness Level (TRL) 3 and beyond. A hallmark achievement is India's first NABL-accredited hip implant testing facility, underscoring CMD's commitment to regulatory excellence. Beyond testing, CMD is actively redefining talent development with hands-on workshops, customized training, and certifications. It addresses the talent gap in the MedTech sector by creating a workforce equipped for real-world challenges.

CMD's innovation spans across three major domains: orthopedic implants and biomaterials, electro active

devices and intelligent systems, and drug-device combination technologies. From 3D/4D biomaterials and artificial organs to organ-on-chip platforms and smart diagnostics, CMD is leading transformative research with tangible healthcare impact. CMD also champions drug-delivery innovations—micro needles, transdermal patches, drug-eluting implants—and advanced diagnostics, including biosensors, point-of-care systems, and microfluidics. With its expanding bioelectronics and small-animal imaging capabilities, and state of art research and testing infrastructure, CMD is positioning itself as a linchpin in preclinical research and early diagnostics.

CMD's recognition under ISO/IEC 17025 and ISO 13485:2016 further bolsters its testing and regulatory training capabilities. The Centre offers comprehensive services including device testing, regulatory guidance, joint R&D, and IP mentoring. Notable initiatives like the Pfizer INDovation Workshop with Social Alpha highlight CMD's mission to accelerate lab-to-market translation. With an expanding network of experts and strategic collaborations with industries and research organizations, CMD stands as a national leader in medical device innovation—pushing boundaries, building capacity, and shaping the future of Indian healthcare.







Orientation Programme 2025 – Welcoming the New Batch

On 4 August 2025, NIPER Ahmedabad organized its Orientation Programme to warmly welcome the incoming batch of students. The event marked the beginning of their academic journey at one of India's premier institutes of pharmaceutical education and research. The programme was graced by the presence of two distinguished dignitaries – Prof. Bharat Bhasker, Director of the Indian Institute of Management Ahmedabad, and Prof. Durgesh Pant, Director General of the Uttarakhand Council for Science and Technology. Both stalwarts in the fields of education, science, and leadership, their participation added immense value to the occasion. In their inspiring addresses, Prof. Bhasker and Prof. Pant emphasized the importance of innovation, interdisciplinary learning, and ethical leadership in shaping the future of pharmaceutical sciences. They encouraged students to cultivate a spirit of curiosity,

resilience, and responsibility, reminding them that their academic journey at NIPER Ahmedabad is not only about acquiring knowledge but also about contributing meaningfully to society.

The Orientation Programme also introduced students to the academic structure, institutional resources, and research opportunities available at NIPER Ahmedabad. Faculty members highlighted the institute's commitment to excellence in teaching, cutting edge research, and industry collaboration, ensuring that students are well prepared for both professional and societal challenges. The event concluded with a renewed sense of motivation and purpose, as the new batch embraced the values of NIPER Ahmedabad and looked forward to embarking on a transformative journey in pharmaceutical education and research.



12th Convocation Ceremony at NIPER Ahmedabad

On 10 January 2026, the National Institute of Pharmaceutical Education and Research, Ahmedabad proudly hosted its 12th Convocation Ceremony, a landmark occasion celebrating academic excellence and the achievements of its graduating students.

During the ceremony, 195 Master's graduates (MS and MBA) and 16 Ph.D. scholars from the 2023–25 batch were formally conferred with their degrees, marking the successful culmination of their rigorous academic journey.

The event was graced by eminent dignitaries:

- Prof. (Dr.) G.D. Yadav, Chief Guest, renowned academic leader and visionary in chemical sciences.
- Shri Awadhesh Kumar Choudhary, Senior Economic Advisor, Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers.
- Shri Sudarshan Jain, Secretary General, Indian Pharmaceutical Alliance (IPA), as Guest of Eminence.

Their presence and inspiring addresses highlighted the importance of innovation, industry-academia collaboration, and global competitiveness in shaping the future of pharmaceutical sciences. The convocation also

witnessed the participation of Prof. Shailendra Saraf, Director, NIPER Ahmedabad, along with the Registrar, Dean, faculty members, staff, alumni, and distinguished guests. Together, they celebrated the accomplishments of the graduating students and reaffirmed the institute's mission of nurturing leaders, innovators, and researchers who will contribute to advancing healthcare and pharmaceutical innovation in India and beyond. The ceremony concluded with a spirit of pride and optimism, as the graduates embarked on their professional journeys, carrying forward the values of excellence, integrity, and service to society that define NIPER Ahmedabad.



