SCORING VACCINES FOR PROBABILITY OF SUCCESS

A recent review of history of vaccination concluded that the probability of success in vaccine development is highest when protection is mediated by antibodies and antigens that have no or limited antigenic variability (1). In Figure 3, we have tried to rank the panoply of vaccines discussed in this book according to two criteria, as variables: (*i*) the type of immunity that is critical for protection and (*ii*) antigenic stability. Vaccines that have the highest probability of technical success are in the upper right quadrant, which belongs to the pathogens that can be addressed by antigens that induce an antibody-mediated protection and that are not highly variable. The risk in vaccine development increases as one moves toward the intersection of the two axes (Fig. 3). Accordingly, vaccines where T-cell immunity is critical for protection or where protective antigens are highly variable have an increased likelihood of failure during development. It is clear from Figure 3 that the majority of the successful

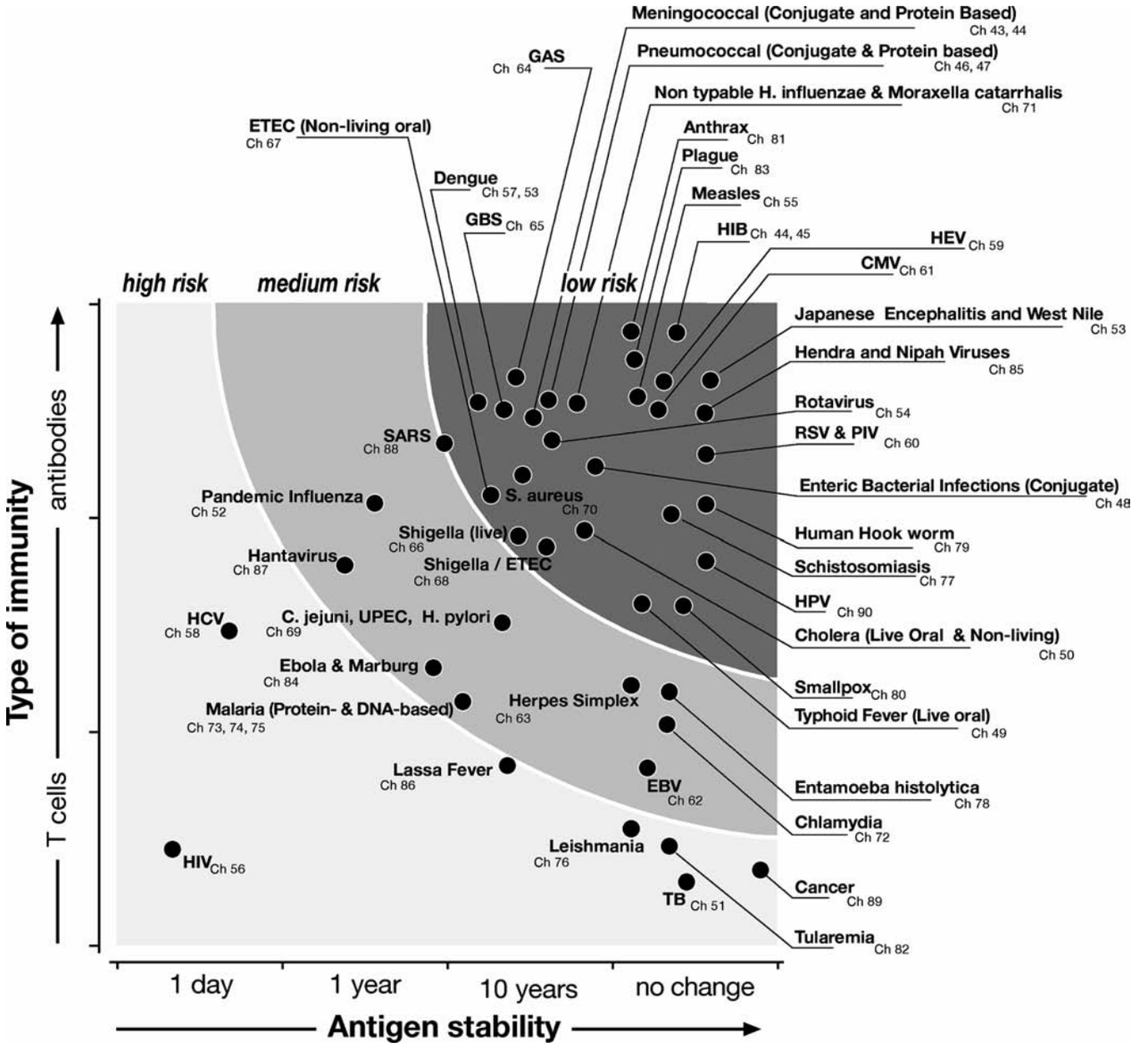

Figure 3 The new generation of vaccines discussed in the chapters of this book are plotted as a function of the type of immunity required to confer protection against the disease on the *y*-axis and the stability/variability of surface antigens of the pathogen on the *x*-axis. The probability of success of a vaccine during development is highest when protection is mediated by antibodies and when antigens have no or only limited antigenic variability (1). The upper right quadrant represents vaccines with a low risk of failure during the development process. Moving down and left, we move through zones of medium and high risk of failure, with more difficult challenges when antigens are extremely variable and/or protection relies only on T cell–mediated immunity.