

1943

## Abstracts

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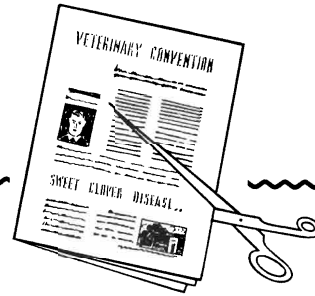
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# ABSTRACTS



**VALUE OF CARBAMIDE IN INFECTED WOUNDS.** The use of carbamide (urea) in the treatment of infected and contaminated wounds with excellent results is a clinical fact. The bacteriostatic and healing properties of urea in infected wounds is attributed to the removal of necrotic tissue by a process of chemical debridement with little effect on the normal physiologic cell and tissue functions. These experiments demonstrate the synergistic action of urea with sulfonamides. The efficacy of topical application of sulfonamides is inversely proportional to the concentration of sulfonamide inhibitors, the local concentration of the drugs, and to the degree of cellular defense in the wound.

Carbamide enhances the action of the sulfonamides in a number of ways. It removes the sulfonamide inhibitors such as necrotic tissue, pus, and tissue exudate. The degree of cellular defense is aided, since it has been shown carbamide increases the rate of formation of granulation tissue. It retards epithelization, but the treatment will have been discontinued after the wound is covered with clean granulation tissue. The carbamide, as a diluent for sulfonamides, increases the solubility of the relatively insoluble sulfonamides, makes the treatment cheaper, allows more freedom from toxicity limitations, as well as being more effective as a mixture.

The most commonly employed mixtures are as follows.

1. Carbamide 86 percent, sulfanilamide 14 percent.
2. Carbamide 80 percent, sulfanilamide

13 percent, sulfathiazole 2 percent, and pectin 5 percent.

3. Carbamide 89 percent, sulfanilamide 10 percent, and sulfathiazole 1 percent. The crystalline mixtures can readily be converted into solution, meeting any practical therapeutic indication.

Wound therapy with carbamide-sulfonamide mixtures (C.S.M.) is simple and inexpensive; results are excellent. Application as a first-aid measure is very useful in prolonging the period during which it is safe to do definitive surgery. The early treatment of fresh wounds with C. S. M. is an important factor in making possible primary suture without drainage after careful debridement. The daily use of C. S. M. in open wounds is productive of healthy granulation tissue, and excellent results are obtained even in infected wounds.

(Holder, H. G. and MacKay, E. M. 1943. Carbamide-sulfonamide mixtures in wound therapy. *Surgery*. 13(5):677-682.)

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**RENAL LESIONS CAUSED BY SULFONAMIDES.** From the administration of acetylsulfapyridine, both with and without urea, it was determined that the toxic effects of the sulfonamide drugs on the kidneys is primarily mechanical in nature. Due to the poor solubility of acetylated sulfonamides (acetylsulfapyridine in experiment), part of it is precipitated in the uriniferous tubules. The precipitates cause partial occlusion of the tubules which results in hydronephrotic

degeneration ranging from severe degeneration to necrosis of the epithelium of the involved tubules. This damaged tissue in turn serves as a matrix or core for calcium precipitation and calculus formation. The calculi may cause areas of hydronephrosis. These lesions produced in rats coincide with those produced in humans and animals.

By test tube and animal experimentation it was found that the solubility of sulfapyridine increased proportionately with the specific gravity of the urine. The possible role of urea was considered. Upon simultaneous administration of urea and acetylsulfapyridine to the rats there was no precipitate in the nephric tubules and no lesions were produced.

(Sabin, S. S., Aronberg, L. M., and Rolnick, H. C. 1943. *The nature of the renal lesion with the sulfonamides and its prevention with urea. Am. Jour. Path.* 19(2): 211-219.)

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**THE EFFECT OF WEATHER ON THE SEMEN OF BULLS.** Experimentation was conducted at the Beltsville Research Center to determine if the semen of bulls tends to degenerate during the summer months in a manner similar to that found in rams, and if so, if the degeneration is an important cause of low fertility.

Samples of semen from three beef-type Shorthorn and three milking Shorthorn bulls were studied at intervals of two weeks throughout a year. The semen was collected by means of an artificial vagina. Observations were made on motility, volume, number of sperm per cc., total number of sperm, the proportion of abnormal heads, necks, middle pieces, and tails, total abnormal spermatozoa, and the ability of the sperm to survive in storage.

