Physiology and Pathophysiology of Prostate Infection

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Introduction

The accessory glands of the male genital tract, including the prostate gland, show a wide range of variation and difference in the various species, above all in the anatomy, biochemistry, and function of these organs. For example, while the seminal vesicles are very large, prominent organs, particularly in humans and the rat, these organs do not exist in the cat or dog. However, the prostate gland is found in all mammals, although different species vary greatly in prostate anatomy, biochemistry, and secretion. Prostate pathology also differs in the development of benign as well as malignant changes, and naturally in the occurrence of inflammatory changes in the prostate region. It should be mentioned here that the rat prostate gland is anatomically divided into several distinct lobes, namely dorsal, ventral, and lateral lobes, with these carrying out separate functions. In contrast, the human prostate gland is not divided into separate lobes but into zones. Altogether, however, it has the appearance of an anatomically uniform gland (Fig. 1).

Not only does the anatomy of the prostate gland vary strongly from species to species but also its biochemistry, namely that which the prostate secretes or contributes to the ejaculate (Zanefeld and Tauber 1981). For example, the boar ejaculates a volume of approximately 250 ml, the stud 70 ml, the dog 9 ml, the bull 4 ml, the human 3 ml, and the ram 1 ml. A difference also exists in ejaculate

Fig. 1. Schematic representation of the division of the prostate into zones: T, transitional zone; P, peripheral zone; U, periurethral region; S, sphincter region. (From McNeal 1981, with permission)
behavior. Human ejaculate first clumps and then dissolves, while in many animals the ejaculate forms a solid lump and is ejaculated in this form. Not only the ejaculate quantity but also its biochemical composition as well as the secretion of proteins and ions differs greatly from species to species (Cofley 1985).

It should be mentioned that among mammals no organ possesses such a wide range of variation in its anatomy and/or biochemistry as does the tissue of the accessory genital glands and, to repeat, this includes the prostate gland (Isaacs et al. 1981). A certain mysticism surrounds the prostate gland and the other accessory genital glands, with great variety and different functions, so that the question must be posed as to whether all this is really necessary – does it make any biological sense? What is the reason for these considerable differences? Are they really necessary for reproduction, or does this diversity play a decisive role in protecting the genital tract from invasion of pathogenic germs? Many things can be interpreted into this diversification. But in all certainty it must be said that there are some things that we simply do not yet understand, and that we will understand only when we learn more about the function and the molecular biologic rules according to which these glands work. We will then have a much better insight than we now have (Niemi et al. 1963; O'Connor and Sinha 1985).

Transport of Biologic Components into and out of the Male Accessory Sex Glands

What biologic material is transported from the serum into the seminal fluid and vice versa? Our knowledge of the transport and exchange of ions, therapeutic substances, or natural products in the secretion of the accessory glands of the male genital apparatus is very limited. It is, however, very important that we especially know more about the transport mechanism of therapeutic substances into these accessory glands particularly to be able to administer the correct therapy for acute or chronic inflammations as well as to achieve effective levels of the individual substances in the target organs (Fair et al. 1973; Fair and Wehner 1979; Fair and Parrish 1981; Stamey et al. 1968).

Androgenic Mechanism of the Prostate Gland

The most important androgen in the human male is testosterone, and as soon as testosterone has reached the prostate cell by diffusion, it is metabolized into other steroids by a series of enzymatic processes. More than 75% of the testosterone is converted into the most important intraprostatic androgen, namely dihydrotestosterone (Bruchovsky and Wilson 1968; Bruchovsky and