Handbook of medical textiles
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Handbook of medical textiles

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Some of the most thrilling applications of textiles are in their medical uses. Medical textiles are located at the interfaces between technical disciplines and life sciences (see Fig. below): On the one hand, representing the technical aspect, we find textile engineering, chemistry and testing and certification; while on the other, we have life sciences like medicine, microbiology and comfort or strain (and this is by no means a complete list). All the different sciences interact and overlap with one another. New developments in one of these sciences may boost new innovations in others, too: for example, new superabsorbent, gel-forming substances invented in chemistry led to the development of new baby diapers and adult incontinence products used in medicine. Three-dimensional spacer fabrics (textile engineering) or bio-functional clothing (chemistry) were rapidly transferred into new medical products like bandages or clothing for patients with
atopic eczema, respectively. Conversely, different disciplines have their own needs, which do not always coincide. For instance, coated or laminated fabrics used in OR gowns led to a significantly higher protection level against body liquids or germs (medicine, microbiology). But the wearers quickly realised that the coating or membrane has to be breathable, i.e. water-vapour permeable, otherwise the wear comfort becomes rapidly inadequate. These various connections between all different aspects make medical textiles such a challenging but fascinating field of research.

Medical textiles can be regarded as a part of the wider category of technical textiles. Here we find links with other applications as in the use of similar materials for different purposes; for example, in the operating theatre protective textiles are used which are similar to other kinds of protective clothing such as that used for chemical, bio-hazard or foul-weather protection. Keeping with this example, new developments intended for foul-weather protective clothing, like densely woven microfibre fabrics or breathable laminated textiles, were established as OR gowns, too. As a consequence the surgeon and the other operating room staff achieved a higher level of protection plus a good wear comfort.

Medical textiles are not only a fascinating research area, but are also extremely important from the economic point of view. Medical textiles are decisive elements of the progress made in medicine, which often result in new medical textile products and vice versa. Consequently medical textiles are today an inevitable constituent of modern disease management. A strong additional impetus for the need for medical textiles is generated by the increasing number of elderly people in the populations of developed countries.

Starting from common cotton fabrics, medical textiles have shown rapid development over the last few decades. This progress affects nearly all textile sectors: New, bio-degradable fibre constituents enabled novel types of implants; recent textile machines allow for three-dimensional spacer fabrics; and silver-ion based finishes effectively reduce bacteria growth. In this way the field of medical textiles has grown extensively over the years. As a consequence, it became a difficult area to understand and to review.

This book sets out to embrace several important aspects of medical textile research, development and applications. It can be taken as a starting point for readers to familiarise themselves with medical textiles, and allows experienced readers to expand their knowledge.

The book is divided into four parts: First, the types and properties of medical textiles; second, textiles and the skin; third, textiles for hygiene; and fourth, medical textile case studies and applications. The parts are further divided into several chapters. Each chapter can be regarded as a standalone review article, written by a leading expert in his field. Authors are from universities, research organisations, industry and hospitals, reflecting the diverse nature of medical textiles. Accordingly the chapters will be of great benefit to readers from a wide variety of institutions.