# A STUDY IN RENAL SENESCENCE*

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In a study of the kidneys four years ago I thought I noticed a fact which I had never heard mentioned, namely, that as age advanced there was a thickening of the interstitial tissue at the apex or papillary end of the pyramids and that this thickening was reasonably uniform. Further study on one hundred and fifty kidneys from individuals of all ages dying from many different diseases (though the majority died from tuberculosis of the lungs) added confirmation. I then showed a number of unselected specimens, the identification of which was withheld, to Dr. McFarland, who was so successful in determining the ages of the patients by the criterion mentioned that I have thought it worth while to prepare the following notes for publication.

The condition is practically one for demonstration rather than for description, yet the specimens shown at the time of the reading of the paper might be described as follows: The specimen from the child one month old showed through a ⅔ lens the tubules at the apex of the pyramids practically in juxtaposition with so little interstitial tissue between them that it was practically invisible; in the 9-year old specimen there were one or two fine lines of interstitial tissue between the tubules; in the 27-year-old specimen three or four lines; in the 35-year-old specimen five or six; in the 69-year-old

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specimen eight to ten lines and in the 99-year-old specimen ten to twenty lines.

Moreover, the study revealed that this thickening of the interstitial tissue was not dependent on the accompanying pathologic condition of the kidney, but occurred apparently only as a result of age. All kinds of pathologic conditions were found in the one hundred and fifty kidneys studied, namely, cloudy swelling, acute parenchymatous nephritis, chronic parenchymatous nephritis, focal interstitial nephritis, the various kinds of general interstitial nephritis, amyloid degeneration, pyelonephritis, etc. It was found that pyelonephritis and hydronephrosis injured the pyramids and increased the interstitial tissue in them to such an extent as definitely to obscure the comparatively slight increase due to age; in these cases, therefore, the age could not be told from the appearance.

In addition it was found that a general or a marked focal interstitial condition which is commonly only studied and described from the appearances in the cortex affected also the pyramids and hence increased the interstitial condition at the apex of the pyramids so that the thickening at this point did not correspond exactly with the age. Comparison of many such kidneys, however, showed that it was not difficult to learn from the condition in the cortex how much of the thickening at the apex of the pyramids was to be attributed to the pathologic condition and how much to age. In other words though interstitial nephritis modifies the amount of interstitial thickening at the apex of the pyramids, this modification can be recognized and taken into account. In regard to the question which naturally arises as to how reliable is the differentiation of age from this thickening of the interstitial tissue, I would say that it is almost as reliable as the appearance of the face; though we can generally give a pretty good idea of the age of an individual by looking at him we are sometimes mistaken in middle life to the extent of ten or even fif-

teen years and in old age rarely even to the extent of twenty years.

In deciding the age of the individual from the thickening of the interstitial tissue at the apex of the pyramids the following precautions should be taken: First, the apex of the pyramid should be in view. Sometimes a cross-section of the kidney is made in such a way that we see a long stretch of pyramid but instead of one we are looking at two pyramids end to end; in other words, a specimen may be cut across two pyramids in such a way that the apical portion of one pyramid will run into the apical portion of the other so as to make the end of the specimen actually near the second cortex though the second cortex is not in view. Second, edema must be differentiated from thickening of the interstitial tissue. Third, the amount of interstitial tissue should be estimated, not from one single location, but from several fields of a ⅔ lens. Fourth, interstitial nephritis increases the amount of interstitial tissue at the apex of the pyramid and must be accounted for. Fifth, pyelonephritis and hydronephrosis obscure completely the thickening due to age.

## SUMMARY

1. There is a gradual increase in the amount of interstitial tissue at the apex of the renal pyramids so uniform with advancing age that the age of the individual is evident from the amount of interstitial tissue found.

2. This relation of the amount of interstitial tissue to the age is lost in cases of pyelonephritis and hydronephrosis; and modified by interstitial nephritis, though this modification can be accounted for, so that the age remains evident.

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