Student Achievement

1. **Ms. Sree Teja Paritala**, a PhD student of NIPER-Ahmedabad working under the mentorship of Dr. Nitish Sharma, won First Prize (Best Poster Presentation) at Alkem Scientifica 2025 for her work on "Multiplatform Techniques."
2. **Ms. Megha Sajakumar Pillai**, a PhD student of NIPER-Ahmedabad working under the mentorship of Dr. Pinaki Sengupta, secured the Second Prize in the Dissolution Research Presentations International (DRPI) India competition organized by "The Society for Pharmaceutical Dissolution Science (SPDS)".
3. **Mr. Pankaj**, a PhD scholar at the Department of Medical Devices under the guidance of Dr. Suveen Kumar, for presenting his research work entitled "Carbon Nanotube

Modified Thread-Based Biosensor for Oral Cancer Detection" at the BBIFCC INTERONC 2025 Conference: an "Interdisciplinary Conference on Oncology" hosted by BBIF Cancer Care (BBIFCC) in association with the Faculty of Life Science and Biotechnology, South Asian University (SAU, New Delhi), was held on March 28 -29, 2025.

4. **Mr. Shubham Ramdas Mule**, a PhD Scholar from the Department of Pharmaceutics at NIPER-Ahmedabad, working under the mentorship of Prof. Rakesh Kumar Tekade, presented his research work 'Laser coupled 3D-printed implant for prevention of post-surgical oral cancer relapse' at MPCST Sponsored Annual International Conference 2025 at Medicaps University, Indore and

achieved first prize in poster presentation category. He received financial support for attending this event through a Travel Grant awarded by the Indian Council of Medical Research(ICMR).

5. Ms. Anoothi Bain, a PhD Scholar from Dr. RKT Lab, NIPER-Ahmedabad, presented a research poster entitled "Exercise-mimicking effect eliciting Protonation-prone Liposomal Resveratrol in Differentiated Fat Cells" at the conference "Mesoscience: Integrating Science and Technology in Healthcare and Medical Devices." The conference was held on 20-21 September 2025 at the Laureate Institute of Pharmacy, Kathog, Kangra, Himachal Pradesh, India. The research presentation received the First Prize in the Poster Presentation category, recognizing the scientific significance and innovative approach of the work.

6. Ms. Tanisha Gupta, a PhD scholar from Dr. RKT Lab, NIPER-Ahmedabad, presented a research findings as oral presentation on "3D Printed Graphene@cisplatin Bio Dissolvable Implant for Post Surgical Oral Cancer Intervention" at the Conference Mesoscience: Integrating Science And Technology in Healthcare and Medical Device. The conference was held on 20-21 September 2025 at the Laureate Institute of Pharmacy, Kathog, Kangra, Himachal Pradesh India. The oral presentation received the 1st prize.

7. Mr. Shivam Otavi, a PhD Scholar from the Department of Pharmaceutics at NIPER-Ahmedabad, working under the mentorship of Prof. Rakesh Kumar Tekade, presented his research work at the "3rd International Conference on New Science Integrated Science & Technology in Healthcare & Medical Devices". The conference was organized by the Laureate Institute of Pharmacy, Jwalamukhi, in collaboration with Universiti Sultan Zainal Abidin, Malaysia, on September 20-21, 2025. Mr. Shivam Otavi was awarded the 3rd Prize in Oral Presentation for his research presentation. He received financial support for attending this event through a Travel Grant awarded by the Indian Council of Medical Research(ICMR).

8. Mr. Vasu Peddinti, PhD scholar working under the supervision of Dr. Aakanchha Jain, Department of Pharmaceutics, secured the position of First Runner-up in the poster competition at National Clinical Research Conference 2025, organized by Clantha Academy in collaboration with L.M. College of Pharmacy on 27th September 2025.

9. Ms. Sree Teja Paritala, a PhD Scholar in the Department of Pharmaceutical Analysis at NIPER-Ahmedabad, secured the 1st Prize at Analytical Community of Science (ACoS) 2025 for her research titled "Deconstructing Peptide Therapeutics Through Multi-Platform Characterization Approaches." The award was presented by Biocon Bristol Myers Squibb R&D Centre(BBRC).

