Anatomical Pathology

NORMAN F. WEATHERLY

1. INTRODUCTION

The anatomical pathology, i.e., the gross and microscopic study of the effects of *Trichinella* infection on the organs and tissues of the host, is the subject of this chapter. The material presented is limited primarily to those studies that used small laboratory animals and conventional histological techniques. Ultrastructural changes, as detected by various electron-microscopic techniques, are described elsewhere.

The mouse and the rat have been by far the most popular animals for the study of experimental trichinosis. Guinea pigs, rabbits, and hamsters have also been used with some frequency. In addition, there are isolated reports in the literature on the use of young chickens, small pigs, and wild rodents. Because most recent investigators have used the mouse for both gross and microscopic study of infected organs and tissues, the histological changes in this animal species will be detailed, with studies in other experimental animals being compared to those in the mouse.

The anatomical changes produced by the preadults and adults in the gastrointestinal tract will be discussed first. Following this, the changes associated with invasion of striated muscle cells by larvae will be characterized. The last section of this chapter will deal with the pathological anatomy produced by invasive larvae in various organs, such as heart, liver, spleen, eyes, and central nervous system.

In reading this discussion of the histopathological changes in the...
tissues and organs of experimental animals, the reader should keep in mind that although the basic mechanisms of pathogenesis and host defense response to infectious agents such as bacteria, protozoa, and helminths are similar, *Trichinella* does have certain peculiarities that may make accurate interpretation of histopathological observations difficult. For example, compared to bacteria and protozoa, *T. spiralis* is a relatively large organism, has a relatively resistant outer cuticle, and has, at certain phases of its life, migrational abilities. Different antigenic compositions and different methods of feeding of preadult, adult, newborn larvae, and encysted larvae—in other words, factors that affect the nature of disease—are not well understood. Thus, the conventional understanding of the usual modes of immunoglobulin action, inflammation, complement activity, and cellular as well as cell-mediated immunity may not be appropriate when one attempts to unravel the specific mechanism of pathogenesis of an infection such as that caused by *T. spiralis*. For example, large amounts of immunoglobulins are produced by the host in response to infection with *T. spiralis*, yet the protective function of these immunoglobulins is in question. Rather than being beneficial to the host, they may contribute to the pathogenesis by causing immune-complex disorders. Also, the relatively recent discovery of certain immunosuppressive properties of *T. spiralis* has yet to be fully investigated.

Host factors are also important determinants of disease—numerous examples exist in which an infective agent causes little or no morbidity in one species of animal, yet leads to severe illness or death in another; individual variation exists within the same species, as well as among strains. In addition, it is imperative that this interaction between the two organisms not be viewed as a static relationship but, rather, as one that is constantly changing due to various parasite and host factors. Host factors known to influence the degree of morbidity caused by *T. spiralis* are age, sex, diet, general nutritional status, genetics, prior infection, and physiological stressful conditions such as pregnancy and lactation.

Finally, there are differences in virulence among various strains and isolates of *T. spiralis*. This, and the factors discussed above relating to both the host and the parasite, probably account for the various inconsistencies and discrepancies that have characterized the literature on the pathogenesis and host response to infection with *T. spiralis*.

2. GASTROINTESTINAL TRACT

This section deals with the morbidity associated with the development of the adult parasite within the tissues of the gastrointestinal tract.