Dental Science, like much of the evolution of human civilization, progresses in steps that are often the
result of the complex relationship between science, empirical knowledge, and advances in technology.
Over the years some of these have been peculiar to dentistry, but most of the time they have been part
of wider movements, associated with the driving impact of discoveries and technological development.
In the history of science there have been leaps forward linked to improvements in observation, such as
the telescope and the microscope, or in measurement with the invention of accurate time pieces. Perhaps
no development (since Aristotle laid the foundations of modern science nearly two and a half millennia
ago) has had such a far reaching and in-depth impact on scientific thinking, research and practice as the
advent of the computer. Computing has modified our perception, the sense and use and interpretation
of time and enabled scientists to perform existing procedures far faster and more accurately than ever;
it has allowed them to make a reality of things they had only dreamed of before; and perhaps of greater
consequence and more excitingly, it has often stimulated them to perceive and focus on their subject
with new eyes; to see it on a different scale from a completely different perspective.

The almost meteoric speed of improvements in hardware following Moore’s Law and the parallel
developments in software have meant that previously unimaginable amounts of computing power are
now available to scientists and practitioners in a form that can be carried around in a briefcase. The
burgeoning development of “cloud computing” currently underway means that the individual at their
practice, in the laboratory, in office or at home, will soon have the power of a mainframe computer at
their fingertips. Thus, quantitative and qualitative information can be gathered via constantly developing
resources, tools and support to create a much more realistic and detailed picture of health and disease.

Dentistry is a particularly complex and sophisticated applied science; every problem to be solved is
as unique as the individual, no two faces, two mouths or even two teeth are identical. To navigate from
observation to diagnosis and then to the most appropriate therapeutic solution in a situation with multiple
variables and degrees of freedom, the dentist has to draw on scientific knowledge from a wide range
of specialist disciplines. This knowledge has to be combined with experience and judgement and the
resulting diagnosis and treatment planning implemented in the form of therapy by means of the clinical
wisdom and manual dexterity accrued through years of training and practice. Furthermore, in many cases
the success of the final result will also depend on the dentist’s sense of colour and aesthetics.

This book amply illustrates how the use of computing related technology in dentistry has expanded
beyond statistical number crunching and information retrieval to make an imaginative and creative
contribution to almost every aspect of dental science. In some of these areas, digital technology may go
much further than enhancing current approaches and technologies and fundamentally change many of
the factors that make up the way the subject is conceived. Scientific knowledge from other areas such as
engineering and mathematics and biology can now be more easily applied to dental and oral and maxil-
lofacial problems. Computers will not only transform the way dentists will work in the near future, they
also have the potential to reformulate the ways that we think about many aspects of our continuously 
broadening and deepening medical discipline.

It is a privilege and a pleasure to write a foreword to a book that makes a significant contribution to 
the shape of things to come in dentistry. Contributions in this book illustrate the progress that has been 
made in applying computing to such diverse areas and topics as cephalometric, 3D-time, finite element 
and image analyses, 3-D reconstruction and guided surgery, modelling and shrinkage and stress of ma-
terials, intraoral registration, tissue engineering of teeth, clonogenic assays, health records, a library for 
dental biomaterials, rapid prototyping, unicode characters for human dentition and even virtual dental 
practices and environments. All of these document the creativity and persistence of dedicated scientists 
pursuing the goal of unravelling the dynamics of living structures and functions and supporting problem 
solving processes and management in oral and maxillofacial surgery, oral radiology, restorative and 
prosthetic dentistry, orthodontics, endodontics, dental implantology and practically every field of dental 
practice, research and education.

The dentist of the future will have new and powerful tools to help in the processes of diagnosis, 
analysis, calculation, prediction and treatment. Computing and its related technologies will help dentists 
to work faster, with greater knowledge and awareness of the situation they are dealing with to implement 
solutions that are more effective and have a more certain prognosis. With such a complex and multifaceted 
science however, the role of the individual practitioner in selecting, orchestrating and implementing this 
array of exciting new possibilities will be enhanced, but remain unchallenged.

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