10. Mr. Gourang Hari Gupta, a PhD student of NIPER-Ahmedabad working under the mentorship of Dr. Suveen Kumar secured Best Poster Award entitled

"Semiconducting Few-layer 2D Borophene based Impedimetric Sensor for Cortisol detection" hosted by the Indian Institute of Technology Gandhinagar & Gujarat Technological University (GTU) from 10th - 12th December 2025.

11. Mr. Pankaj, a PhD student of NIPER-Ahmedabad working under the mentorship of Dr. Suveen Kumar secured Best Poster Award entitled "Integrating electrochemical biosensors with textile threads: A smart platform for early oral cancer detection" hosted by the Indian Institute of Technology Gandhinagar & Gujarat Technological University (GTU) from 10th - 12th December 2025.

12. Mr. Chetan Ramesh Gawali, a PhD student of NIPER-Ahmedabad working under the mentorship of Dr. Suveen Kumar secured Best Poster Award entitled "2-D Graphane Grafted Conducting Paper-Based Electrochemical Biosensor for the Detection of ANXA2 Biomarker" in International Conference for Translational Molecular Medicine and Diagnostic Devices (ICTMDD 2026), organized by Department of Biotechnology NIPER-Ahmedabad, from 12th - 13th January 2026.

13. Ms. Tanisha Gupta, a PhD scholar from Dr. RKT Lab, NIPER-Ahmedabad, presented a research findings as poster entitled "Protonation prone preprogrammed nano shuttle delivering RNAi therapeutic for molecular level treatment of chronic obesity in high fat diet mice model" in International Conference on Translational Molecular Medicine and Diagnostics Devices (ICTMDD) 2026 on 12th - 13th January 2026 At NIPER-Ahmedabad. This research work is awarded with best poster presentation. This work establishes miRNA-based gene silencing technique as potential approach to treat obesity at molecular level and developed safe poly-lipidic formulation that functions by offering exercise-like effects.

14. Ms. Tanisha Gupta, a PhD scholar from Dr. RKT lab, NIPER-Ahmedabad, presented a research findings as e-poster entitled "Protonation Prone Preprogrammed Nano Shuttle Delivering RNAi Therapeutic for Molecular Level Treatment of Chronic Obesity in High Fat Diet Mice Model" at International Conference on Emerging Trends In Pharmaceutical Sciences With Forensic Perspectives organised by School of Pharmacy, National Forensic Science University, Gandhinagar, Gujarat on 5th and 6th February 2026. This work received 1st prize in e-poster presentation.

15. Mr. Shivam Otavi, a PhD Scholar from the Department of Pharmaceutics at NIPER-Ahmedabad, working under the mentorship of Prof. Rakesh Kumar Tekade, has been invited as Featured Speaker to deliver an Oral Presentation at the World Conference on Biomaterials and Regenerative Medicine (WCBRM-2026), Paris France, on the topic of "Laser Activable Nanoparticle-Infused Gel for hard-to-heal Diabetic Wound", on March 09-11, 2026. He received prestigious Travel Grant awarded by ICMR.



INSTITUTIONAL GROWTH

Inauguration of Sabarmati Atithi Gruh – A New Milestone in Campus Infrastructure



On 23 March 2026, NIPER Ahmedabad proudly inaugurated its newly constructed guest house, Sabarmati Atithi Gruh. The facility was formally inaugurated by Shri Manoj Joshi, IAS, Secretary, Department of Pharmaceuticals, Ministry of Chemicals & Fertilizers, Government of India, whose presence added great significance to the occasion.

The Sabarmati Atithi Gruh has been envisioned as a state of the art residential facility designed to host visiting dignitaries, collaborators, and guests of the institute. With modern amenities and a serene environment, it reflects NIPER Ahmedabad's commitment to providing a welcoming and professional space that supports academic exchange, industry partnerships, and international collaborations. During the inauguration, Shri Joshi appreciated the institute's efforts in strengthening its infrastructure to match its growing stature in pharmaceutical education, research, and innovation. His encouragement reaffirmed the importance of creating spaces that foster dialogue, collaboration, and knowledge sharing.

NIPER Ahmedabad expresses its sincere gratitude to Shri Joshi for his support and guidance. The inauguration of Sabarmati Atithi Gruh marks yet another step in the institute's journey toward becoming a national hub for excellence, not only in research and education but also in creating an environment conducive to global partnerships and academic hospitality.

