

BODYPAINING ON MANNEQUINS: STUDYING TOPANATOMICAL ANATOMY.

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Background:

Mastering topographic (regional) anatomy requires translating three-dimensional spatial relationships, fascial boundaries, and neurovascular trajectories into clinical practice. While cadaveric dissection remains a traditional benchmark, reduced access, high maintenance, and modern curricular shifts have accelerated interest in alternative pedagogical tools. Bodypainting—the schematic projection of underlying structures onto a surface—is well-established as a cost-effective, active-learning modality that enhances surface anatomy comprehension, active retention, and tactile palpation skills. Recent advancements have expanded bodypainting beyond live peer models to include synthetic physical mannequins (such as ultrasound phantoms) and interactive virtual 3D ecosystems. Bodypainting is also used in real clinical practice.

Objective:

This narrative review synthesizes current literature on the application of bodypainting across physical synthetic mannequins and virtual platforms, evaluating how this dual-modality framework enhances topographic anatomy acquisition, spatial retention, and procedural orientation.

Key Findings:

- **Physical Bodypainting (Synthetic & Phantom Mannequins):** Literature highlights that applying tactile markings and color-coded pathways directly onto physical models leverages cognitive load theory via multisensory integration (kinesthetic, visual, tactile). It establishes crucial haptic feedback, aiding learners in mapping superficial landmarks to deeper target structures—a vital competency for palpation, surface projection, and needle-to-target alignment in image-guided procedures.
- **Virtual Bodypainting (3D Digital Platforms):** Digital annotation, dynamic multi-layer texturing, and virtual plane-slicing (e.g., Anatomage, Sectra, 3D software ecosystems) overcome the physical limitation of opacity. Virtual platforms allow learners to isolate fascial planes, perform non-destructive volumetric sectioning, and correlate surface landmarks directly with cross-sectional imaging (CT/MRI).
- **Synergistic Dual-Modality Impact:** Review of comparative educational outcomes indicates that combining physical surface mapping with digital multi-layer rendering bridges the gap between external landmarking and internal 3D architecture, resulting in superior cross-sectional depth perception compared to either modality used in isolation.
- **In Clinical Practice:** Body painting helps teach and visualize surface anatomy before performing various peripheral nerve blocks, including scalp blocks, superficial cervical plexus blocks, brachial plexus blocks, blocks at the elbow and wrist, paravertebral and intercostal blocks, truncal blocks, lower extremity blocks, and foot blocks. While primarily used as an educational tool, anatomical surface mapping can also assist during nerve stimulation-guided blocks; however, it is an **optional adjunct**, not a mandatory requirement.

Conclusions & Educational Implications:

Integrating body painting across both physical human models and virtual platforms offers a highly complementary pedagogical strategy. Physical models provide the tactile and spatial grounding necessary for surface anatomical projection, while digital platforms deliver the volumetric transparency required for deep topographic comprehension. Medical curricula and simulation centers can leverage this dual-modality approach to optimize active learning and long-term knowledge retention in regional anesthesia and surface anatomy. Furthermore, body painting serves as a valuable practical tool for enhancing landmark identification in daily clinical practice.

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