دانشگاه علوم پزشکی و خدمات بهداشتی درمانی اصفهان

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Research Priorities in Burn Injury, Wound Healing, and Reconstruction Focusing on Multidisciplinary Team

Research Focus اولویت‌های تحقیقاتی پیشنهادی
1. Modern & Smart Wound Dressings • **Advanced hydrogels (synthetic, natural, hybrid)** — exploring stimuli-responsive, self-healing, antimicrobial, and growth-factor-releasing properties • **Sensor-embedded "smart" dressings** — capable of real-time monitoring (pH, temperature, pressure) and on-demand drug delivery
2. Precision & Theranostic Modalities • **Theranostic dressings** combining diagnostics (e.g. pH/prompt infection color change) with therapeutic release **Biomarker-guided care** leveraging multi-omics and single-cell analysis to tailor interventions
3. Tissue Engineering & Cell-Based Therapies • **Combined keratinocyte + fibroblast skin substitutes** shown to accelerate healing and reduce scarring • **Stem cell therapies** (e.g., BM-MSCs) for full-thickness burns—require larger RCTs
4. Diagnostic & Predictive Technologies • **Non-invasive burn-depth tools:** laser Doppler imaging, thermography, OCT, photoacoustic, hyperspectral imaging • **AI-driven wound assessment:** image segmentation/classification by deep learning; predictive analytics for healing trajectories
5. Physical & Adjunct Therapies • **Negative Pressure Wound Therapy (NPWT)**—enhances granulation and graft uptake • **Hyperbaric Oxygen Therapy (HBOT)**—promising, but high-quality trials needed • **Cold atmospheric plasma (CAP)**—antimicrobial effects under clinical evaluation
6. Biofabrication & Nanotechnology • **Nanoparticle-infused dressings** (Ag, ZnO, chitosan)—enhanced antimicrobial efficacy, reduced scarring • **3D-printed/ electrospun biosensors**—e.g., nanodiamond-silk thermal sensors for infection detection

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7. Scar Prevention & Remodeling • **Antifibrotic agents** (e.g., pirfenidone, retinoids) to reduce hypertrophic scars—moving from preclinical to trials • **Bioengineered full-thickness skin substitutes** incorporating adnexal structures and immune elements
8. Psychological, Social & Rehabilitation Focus • **Psychosocial adjustment strategies**—CBT for scarring, VR for pain/anxiety; cross-cultural approaches in post-burn recovery • **Pre-hospital & follow-up care models**—evaluating self-treatment/traditional medicine use post-discharge
9. Health Systems & Policy • **Standardized outcome metrics** for burn depth, infection, closure, scars—aligned with ABA and FDA standards • **Multidisciplinary care pathways**—evaluating cost-effectiveness and care integration from pre-hospital to ICU rehab
10. Data Infrastructure & AI-Enabled Analytics • **Digital wound mapping tools** (e.g., Wound Flow) for objective tracking • **AI-based predictive platforms**—using institutional, imaging, biomarker data to forecast healing and complications