Aside from sample variations the greatest effect on semen quality was due to differences between bulls. Most significant was the effect of season on sperm morphology and on the number of sperm per cc. Samples of sperm contained the highest frequency of abnormal heads and necks in the summer and the lowest in

winter. The fact that abnormal tails were most numerous in winter and fewest in summer could only be attributed to cold weather effects after collection. Total sperm production was highest in the spring and lowest in fall. The volume of semen produced was highest in winter and lowest in summer.

Attempting to correlate semen quality, as measured by their criteria with the trend in fertile matings, the investigators analyzed the breeding data of the herds from which the bulls used in this study were taken. They studied a total of 1,135 matings which covered a period of about seven years. These records revealed that the highest percentage of fertile matings occurred in April (59.6%) and was the lowest in August (40.8%).

Since there was a decline in both semen quality and percentage of fertile matings during the summer months, it was concluded that warm environment affected certain qualities of sperm to the extent that they were reflected in the breeding efficiency of the herd. These results are in close agreement with results of dairy cattle investigations.

It was recommended that management of beef cattle in warm climates be altered to permit the breeding season to fall either before or after the hot season. But if any breeding is carried on during the summer months it may be helpful to maintain the bull in cool quarters.

(Phillips, Ralph W., Knapp, Bradford Jr., Heemstra, Louis C., and Eaton, Orson N. 1943. *Seasonal variations in the semen of bulls. Amer. Jour. Vet. Res.* 4(11): 115-119.)

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**USE OF PENICILLIN IN WOUND THERAPY.** Penicillin, when used therapeutically against experimental *Clostridium welchii* infection, proved to be far superior to sulfathiazole and sulfadiazine. The latter two agents protected 50 percent of experimentally infected animals, but huge lesions remained from which *Clostridium welchii* could be isolated for four to five weeks after inoculation.

Mice and guinea pigs were inoculated

intramuscularly in the thigh with a culture of *Clostridium welchii* of sufficient virulence to kill 90-100 percent of untreated animals.

A single injection of 50 Florey units of penicillin administered subcutaneously at the time of intramuscular injection of *Clostridium welchii* protected 98 percent of infected animals. Small doses repeated every four hours over a period of 48 hours gave as good results as large single doses. To obtain maximum effect of penicillin, the therapy had to be started within 3 hours after inoculation with *Clostridium welchii*. Therapy given after three hours is associated with a lowered survival rate, however, death in penicillin treated animals occurred 48 hours or more after inoculation while death in sulfonamide treated animals occurred most frequently within 24 hours.

No drug toxicity was observed in any of the animals treated.

(Hac, L. R. and Agnes, C. H. 1943. *Penicillin in treatment of experimental Clostridium welchii* infection. *Proc. of the Soc. for Exp. Biol. and Med.* 53:(1) 61-62.)

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**H**ORMONE INFLUENCE ON THE SKELETAL SYSTEM. Sexual differences in the extent and form of osseous growth have been noted in many species, and in some species, cyclic changes in the gross and microscopic structure of at least parts of the bones have been found to be associated with reproductive phenomena. Oviparous animals which surround their ova with calcified shells need some mechanism to co-ordinate certain aspects of calcium metabolism with reproductive function. Since the bones act as storehouses for the calcium reserves of the body, they may be associated with reproductive functions. The drain upon the maternal calcium stores in mammals imposed by embryonic skeletal development or by lactation might indicate a need for some mechanism of interrelationship between reproductive functions and calcium metabolism in mammals.

In the experiments conducted, injection of estrogenic hormones into birds in-

creased the levels of serum calcium and accelerated the formation of endosteal bone. However, the rapid proliferation and ossification of osteogenic tissue could occur in estrogen-treated birds in the absence of marked changes in the levels of serum calcium especially when small amounts of androgen were also injected. The gonads or steroid sex hormones, therefore, may influence both bone proliferation and the mechanism regulating calcium levels, but these two phenomena are not necessarily related.

In some laboratory rodents the sclerosis of cartilaginous matrix, proliferation and ossification of medullary osteogenic tissues were augmented in estrogen-treated animals, but the levels of serum calcium were unchanged or only slightly affected. Androgens prevented the excessive osseous growth when given to mammals given estrogens.

