females, following oral administration of chloroform.[1] Morphologic differences in the kidneys of mice have been described for normal males, normal females, castrated males, testosterone-treated castrated males[2, 3, 4] and for testosterone-treated females.[5] The present report deals with the finding of a correlation between kidney morphology and susceptibility to chloroform necrosis.

Sex differences in the morphology of the mouse kidney have been clearly established only recently by Crabtree[2] who showed that the parietal layer of most of the Bowman's capsules in female mice is composed entirely of squamous cells, while in most of the capsules in male mice it is composed partly or entirely of cuboidal cells similar to those of the proximal convoluted tubules. Crabtree has subsequently shown that the per cent. of capsules having cuboidal cells does not reach a high value in the male until sexual maturity,[3] that in castrated male mice this value remains low and closely approaches that of normal female mice, but that when castrated male mice are treated with testosterone this value returns to near that of normal males.[4] Selye[5] had earlier shown that treatment of female mice with large doses of testosterone resulted in increase of kidney weight, the presence of cuboidal cells lining Bowman's capsules and enlargement of cells of the convoluted tubules of the kidneys. Wicks[6] has found that persistent and marked proteinuria is present in males, while a trace or none is found in females of several inbred strains of mice. He observed that the proteinuria gradually decreased following castration.

In our experiment four groups of strain A mice were used: normal females, normal males, castrated males and testosterone-treated castrated males. Five animals were used in each of the four groups. Castration was performed under ether anesthesia through a mid-line abdominal incision when the males were 5 weeks of age. Treatment with testosterone propionate was begun at 10 weeks of age, 1 mg in 0.25 cc of sesame oil being injected subcutaneously every other day for a total of 10 injections. At 13 weeks of age all animals were given 0.005 cc of a 12 per cent. solution of chloroform in olive oil per gram body weight by stomach tube. Twenty-four hours later 2 of 5 testosterone-treated castrated males were dead and the remaining 3 and all 5 normal males were in moribund condition. All animals remaining alive 24 hours after administration of chloroform were killed. Both kidneys of all 20 mice were fixed in Zenker-formol, dehydrated in ethanol and embedded in paraffin. One kidney of each animal was sectioned transversely, and the other longitudinally. Sections were stained with hematoxylin and eosin and with Mallory's aniline blue.

All glomeruli in one section of each kidney were counted and tabulated as having squamous or cuboidal cells, as described by Crabtree. The total number of glomeruli counted in groups of five animals ranged from 976 to 1,179. The sums of the two types of glomeruli in all five animals of each group were obtained and their proportions expressed as per cent. are shown in Fig. 1.

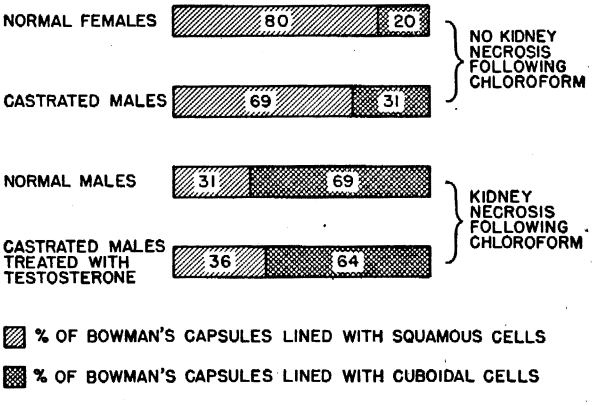

FIG. 1

There was extensive necrosis of portions of the proximal and distal convoluted tubules in normal male and in testosterone-treated castrated male mice and no necrosis in female and in castrated male mice. No necrosis was observed in Bowman's capsules or in the upper portions of the proximal convoluted tubules.

These observations with their correlations of morphologic and physiologic differences raise some interesting questions for further experimentation. However, no additional work along this line is contemplated by the authors, and the results obtained are therefore briefly reported.

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THE ACTIVITY OF PENICILLINS G AND X IN VITRO

INTRODUCTION

WELCH, Putnam, Randall and Herwick have reported[1] that *in vitro* studies show penicillin X to be

[1] A. B. Eschenbrenner, *Jour. Nat. Cancer Inst.*, 5: 251, 1945.
[2] C. Crabtree, SCIENCE, 91: 299, 1940.
[3] C. Crabtree, *Anat. Rec.*, 79: 395, 1941.
[4] C. Crabtree, *Endocrinology*, 29: 197, 1941.
[5] H. Selye, *Jour. Urol.*, 42: 637, 1939.
[6] L. F. Wicks, *Proc. Soc. Exp. Biol. and Med.*, 48: 395, 1941.

[1] H. Welch, L. E. Putnam, W. H. Randall and R. P. Herwick, *Jour. Am. Med. Asn.*, 126: 1024, 1944.

more effective than commercial penicillin against a strain of *Klebsiella pneumoniae* type A and a strain of *Bacillus cereus*. No difference in effect could be shown, however, on four strains of *Staphylococcus aureus*. The same authors[1] have shown penicillin X to be more effective in protecting mice against type I pneumococci and in the treatment of gonorrhea in humans.

