

Delhi Pharmaceutical Sciences & Research University
(Established under Act 07 of 2008, Govt. of NCT of Delhi)
Sec-III, Pushp Vihar, MB Road, New Delhi – 110017

RESEARCH AGENDA: OVERVIEW
DPSR University envisions a comprehensive, interdisciplinary research framework that integrates Pharmaceutical Sciences, Physiotherapy, and Management to tackle pressing health issues. This overview emphasizes translational research, technological innovation, and sustainable practices to enhance human health and well-being, particularly in the context of non-communicable diseases, rehabilitation, and health systems.
THEMATIC RESEARCH AREAS & OBJECTIVES
1. Pharmaceutical Sciences Develop novel, safe, and effective pharmacological interventions for chronic and complex diseases through innovation in drug discovery, delivery, and sustainable pharmaceutical sciences. Objectives: A. Develop preventive and therapeutic strategies for: <ul style="list-style-type: none">• Metabolic disorders and their secondary complications (e.g., cardiovascular disease, neuropathy, nephropathy)• NAFLD / MASLD through metabolic modulation and hepatoprotective agents• Cancers, targeting pathways in breast, liver, lung, and colorectal cancers B. Investigate and design advanced drug delivery systems for: <ul style="list-style-type: none">• Oral, transdermal, injectable, and targeted delivery mechanisms• Enhancing bioavailability, controlled release, and site-specific drug action• Optimization of Pharmacokinetics and Pharmacodynamics in disease-specific models C. Explore natural product-based drug discovery: <ul style="list-style-type: none">• Phytomolecules and phyto-pharmaceuticals as leads for therapeutic development• Utilization of green chemistry in drug synthesis to minimize toxicity and environmental impact D. Examine genomic, proteomic, Lipidomic and microbiome approaches to develop precision medicine <ul style="list-style-type: none">• Genetic profiling to predict drug response and adverse effects• Tailored therapies for precision medicine in metabolic and oncological conditions
2. Physiotherapy Promote recovery, functional independence, and performance optimization through evidence-based, technology-driven rehabilitation strategies. Objectives: A. Investigate the impact of exercise and dietary interventions on gut microbiota: <ul style="list-style-type: none">• Influence of exercise regimens and macronutrient intake on microbiome diversity• Correlation with immune function, inflammation, and recovery in athletes B. Develop AI-assisted diagnostic and rehabilitation tools: <ul style="list-style-type: none">• Machine learning models for early detection of sports injuries• Sensor-based and mobile health tools for real-time physiotherapy guidance C. Evaluate physiotherapy interventions in different populations: <ul style="list-style-type: none">• Impact of physiotherapy on neurological, musculoskeletal, and cardiopulmonary disorders• Custom protocols for geriatric, paediatric, and chronic care populations D. Study integrative physiotherapy models: <ul style="list-style-type: none">• Incorporation of yoga, mindfulness, and breathing exercises in rehabilitation programs• Psychophysiological benefits in stress-related and chronic pain disorders
3. Management (Pharma Management & Public Health) Strengthen health systems, empower communities, and promote health equity through applied research in public health and environmental health. Objectives: A. Conduct socioeconomic and environmental health assessments: <ul style="list-style-type: none">• Health impact of urbanization, air and water pollution, climate change, and occupational hazards• Health disparities across income groups, gender, and geography B. Design community-based health and environmental awareness programs:

<ul style="list-style-type: none"> • Campaigns for hygiene, nutrition, vaccination, and lifestyle diseases • School and workplace-based awareness modules <p>C. Evaluate the effectiveness of public health interventions:</p> <ul style="list-style-type: none"> • Use of digital tools to assess health behavior change and outcomes • Implementation and assessment of community empowerment strategies <p>D. Promote One Health initiatives:</p> <ul style="list-style-type: none"> • Integration of human, animal, and environmental health • Prevention strategies for zoonotic and vector-borne diseases <p>E. Applying decision science models in healthcare</p> <ul style="list-style-type: none"> • Optimizing resource allocation using decision science models • Clinical decision support systems • Health economic evaluations • Supply chain management in pharmaceutical industry • Regulatory Affairs and policy analysis • Pharmaceutical market analysis
<p>RESEARCH HYPOTHESES</p> <p>Although not exhaustive, the research directions are guided by the following broad hypotheses:</p> <p>Pharmaceutical Sciences</p> <ul style="list-style-type: none"> • Novel phytochemical and green chemistry-derived formulations provide effective, affordable, and low-toxicity treatments for NAFLD, cancer, cardiometabolic diseases, neurodegenerative disorders, wounds, and pain. • Advanced drug delivery systems will significantly improve patient outcomes by enhancing bioavailability, targeting efficiency, and compliance. <p>Physiotherapy</p> <ul style="list-style-type: none"> • Tailored exercise and nutrition programs positively modulate gut microbiota, improving athletic recovery, inflammation, and immune regulation. • AI-based physiotherapy tools will outperform traditional rehabilitation approaches in terms of speed, accuracy, and personalized care. <p>Management (Pharma Management & Public Health)</p> <ul style="list-style-type: none"> • Community-based, environmentally conscious public health interventions will result in measurable improvements in disease awareness, prevention behavior, and local health outcomes. • Addressing socioeconomic and environmental determinants of health will lead to sustainable health equity and system resilience.
<p>KEY RESEARCH ASSAYS</p> <p>Analytical Techniques</p> <ul style="list-style-type: none"> • Method Development and Validation: API and formulation analysis using UV spectrophotometry, HPLC, GC-MS, and LC-MS. • Chromatographic Techniques: Column chromatography, UPLC, HPTLC, UFLC, and LC-MS-based metabolomics. • Impurity Profiling: Comprehensive analysis of APIs and pharmaceutical formulations for impurities. <p>Computational Studies</p> <ul style="list-style-type: none"> • In-Silico Modelling: ADMET profiling, network pharmacology, molecular docking, and molecular dynamics simulations. <p>Pharmacognosy and Natural Product Research</p> <ul style="list-style-type: none"> • Standardization and Characterization: Analysis of crude drugs and herbal extracts. • Phytopharmaceutical Research: Isolation and characterization of phytomolecules using classical techniques. • TLC Autobiography: Detection of bioactive compounds through TLC-based bioautographic methods. <p>Preclinical Pharmacological Studies</p> <ul style="list-style-type: none"> • Evaluation of pharmacological activities such as: Anti-inflammatory, Anti-anxiety, Anti-ulcer efficacy in preclinical models <p>Bioanalytical Techniques</p>

- Bioactive Characterization: Utilizing GC-MS and LC-MS for compound profiling
- Metabolomics: Profiling using LC-MS/MS and GC-MS
- Proteomics and Transcriptomics
- Mitochondrial Function Studies

Formulation and Development

- Preformulation studies
- In vitro formulation characterization studies (for conventional solid dosage forms and novel drug delivery systems)
- In situ characterization assay (qualitative and quantitative)
- In vivo Bio imaging assay (qualitative and quantitative)

Nanotechnology and Drug Delivery

- Nanoformulations: Development of amorphous dosage forms, nanofibers, exosomes, buccal films, and silica nanoparticles.
- Targeted Therapeutics: Research on antibody-drug conjugates and siRNA delivery systems.

Disease-Focused Research Ongoing research and assays in:

- Metabolic syndrome-associated cardiovascular disorders
- Parkinson's disease
- Cancer
- Malaria
- Inflammatory bowel disease (IBD)
- Central nervous system (CNS) disorders

Analytical and Bioanalytical Method Development

- Freeze-Drying (Lyophilization) Cycle Development
- Pharmacokinetic Studies: Drug absorption, distribution, metabolism, and elimination (ADME) profiling.