NIRF Ranking 2025 – NIPER Ahmedabad Secures 21st Position in Pharmacy

NIPER-Ahmedabad has achieved a remarkable milestone by securing the 21st rank in the Pharmacy category in the National Institutional Ranking Framework (NIRF) 2025, released on 4 September 2025 by the Ministry of Education, Government of India. This recognition reflects the institute's consistent academic excellence, impactful research contributions, strong industry linkages, and commitment to innovation in pharmaceutical sciences. The ranking underscores NIPER-A's growing stature as a premier institution that nurtures future leaders, researchers, and innovators in the healthcare and pharmaceutical sectors.

The achievement is a testament to the collective efforts of faculty, researchers, students, and staff, whose dedication continues to strengthen the institute's vision of becoming a globally recognized hub for pharmaceutical education and translational research. With this accomplishment, NIPER-A reaffirms its mission to drive cutting edge research, skill development, and industry academia collaboration, ensuring that its graduates are well equipped to contribute to India's leadership in healthcare innovation and global competitiveness in the pharma sector.



THE EMOJI DECODER (Guess the Drug / Concept)

Decode the visual emoji clues to find the pharmaceutical terms or drugs.

1. 🛡️ + 🧬 + 🌐 + 🦠 + 🚫 ➡️ _____

Clue: India's newly approved breakthrough combination antibiotic for drug-resistant Gram-negative superbugs.

2. 🧠 + ⚡ + 🖱️ + 🏠 ➡️ _____

Clue: Devices that bridge biology and electronics to monitor or stimulate neural pathways—a key research focus at NIPER-A.

3. 🔑 + 🎯 + 🧬 + 🦠 ➡️ _____

Clue: Instead of just blocking a disease-causing protein, this modern technology marks it for total cellular destruction.

1. ZAYNICH (Zidebactam/Cefepime)
2. BIOELECTRONICS
3. PROTAC (Proteolysis Targeting Chimera)

Answers:



CULTURAL & RECREATIONAL

Intra NIPER A Sports Week – UTSAH 2K26

From 22 to 24 January 2026, NIPER Ahmedabad reignited the excitement of sports and camaraderie with its annual Intra NIPER Sports Week – UTSAH 2K26. The three day event brought together students, faculty, and staff in a celebration of energy, competition, and community bonding. The opening ceremony, attended by Prof. Shailendra Saraf, Director, Mr. Avdhesh Nautiyal, Registrar, and members of the Sports Committee, set the tone for the week. Their inspiring words emphasized the values of teamwork, dedication, and a positive sporting spirit, motivating participants to give their best both on and off the field.

The campus buzzed with enthusiasm as matches unfolded across a wide range of sports, including cricket, volleyball, throwball, badminton, carrom, chess, table tennis, and shot put. Some competitions, such as badminton singles, doubles, and mixed doubles, were hosted at Gandhinagar Gymkhana, Sector 21, adding to the scale and excitement of the event. The semi finals and finals witnessed thrilling

contests and close finishes, showcasing the skill and determination of the participants. A highlight of the week was the cricket final between Ph.D. scholars and second year M.S. students, where the Ph.D. team emerged victorious after a gripping match. Equally engaging were the finals in volleyball, throwball, and table tennis, which drew enthusiastic cheers from the audience.

The event concluded with a closing ceremony, where winners were honored with trophies and medals, celebrating not just victory but also the spirit of participation. More importantly, UTSAH 2K26 fostered teamwork, sportsmanship, and friendships, leaving behind cherished memories and renewed energy across the NIPER community. UTSAH 2K26 was not merely about winning—it was about coming together to celebrate sports, unity, and the joy of collective achievement. With its resounding success, the institute now looks forward to the next edition of this spirited tradition.



Cultural Event – Celebrating Creativity and Community at NIPER Ahmedabad



On 10 January 2026, the campus of NIPER Ahmedabad came alive with colors, music, and energy as the institute successfully organized a vibrant Cultural Event. Commencing at 6:00 PM, the evening provided a platform for students to showcase their diverse talents through an array of cultural performances, ranging from music and dance to drama and creative expressions.

The event created a lively and engaging atmosphere, celebrating the values of creativity, diversity, and teamwork. Each performance reflected the enthusiasm and dedication of the students, while also highlighting the institute's commitment to nurturing holistic development

alongside academic excellence. The presence of faculty members, staff, and invited guests added to the spirit of the evening, offering encouragement and inspiration to the participants. Their support reinforced the sense of community and belonging that defines NIPER Ahmedabad. The program concluded on a joyful and memorable note, leaving behind cherished experiences for everyone present. More than just an evening of entertainment, the Cultural Event reaffirmed NIPER Ahmedabad's vibrant cultural spirit, where creativity and collaboration flourish hand in hand with scientific pursuit.

