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Role of Textiles in Gastroenterology

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Textiles play a multifaceted role in gastroenterology, ranging from traditional hygiene and infection control in clinical settings to innovative applications in diagnostics and therapeutic devices. Advanced textile materials are increasingly being integrated into medical practices to enhance patient comfort, safety, and recovery.

Here is an overview of the role of textiles in gastroenterology:

Diagnostic and Monitoring Applications (Smart Textiles)

Electrogastrogram (EGG) Electrodes

Conductive textiles, such as those incorporating stainless steel fibers or Copper-Nickel-plated nylon, are used to create non-invasive, wearable electrodes. These electrodes are placed on the abdomen to record EGG signals, which are associated with stomach electrical activity and digestive health.

Motility Monitoring

Research is ongoing into implantable and biodegradable smart textiles designed for continuous, long-term monitoring of gastrointestinal motility.

Smart Bandages/Capsules

Wearable pads with sensors can collect clinical data, while specialized, ingestible, or biocompatible textile-based capsules are being developed to monitor internal conditions.

**Surgical and Therapeutic Applications
Implantable Materials**

Textile structures (woven, knitted) are used as scaffolds for tissue regeneration in the digestive system.

Sutures

Specialized textile fibers (including biodegradable ones) are used for surgical suturing of internal organs.

Drug Delivery Systems

Membranes derived from polymers like chitosan, which have antibacterial and biocompatible properties, can be used for targeted drug delivery in the gastrointestinal tract.

Infection Control and Hygiene

Antimicrobial Textiles

In gastrointestinal wards, antimicrobial-treated fabrics (e.g., using silver or copper nanoparticles) are essential for reducing the risk of healthcare-associated infections (HAIs).

Hygiene Products

Specialized textile-based products, including wipes and diapers with deodorant properties, are used for patient care.

Research in Gastrointestinal Pathology

Textile Foreign Bodies

Studies have highlighted that accidental ingestion of textiles can cause severe gastrointestinal obstruction, necrosis, and perforation in pets, requiring emergency intervention.

Microfiber Contamination

Research into the ingestion of microfiber pollutants has found their presence in the gastrointestinal tracts of marine life, pointing to potential risks for human health.

Material Innovation

Biodegradable Polymers

Researchers are developing bio-compatible and bio-absorbable materials (e.g., polylactic acid) that can be used for internal surgical supports and scaffolds for tissue engineering, including liver or bowel tissues.

Chitosan-based Materials

These are used for wound care and are being studied for their potential in treating gastrointestinal wounds due to their healing properties.

These applications demonstrate that textiles are no longer just for basic comfort but are critical, high-tech components of modern gastroenterological care and diagnosis.

In gastroenterology, textiles have transitioned from passive hospital supplies like linens and gowns to active components in diagnostics, treatment, and infection control.

Diagnostic Innovations

Non-invasive Monitoring

Conductive textile electrodes, made from materials like stainless-steel fibres or copper–nickel-plated nylon, are used in electrogastrography (EGG). These wearable electrodes track electrical activity in the stomach to screen for digestive abnormalities without invasive procedures.

Implantable Sensors

Biodegradable smart textiles are being developed to monitor gastrointestinal motility internally before safely absorbing into the body.

Therapeutic Applications

Localized Drug Delivery

Modified cotton gauzes act as reservoirs for common medications like ibuprofen and amoxicillin. These functionalised fabrics allow for the controlled adsorption and subsequent release of drugs, providing a topical alternative for treating infections or pain.

Smart Therapeutics

Emerging e-textiles can deliver chemical or thermal stimulation to manage post-surgical pain or enhance healing through integrated heaters and drug-releasing hydrogel layers.

Infection Control & Management

Antimicrobial Barriers

Specialized textiles treated with antimicrobial agents (e.g., silver, copper oxide, or zinc) are used for surgical gowns, drapes, and hospital linens to reduce the spread of pathogens like *Clostridium difficile*, a common cause of hospital-acquired gastrointestinal infections.

Hygiene Products

Non-woven textiles are essential in manufacturing diapers and incontinence pads, which are critical for maintaining patient hygiene and preventing skin degradation in cases of chronic gastrointestinal disorders.

Environmental and Accidental Risks

Microfiber Pollution

Synthetic textiles are a major source of microfibers that can contaminate food chains and be ingested by humans, potentially impacting human gastrointestinal health.

Ingested Foreign Bodies

In veterinary medicine, accidentally ingested textiles (e.g., clothing scraps or thread) are a significant cause of gastrointestinal obstruction, often requiring emergency surgical intervention.

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