This report shows the concentration of penicillin G and penicillin X in units and micrograms per ml necessary to inhibit the growth of strains of the following organisms: *Staphylococcus aureus, Bacillus subtilis,* types I, II and III pneumococci, groups A, B and D streptococci, *Erysiphelothrix rhusipathiae* and *Escherichia coli.*

Experimental: A chloroform-extracted calcium salt of penicillin, 1,050 units per mgm, was used throughout for determining the activity of penicillin G. Two crystalline sodium salts of penicillin X,[2] 846 units and 990 units per mgm, respectively, were used for comparative purposes. Sterile penicillin solutions were obtained by filtration through Seitz filters. Serial dilutions of penicillin were made with sterile A.C. or brain-heart-infusion broth (Difco). The cultures to be tested for the activity of penicillins G and X were grown in A.C. or brain-heart-infusion broth in a 37° C water bath for about 3 hours, or until they had reached the logarithmic growth phase. One milliliter of a one to ten dilution of the culture was then inoculated into 1-ml volumes of the serial dilutions of penicillin. These experimental cultures were incubated at 30° C for 18 hours. The results are recorded as the lowest concentration of penicillin G or X that prevented the visual appearance of growth at the end of 18 hours' incubation. *Results:* The first column of Table 1 shows the number of organisms in millions per ml, as indicated by plate counts, at zero time. Columns 2 and 3 show the concentration of penicillin G or X in units per ml of medium required to inhibit visible growth for a period of 18 hours' incubation at 30° C. Table 2 shows the concentration of penicillin G or X in micrograms of penicillin per ml required to inhibit the appearance of visible growth. The final columns in Tables 1 and 2 show the comparative activity of penicillins G and X, as expressed by the ratio of the units or micrograms of penicillin G to penicillin X to inhibit growth.

TABLE 1

UNITS OF PENICILLIN PER ML TO INHIBIT GROWTH

Organism	Inoculum millions/ml	Units* penicillin G	Units* penicillin X	Ratio $\frac{G}{X}$
Staphylococcus aureus— NRRL–313	1.4	.0625	.0625	1.0
Bacillus subtilis—3R9675	1.3	.0982	.0982	1.0
Pneumococcus Type I (SVI)	1.7	.03125	.0156	2.0
Pneumococcus Type II	0.7	.01225	.0050	2.4
" " III	0.5	.0121	.0050	2.4
Streptococcus Group D	0.4	4.0000	1.7000	2.4
" " B	1.0	.2030	.0664	3.0
" " A	0.6	.0176	.0063	2.8
Erysiphelothrix rhusipathiae	1.7	.1607	.0491	3.3
Escherichia coli	1.7	133.9000	46.8750	2.9

*Mean values for 7 trials carried out on different days.

TABLE 2

MICROGRAMS* OF PENICILLIN PER ML TO INHIBIT GROWTH

Organism	Penicillin G	Penicillin X	Ratio $\frac{G}{X}$
Staphylococcus aureus— NRRL–313	.040	.060	0.7
Bacillus subtilis—3R9675	.059	.098	0.6
Pneumococcus Type I (SVI)	.019	.016	1.2
" " II	.007	.005	1.4
" " III	.007	.005	1.4
Streptococcus Group D	2.400	1.700	1.4
" " B	.120	.066	1.8
" " A	.010	.006	1.7
Erysiphelothrix rhusipathiae	.097	.049	2.0
Escherichia coli	81.000	46.900	1.7

* Calculated on the basis of 1,650 units/mgm for pure penicillin G and 1,000 units/mgm for pure penicillin X.

Discussion: In agreement with Welch *et al.*[1] penicillin G and X appear equally effective on a unit basis in inhibiting the growth of *Staphylococcus aureus;* likewise, both penicillins are equally effective against the strain of *Bacillus subtilis* used. On a weight basis, however, penicillin G is more effective than penicillin X on the strains of these two organisms used in this study.

For the remaining organisms tested, penicillin X is more effective both on a unit and on a weight basis than is penicillin G in inhibiting growth *in vitro.* Depending on the organisms tested, 2 to 3 times more penicillin G than penicillin X is required on a unit basis to inhibit visible growth, while on a weight basis 1.2 to 2 times more G than X is necessary.

Summary: The data presented indicate that penicillin X is more effective than penicillin G against a number of different organisms.

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[2] The sodium salt of penicillin X used in these experiments was prepared by E. F. Williams, of the Physics Research and Testing Division of these laboratories.

THE SPECIFICITY OF THE XANTHYDROL-PYRIDINE REACTION FOR 2, 2 BIS (p-CHLOROPHENYL) 1,1,1 TRICHLOROETHANE (DDT)

STIFF and Castillo[1] reported a new sensitive colorimetric test for 2,2 bis (p-chlorophenyl) 1,1,1 trichloro-