Microbiome and Genomics Research

- Metagenomics: 16S rRNA gene sequencing and microbiome profiling.
- Whole Genome Sequencing: Identification of antimicrobial resistance (AMR) and virulence genes.

Biomarker and Gene Expression Studies

- Cytokine/Biomarker Quantification: ELISA and multiplex bead-based assays.
- Gene and Protein Expression: Western blotting, immunohistochemistry, and qRT-PCR.

AMR Research

- AMR Gene Detection: PCR-based methods for AMR gene identification.
- Antibiotic Susceptibility Testing: MIC determination and biofilm formation assays.

Histopathology and Tissue Analysis

- Liver Tissue Studies: Histological scoring in non-alcoholic fatty liver disease (NAFLD/MASLD) models.

KEY DELIVERABLES

Pharmaceutical Sciences

- Development of Novel Drug Formulations and Patentable Innovations
- Advanced Drug Delivery Systems with Enhanced Bioavailability
- Curated Databases of Phyto-Pharmaceutical Compounds
- Comprehensive Research Publications and Preclinical Trial Data
- Target Identification and Validation
- Use of omics technologies (genomics, proteomics, metabolomics) for novel target discovery
- Integration of systems biology and bioinformatics for disease-pathway mapping

Management (Pharma Management & Public Health)

- Environmental health impact reports
- Community empowerment toolkits
- Policy briefs and behavior change models
- Educational materials and mHealth apps.

Physiotherapy

- AI-enabled injury diagnosis tools
- Microbiota-exercise interaction studies
- Clinical guidelines for rehabilitation
- Protocols for integrative physiotherapy

<ul style="list-style-type: none"> • Mechanism-Based Drug Screening 	
EXPANSION AREAS	
To position DPSR University as a leader in interdisciplinary health research, the following additional areas may be integrated:	
Nutraceuticals and Functional Food Innovation	
<ul style="list-style-type: none"> • Development of health-promoting foods for NCD prevention • Clinical validation of dietary supplements 	
Translational and Implementation Research	
<ul style="list-style-type: none"> • Bridging the gap between lab discoveries and real-world application • Pilots and scale-up models for public health programs 	
Strategic Impact	
<ul style="list-style-type: none"> • Strengthening interdisciplinary collaboration across departments • Advancing India's contributions to global health research • Promoting innovation and entrepreneurship through patentable and marketable products • Enhancing community health and capacity building in underserved populations 	

RESEARCH FACILITIES @DPSR UNIVERSITY		
DPSR University envisions a comprehensive, interdisciplinary research framework that integrates Pharmaceutical Sciences, Physiotherapy, and Management to tackle pressing health issues. This overview emphasizes translational research, technological innovation, and sustainable practices to enhance human health and well-being, particularly in the context of non-communicable diseases, rehabilitation, and health systems.		
CENTRE FOR PRECISION MEDICINE AND PHARMACY		
<ul style="list-style-type: none"> • Next generation sequencer • Real time-PCR • PCR • Electrophoresis (horizontal and vertical) 	<ul style="list-style-type: none"> • Refrigerated centrifuge • Fluorescence microscope • Gel doc • Biosafety cabinet • Biochemistry analysers 	<ul style="list-style-type: none"> • -80 and -20 deep freezer • pH meter • Autoclave • Hot plate
DPSRU-DSIR-CRTDH (Centre for Advanced Formulation Technology, CAFT)		
<ul style="list-style-type: none"> • LC-MS/MS • In vivo animal imaging IVIS • Raman Spectroscopy* 		
DST FIST (Pharmaceutics)- Dermal Technology Facility		
<ul style="list-style-type: none"> • Particle size analyser[#] • Scanning electron microscope (SEM)[#] • X-ray Diffractometer[#] 		
BIRAC's BioNEST Centre		
<ul style="list-style-type: none"> • High Performance TLC • Trinocular microscope • Autoclave Steam Sterilizer • Rheometer • Lyophilizer • Mini Spray Dryer • Fluid Bed Granulator • Extraction System 	<ul style="list-style-type: none"> • HPLC • Prep-HPLC • Laminar Air Flow • Magnetic Stirrer with Hot Plate • Electrospinning & rotary evaporator • Benchtop Microfluidizer 	<ul style="list-style-type: none"> • Bath Sonicator • Homogenizer • Digital Balance • Probe Sonicator • Moisture Balance • Extruder Spheronizer • Rotary Evaporator
PHARMACOLOGY, BIOTECHNOLOGY & TOXICOLOGY UNIT		
<ul style="list-style-type: none"> • Semi-automatic Biochemistry Analyzer • Weight drop Brain Injury 	<ul style="list-style-type: none"> • Deep freezer • Colorimeter • Digital Electro Convulsion Meter 	<ul style="list-style-type: none"> • Gel Electrophoresis (Vertical & Horizontal) • Infrared Actophotometer and Hole Board Test Apparatus