The experimenters believe that the augmented medullary proliferation of bone may be most satisfactorily explained by assuming that estrogens stimulate osteoblasts or the differentiation of osteoblasts from undifferentiated elements of the marrow. The apparent differences in the response of the osteogenic tissues of birds and mammals to androgens when injected simultaneously with estrogens may be due to some fundamental differences in changes induced in cells of the marrow. There is no evidence that estrogens affect calcium metabolism in the same manner as do the parathyroids and "vitamin D" compounds.

The gonads or the steroid sex hormones regulate to some extent the morphogenesis of the skeleton and may control in part the extent of skeletal growth. Large amounts, especially of estrogens, inhibit growth of cartilage and hence longitudinal osseous growth. The function of the anterior pituitary gland is probably also altered in such animals and may be directly responsible for the ensuing "dwarfism". Small amounts, especially of androgen, may augment the rate of longitudinal growth of the skeleton.

The steroid hormones may find a practical application in the prevention or alleviation of symptoms of senile osteo-

porosis, in the acceleration of the healing of fractures, or in the augmentation of the rate of somatic growth in certain hypogonadal individuals.

(Gardner, W. U. and Pfeiffer, Carroll A. 1943. *Influence of estrogens and androgens on the skeletal system. Phys. Rev.* 23(2):139-160.)

**TRICHOMONAD STERILITY IN COWS.** The clinical picture of trichomonad sterility in cows shows considerable variation both in the symptoms and course of the disease. Secondary infections often are a complicating factor in the diagnosis of trichomoniasis. The first indication that the disease is present in a herd is the return to heat of several animals that had apparently settled.

The symptoms manifested in the cow can be divided into five groups: (1) a low-grade endometritis, (2) a catarrhal endometritis, (3) vaginitis and cervicitis, (4) pyometra, and (5) anestrus. Eighty percent of the affected cows may be placed in groups (1) and (2), and the vaginitis is more or less common to all groups. A granular vaginitis is the first symptom noticed, appearing about three days after service, and varying in intensity. Acute vaginitis usually reaches its peak in nine days, but in less severe cases, the symptoms and lesions disappear in four or five days.

Low-grade endometritis is characterized by a history of vaginitis with a return to estrum in three to six weeks after service. It may be noted that in some cases there is a spontaneous recovery in six months or longer after the return to service, thus indicating a limiting factor in the disease.

In the second type, catarrhal endometritis, conception occurs followed by death of the fetus in six to twelve weeks. The first symptom observed is a white mucoid discharge which may not appear until the third or fourth month. It usually subsides fourteen days after onset, but may persist for six weeks. The fetus may or may not be aborted. Direct microscopic examination of exudate for the presence of *Trichomonas fetus* is approximately 33

percent accurate during the pre-peak phase of the discharge. After the discharge ceases, estrum may return, but the majority of the cows remain sterile. The agglutination test is 80 percent effective in diagnosing the type of trichomoniasis characterized by catarrhal endometritis.

Another type, or one characterized by pyometra, may develop if the dead fetus is not expelled. Such cases may be detected by rectal palpation. The remaining group, including about 10 percent of the cases, shows no symptom other than anestrus, usually with a persistent corpus luteum.

Each affected herd may show some different predominating feature, so a history of the cows returning to service at irregular periods is the only general characteristic of the disease. Diagnosis is, therefore, based mainly on the herd history confirmed by direct microscopic examination for the presence of *Trichomonas fetus* or by the agglutination test. Although the parasite is only sporadically present in vaginal exudate, and the agglutination test has an average efficiency of 60 percent in detecting individual cases, the tests are both valuable in diagnosing the herd condition.

Treatment of the trichomonad infection consists of douching the uterine cavity with 100 cc. of a 1:400 or 1:600 iodine solution. Successful results depend on the efficient application of the iodine treatment, and then avoidance of reinfection of the treated cows by educating the stock owner as to the venereal nature of the disease.

The prognosis in the low-grade endometritis is favorable. In catarrhal endometritis, the prognosis is guarded, depending upon whether or not the salpinx is involved. Anestrus responds to iodine and hormone treatment, and gives a satisfactory prognosis.