Celebration of the Kite Festival at NIPER Ahmedabad

On 14 January 2026, the campus of NIPER-A was filled with joy and festivity as the institute celebrated the Kite Festival, a tradition deeply rooted in Gujarat's cultural heritage. The event brought together students, faculty, staff, and their family members, creating a vibrant atmosphere of unity and celebration. The sky above the campus turned into a colorful spectacle, dotted with kites of varied shapes, sizes, and hues, as participants enthusiastically engaged in kite flying. The cheerful competition, laughter, and friendly challenges added to the festive spirit, making the day memorable for all.

In addition to kite flying, the rangoli competition emerged

as a key attraction, with participants showcasing their creativity through intricate designs and vibrant colors. Both activities highlighted the values of teamwork, creativity, and cultural expression, reinforcing the institute's commitment to nurturing holistic development alongside academic excellence. The celebration concluded on a joyful note, leaving behind cherished memories and strengthening the sense of community and togetherness within NIPER-A. The Kite Festival was not just an event—it was a reminder of the institute's lively cultural spirit and its dedication to celebrating traditions that bring people closer.



Nasha Mukt Bharat Abhiyan

NIPER-Ahmedabad organized the Nasha Mukt Bharat Abhiyan Pledge Ceremony on 13th November 2025 at 3:00 PM in SH-1, New Building, as part of the nationwide initiative to promote a drug-free society. The campaign aims to spread awareness, educate individuals about the harmful effects of drug and alcohol abuse, and encourage a healthy and responsible lifestyle. Faculty, staff, and students participated in the pledge ceremony, reaffirming their commitment to support the vision of a Nasha Mukt Bharat and contribute to creating a safer, healthier community.



79th Independence Day Celebration at NIPER Ahmedabad

On 15 August 2025, NIPER Ahmedabad proudly celebrated the 79th Independence Day of India with great enthusiasm and patriotic fervor. The occasion brought together students, faculty members, staff, and children, who gathered on campus to honor the nation's journey of freedom and progress. The celebration

was led by Dr. Shailendra Saraf, Director, NIPER Ahmedabad, who addressed the gathering with an inspiring speech. He highlighted the significance of independence, paid heartfelt tribute to the sacrifices of freedom fighters, and encouraged everyone to contribute meaningfully to the nation's growth through innovation,

integrity, and service. His words resonated deeply, instilling a renewed sense of responsibility and pride among the audience.

The program featured vibrant cultural performances by students, including patriotic songs, speeches, and creative expressions that captured the spirit of national pride. The atmosphere was filled with emotion and unity, reflecting the collective commitment of the NIPER community to uphold the values of freedom and democracy.

As part of the celebration, a tree planting drive was organized, with active participation from attendees. This

initiative symbolized the institute's dedication to environmental sustainability and responsibility, linking the spirit of independence with the duty to protect natural resources for future generations. The patriotic fervor was further heightened through the 'Har Ghar Tiranga' initiative, under which national flags were distributed to staff members to proudly display at their homes, reinforcing the collective spirit of unity and national pride.

The program concluded with a vote of thanks delivered by the Registrar, marking the end of a memorable day that celebrated not only India's independence but also the values of community, responsibility, and progress.



77th Republic Day Celebration at NIPER Ahmedabad

On 26 January 2026, NIPER Ahmedabad commemorated the 77th Republic Day of India with great zeal, dignity, and patriotic fervor. The celebration brought together the entire institute community – students, faculty, staff, and their families – in a spirit of unity and national pride.

The program was led by Dr. Shailendra Saraf, Director, NIPER Ahmedabad, who delivered an inspiring Republic Day address. In his speech, Dr. Saraf reflected on the vision and values enshrined in the Constitution of India, emphasizing the immense power and responsibility of citizenship. He urged everyone to uphold these responsibilities with sincerity, integrity, and dedication, while also highlighting NIPER Ahmedabad's role in nation building through education, research, and innovation in pharmaceutical sciences. The celebration was further enriched by vibrant cultural performances from students, who sang patriotic songs and delivered powerful speeches that resonated deeply with the audience. Adding a special dimension, the children of faculty and staff members participated with heartfelt poems and speeches, captivating the gathering with their innocence and enthusiasm.