<ul style="list-style-type: none"> • Inverted Microscope with Camera • CUP processing with GPU Acceleration Dell • UV Spectrophotometer • Multimode Spectrophotometer • Recording Sherrington drum System • Analgesia Meter (Eddys hot plate type) • Nanodrop 	<ul style="list-style-type: none"> • Digital Plethysmometer • Digital Telethermometry • Histopathology tissue analyser • Thermal Cycler (PCR Machine) • Ultrasonic Tissue Homogeniser (CPX 130 PB) • Van Frey Hair Set (Manual) • FST, L&D Apparatus as per International Standards • Microscope with Camera • Gel-Doc-Go (Imaging System) 	<ul style="list-style-type: none"> • Microprocessor Colony Counter • Neurobehavioral Video Tracking System for Rats and Mice with EPM; Y-Maze; Radial Maze; TST, • Semi-automatic tissue microtome & tissue embedding system
--	---	---

PHARMACEUTICS/ PHARMACEUTICAL CHEMISTRY/ ANALYSIS/ PHARMACOGNOSY AND PHYTOCHEMISTRY

<ul style="list-style-type: none"> • Differential scanning calorimeter • Probe Ultrasonicator • Moisture Analyser • Multicolor fluorescence Imaging system • FTIR • Microcentrifuge • Flame photometer • Bio Safety Cabinet • Permeability Cup • Lipstick Mould • Dissolution apparatus (Type I and II) • Disintegration Apparatus • Bulk Density Apparatus • Hardness Tester • Friabilator Table punching machine (16 station) • Tablet coating machine • Microfluidizer • Hot melt extruder with 3D PRINTER • Electro Spin Machine 	<ul style="list-style-type: none"> • Particle Size Analyzer • Lyophilizer • HPLC with PDA Detector • Atomic Absorption Spectrometer • FT-IR (ECO-ATR) • UV Spectrophotometer • Digital Turbidity Meter • Digital Polarimeter • Visual Melting Range Apparatus • State-of-art Plant Tissue Culture Facility • GC-MS • UPLC • Flash Chromatograph • Microwave Extractor • Autoclave • UV-Vis Spectrophotometer • Microtome • Franz diffusion cell • Muffle furnace
---	---

PHYSIOTHERAPY

<ul style="list-style-type: none"> • Body Impedance analyser • Resuscitation kit • Postural drainage table • Simulation ICU setup • Digital Bicycle Ergometer • Pulmonary function testing software and gadgets 	<ul style="list-style-type: none"> • Energy Consumption analyzer • Suprainductive System • Isokinetic Dynamometry • Transcutaneous direct current stimulation • Pediatric Rehab Unit • Skin fold calliper
---	---

MANAGEMENT (PHARMA MANAGEMENT & PUBLIC HEALTH)

#Subscriptions to scientific databases and policy documents. A dedicated community health facility for offering individual and group counselling services on physical and mental health and serving as a base for planning, conducting large-scale community-based health surveys across urban and rural settings, including slum and underserved populations.

#Expected within 3 months

*Expected within 6 months