(Kerr, W. R. 1943. *Trichomoniasis in the cow. Vet. Jour.* 99(4):95-106.)

**DIETARY CAUSE OF JOINT LESIONS IN HORSES.** Vitamin A deficiency as a cause of joint disease was indicated in an experiment in which lame-

(Continued on page 51)

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## DEAN BERGMAN

*(Continued from page 12)*

and Phi Zeta. Biographical sketches appear in both "Who's Who in America" and "American Men of Science."

As a special contribution to the war effort, he is now serving as the veterinary representative on the Seventh Service Command Committee of the Procurement and Assignment Service for Physicians, Dentists and Veterinarians under the War Manpower Commission.

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## ABSTRACTS

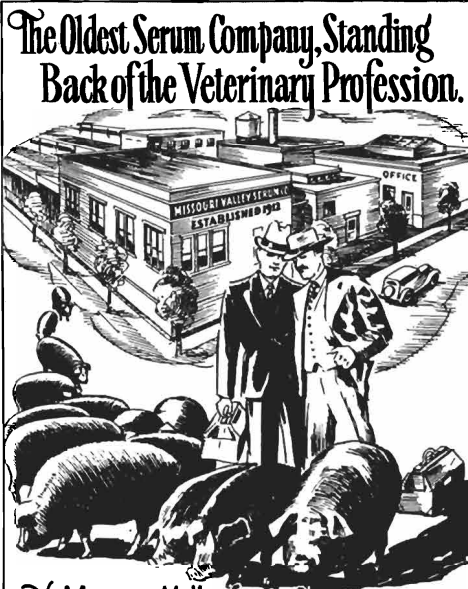
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ness and characteristic rarefying lesions in joint cartilages resulted from feeding a Vitamin A deficient diet. The authors recognized that the rations previously used might be deficient in some other known or unknown dietary essential. In the repeated experiment, the same vitamin A deficient diet was used on one group of two horses as was used in the

previous experiment. The second group of two horses received the same diet, but in addition 5 cc. of high-potency shark liver oil twice a week.

Soon after the experiments started, the two horses not getting shark liver oil became night blind showing that they were vitamin A deficient. Blood tests throughout the experiment showed the steadily decreasing supply of vitamin A in the blood of this group. The amount of ascorbic acid in the blood of all four animals remained fairly constant throughout the experiment.

At various times during the experiment a lameness was noted in both groups which was not readily explained at the time. Joint lesions were not suspected until post mortem. The only microscopic finding of note in the post mortem examination of these horses was the joint lesions. These were present to an equal



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extent in all 4 animals. In the humero-radial and tibio-tarsal joints, the pronounced ulceration of the cartilages duplicated upon opposing articular surfaces was characteristic. This same alteration was present to a greater or lesser degree in all the major joints.

This experiment proved conclusively that vitamin A is not the causative factor of the joint lesions. It quite definitely demonstrated that low vitamin A intake carried to a fatal termination did not seriously affect the blood levels of vitamin C. The substances lacking in this concentrate diet that resulted in the joint changes, if they are of dietary origin, would probably be supplied by green grass or good quality leafy hay. Additional experimentation would be necessary to substantiate this hypothesis.

(Hart, George H., Goss, Harold and Guilbert, Harold. 1943. *Vitamin A deficiency not the cause of joint lesions in horses.* *Amer. Jour. Vet. Res.* 4(11):162-168.)

## Sulfonamides and Surgery

In 100 consecutive surgical cases in which infection was established in 79 at operation and potential in 21, the authors\* applied the sulfonamide compounds locally whenever possible and also systemically by the oral or the parenteral route. The results in traumatic wounds and in intestinal anastomosis were extremely gratifying. In large, extensive surface wounds, exemplified by the radical mastectomy, there was a striking increase in bleeding and serum formation. The use of these drugs in such wounds has been discontinued. Primary closure and healing of infected wounds with the use of the drugs was most gratifying. Sodium sulfathiazole may be administered in a 0.5 per cent solution in isotonic solution of sodium chloride by hypodermoclysis. A stronger solution cannot be used beneath the skin. No severe or permanent adverse reactions were encountered.

\* Waas, F. J., and E. Canipelli, 1942. The Sulfonamide Group in Surgery. *Fla. Med. Assn. Jnl.*, 29, p. 223.

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