International Women's Day Celebration at NIPER Ahmedabad

On 9 March 2026, NIPER Ahmedabad proudly celebrated International Women's Day with great pride and reverence, honoring the remarkable contributions of women in the pharmaceutical sciences and beyond. The event was graced by two eminent women leaders – Prof. Swarnlata Saraf, Dean, Faculty of Technology, Pt. Ravishankar Shukla University, and Dr. Purnima Sharma, Managing Director, Biotech Consortium India Ltd. (BCIL) – whose presence and insights inspired the entire gathering.

In his address, Prof. Shailendra Saraf, Director, NIPER Ahmedabad, along with the distinguished speakers, emphasized the fearless zeal, dedication, and core values that women bring to the forefront of science, leadership, and innovation. Their words highlighted how women

continue to shape a modern, progressive, and innovative India, breaking barriers and leading with resilience.

The celebration was not only a tribute to women achievers but also a reaffirmation of NIPER Ahmedabad's commitment to gender equality and empowerment. By harnessing collective strength and fostering inclusivity, the institute envisions a future where women play an even greater role in driving healthcare innovation, education, and societal progress. The event concluded with a spirit of pride and motivation, reminding everyone that International Women's Day is not just a celebration, but a call to action – to continue building a healthier, more equitable world for all.

Happy International Women's Day!



11th International Day of Yoga – NIPER Ahmedabad

On 21 June 2025, NIPER Ahmedabad celebrated the 11th International Day of Yoga with great enthusiasm, reaffirming its commitment to promoting holistic well being and healthy living. The day was marked by a series of activities designed to encourage the integration of yoga into daily life, highlighting its role in nurturing both physical and mental health. Students, faculty, and staff actively participated in sessions adopting the Common Yoga Protocol, ensuring a structured and inclusive practice. To extend the reach of yoga beyond the physical

gathering, the institute encouraged the use of digital platforms such as the Namaste Yoga App, WHO mYoga App, and Y Break App, enabling participants to continue their practice and awareness in a convenient and accessible manner.

Awareness campaigns were conducted through posters and digital displays across the campus, reinforcing the message of yoga as a lifestyle choice rather than a one day activity. The highlight of the celebration was an expert lecture on the theme "Yoga for One Earth, One Health",

which emphasized the profound interconnectedness of mind, body, and nature. The lecture inspired participants to embrace yoga not only as a wellness practice but also as a philosophy that fosters harmony with the environment and society.

The event concluded with a renewed sense of motivation and mindfulness, reminding the NIPER community that yoga is a timeless tool for resilience, balance, and inner strength. By celebrating International Yoga Day, NIPER Ahmedabad continues to advocate for a healthier, more conscious lifestyle that contributes to both personal well being and collective harmony.



World Entrepreneurs' Day Celebration at NIPER Ahmedabad

On 21 August 2025, NIPER-A proudly celebrated World Entrepreneurs' Day, reaffirming its commitment to nurturing innovation and entrepreneurial spirit among its students and researchers. The event was designed to inspire master's and Ph.D. scholars to explore entrepreneurship as a pathway to translate their scientific ideas into impactful ventures.

A highlight of the celebration was the invited talk and interactive session delivered by Mr. Pranav Dhumad, Executive Director, Axion Meditech. In his engaging address titled "Development of India's First Successful Intraocular Lens (IOL) Delivery System: A Journey From Design Engineer to Entrepreneur", Mr. Dhumad shared his remarkable journey from being a design engineer to becoming a successful entrepreneur. He candidly discussed the challenges faced in the early stages of entrepreneurship, including resource constraints, regulatory hurdles, and the risks of innovation. Drawing

from his own experiences, he explained how perseverance, problem solving, and strategic thinking can transform a promising idea into a working prototype and eventually into a commercialized product. His insights provided students with a real world perspective on entrepreneurship, bridging the gap between academic research and industrial application. The session witnessed enthusiastic participation from over 100 students and faculty members, who found the talk both motivational and practical. The interactive discussion encouraged students to ask questions, share their aspirations, and gain clarity on the entrepreneurial journey.

By celebrating World Entrepreneurs' Day, NIPER Ahmedabad reinforced its vision of fostering a culture of innovation, risk taking, and leadership, empowering young researchers to become future entrepreneurs and change makers in the pharmaceutical and healthcare sectors.



Angdaan Jeevan Sanjeevani Abhiyaan – Organ Donation Awareness at NIPER-A

NIPER Ahmedabad proudly commemorated the noble cause of organ donation through its awareness campaign titled Angdaan Jeevan Sanjeevani Abhiyaan. The initiative was organized to join the pious movement of saving lives by spreading awareness about the importance of organ donation and inspiring the community to contribute to this humanitarian cause. As part of the campaign, the institute organized a series of Information, Education, and Communication (IEC) activities, including painting, slogan writing, and speech competitions. These creative

platforms allowed students to express their thoughts, emotions, and commitment toward organ donation in powerful and impactful ways.

The event not only highlighted the life saving potential of organ donation but also encouraged participants to reflect on the values of selflessness, compassion, and social responsibility. By engaging the NIPER community in such meaningful activities, the campaign reinforced the message that "Angdaan is Mahadaan" – a gift that can give someone a second chance at life. Through Angdaan

Jeevan Sanjeevani Abhiyaan, NIPER Ahmedabad continues to advocate for health awareness, ethical responsibility, and community participation, ensuring

that the spirit of service and humanity remains at the heart of its mission.



Free Eye Check Up Camp at NIPER Ahmedabad

On 9 October 2025, NIPER Ahmedabad organized a Free Eye Check Up Camp in collaboration with Tej Eye Center, held at the institute's New Building. The initiative was part of the institute's ongoing commitment to promoting health awareness and preventive care among its community. A team of experienced ophthalmologists and medical professionals conducted comprehensive eye examinations, screening participants for vision impairments, refractive errors, eye diseases, and other related conditions. The camp emphasized the importance of regular eye check ups in maintaining good vision and preventing long term complications.

The event witnessed enthusiastic participation from

faculty members, staff, and students, who took advantage of the opportunity to receive professional guidance on eye health. The camp also served as a platform to spread awareness about healthy lifestyle practices, early detection, and timely treatment, reinforcing the message that eye care is an essential part of overall well being. By organizing this camp, NIPER Ahmedabad demonstrated its dedication not only to academic excellence but also to the holistic welfare of its community, ensuring that health initiatives remain an integral part of campus life. The success of the program highlighted the institute's proactive role in fostering a culture of wellness, awareness, and responsibility.



Rashtriya Ekta Diwas – Celebrating National Unity at NIPER Ahmedabad

On 31st October 2025, NIPER-Ahmedabad observed Rashtriya Ekta Diwas (National Unity Day) to commemorate the 150th birth anniversary of Sardar Vallabhbhai Patel, the Iron Man of India. The event was organized by the Institute's Sports Committee with the objective of promoting awareness about national unity, integrity, and security among the NIPER community. The program began with a Unity Parade, symbolizing the strength of collective harmony and the importance of standing together as one nation. This was followed by

a Pledge Taking Ceremony, where faculty, staff, and students solemnly reaffirmed their commitment to uphold the spirit of unity, integrity, and national solidarity.

The celebration served as a powerful reminder of Sardar Patel's vision of a united India, inspiring participants to carry forward his legacy by fostering cooperation, inclusivity, and resilience in their personal and professional lives. By observing Rashtriya Ekta Diwas, NIPER Ahmedabad reinforced its dedication to nurturing

not only academic excellence but also the values of national integration and civic responsibility, ensuring that

the institute remains a vibrant contributor to India's collective progress.



Constitution Day Celebration at NIPER Ahmedabad

On 26 November 2025, NIPER Ahmedabad observed Constitution Day, commemorating the historic adoption of the Constitution of India. The event served as a solemn reminder of the nation's democratic foundations and the guiding principles that continue to shape India's progress. Faculty and staff members assembled, and they collectively read the Preamble of the Constitution. This symbolic act reflected the institute's deep respect for constitutional values and reinforced the importance of unity, justice, liberty, equality, and fraternity in both professional and personal spheres.

The celebration was more than a formal observance – it was an opportunity to reaffirm commitment to the ideals enshrined in the Constitution. By engaging in this collective reading, participants strengthened their awareness of the responsibilities that come with citizenship and the role of educational institutions in



nurturing respect for democratic values. Through the Constitution Day observance, NIPER Ahmedabad highlighted its dedication not only to academic excellence but also to civic responsibility, ensuring that the spirit of the Constitution remains alive within its community.

Swachhata Pakhwada 2025 – NIPER Ahmedabad's Commitment to Cleanliness and Sustainability



As part of the nationwide Swachhata Hi Seva 2025 campaign, NIPER Ahmedabad organized a series of impactful activities promoting cleanliness, sustainability, and public health. The programme commenced on 1 September 2025 with a Swachhata Pledge led by Prof. Shailendra Saraf, Director, NIPER A, reaffirming the institute's dedication to a cleaner and healthier environment.

The campaign featured diverse initiatives:

- Swachhotsav Rally to spread awareness on cleanliness.
- Plastic free and hygiene awareness drive at a primary school in Palaj, Gandhinagar.
- Felicitation of teachers for fostering a clean campus

culture.

- Menstrual hygiene awareness sessions and installation of sanitary facilities.
- Tree plantation drive to promote environmental sustainability.
- Safai Mitra Suraksha Shivar coupled with a free health check up camp for community welfare.

These activities reflected NIPER Ahmedabad's holistic approach to cleanliness, sustainability, and community engagement, while instilling values of responsibility and social awareness among students and faculty. The institute's proactive participation underscored its role as a catalyst for positive change in society.

Vigilance Awareness Week 2025 – Upholding Integrity at NIPER Ahmedabad

From 27 October to 2 November 2025, NIPER Ahmedabad observed Vigilance Awareness Week, aligning with the national theme "Vigilance: Our Shared Responsibility." The week long programme aimed to foster a culture of integrity, transparency, and accountability, while raising awareness about the causes, consequences, and threats of corruption.

Students, faculty, and staff actively participated in a series of activities designed to strengthen ethical values

and responsible conduct. A central highlight was the Integrity Pledge, wherein participants reaffirmed their commitment to honesty, fairness, and transparency in both personal and professional spheres. Through these initiatives, NIPER Ahmedabad reinforced its dedication to nurturing an environment of trust, ethical governance, and civic responsibility, ensuring that vigilance remains a collective duty shared by all members of the academic community.



हिन्दी दिवस एवं पखवाड़ा 2025

राष्ट्रीय औषधीय शिक्षा एवं अनुसंधान संस्थान (नाईपर), अहमदाबाद में भारत सरकार, गृह मंत्रालय के राजभाषा विभाग के निर्देशों के अनुपालन में दिनांक 14 सितंबर से 25 सितंबर, 2025 तक हिन्दी प्रयोग प्रोत्साहन पखवाड़ा – 2025 आयोजित किया गया।

इस दौरान संकाय, कर्मचारी एवं विद्यार्थियों की सक्रिय सहभागिता रही तथा हिन्दी के प्रगामी प्रयोग को बढ़ावा देने हेतु विभिन्न प्रतियोगिताओं का आयोजन किया गया। उत्कृष्ट प्रतिभागियों को प्रथम, द्वितीय एवं तृतीय पुरस्कार तथा प्रमाणपत्र प्रदान किए गए, जबकि सभी प्रतिभागियों को सहभागिता प्रमाणपत्र दिए गए। यह आयोजन संस्थान में हिन्दी के उपयोग को बढ़ावा देने में सफल रहा।



This image shows a full page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, typical of notebook paper. There are no margins, text, or other markings on the page.

NIPER-Ahmedabad's *Tribute* to a Legacy of
Leadership, Kindness and Integrity



Dr. K. M. Cherian
(1942–2025)
(Pioneering Indian Cardiac Surgeon)



Dr. Jayant Narlikar
(1938–2025)
(Indian Astrophysicist & Author)



Support & Services

CENTRAL INSTRUMENT FACILITY (CIF @NIPER-Ahmedabad)



CIF at NIPER-Ahmedabad serves as a state-of-the-art hub for advanced analytical and research instrumentation, dedicated to supporting cutting-edge scientific endeavors. Equipped with sophisticated instruments such as powder X-ray diffractometer, high-resolution mass spectrometers, high-resolution mass spectrometers, NMR spectrometers, chromatography systems, and advanced imaging technologies, the facility provides comprehensive analytical solutions to researchers, students, and industry professionals. The primary function of CIF is to facilitate accurate and reliable data acquisition for diverse research domains, including pharmaceutical sciences, chemical analysis, biotechnology, and material sciences. By offering access to world-class instrumentation and technical expertise, CIF fosters innovation, enhances interdisciplinary research, and strengthens collaborations across academia and industry. For more information visit our CIF portal.

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Editor-in-Chief, THE RECAP (Official Newsletter of NIPER-Ahmedabad)
National Institute of Pharmaceutical Education and Research-Ahmedabad
at Gandhinagar - 382 355, Gujarat, India.

✉ registrar@niperahm.ac.in | 🌐 www.niperahm.ac.in