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**SOME OBSERVATIONS ON THE TREATMENT OF TRICHOMONIASIS  
IN THE FEMALE TREATED WITH DECAMETHYLENE-BIS-  
(4-AMINOQUINALDINIUM CHLORIDE)  
(DEQUALINIUM) DEQUADIN**

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BY

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The high antimicrobial activity present in polymethylene-bis-*iso*-quinolinium salts led Babbs, Collier *et al*<sup>1</sup> to investigate a large number of related compounds for their antimicrobial activity. The compound, decamethylene-bis-(4-aminoquinaldinium) was found to have wide antimicrobial activity *in vitro*; it inhibited the growth of all the species of pathogenic bacteria that were tested including Gram-positive, Gram-negative, penicillin-resistant and acid-fast bacteria. Furthermore, similar activity was shown against certain yeasts and fungi notably, *Candida albicans*, *Microsporum canis*, *Trichophyton mentagrophytes*, *Trichophyton rubrum* and *Trichophyton verrucosum*.

This new synthetic antimicrobial compound, which was discovered and developed in the Research Laboratories of Allen & Hanburys Ltd. has been given the trade name Dequadin and assigned the Approved Name of Dequalinium by the Nomenclature Committee of the British Pharmacopoeia Commission. It is used in the form of the chloride.

The extremely low toxicity of Dequadin and the absence of local irritation on mucous membrane and skin was shown by laboratory experiments on mice and rabbits. Solutions containing 2 mg. of Dequadin chloride per ml. of saline appeared to be without effect on the eyes of rabbits when instilled daily for two weeks. Creams containing 0.4 per cent. Dequadin chloride were applied daily for four weeks to the shaved skin of rabbits and to hairless mice without any reaction.

Administered orally in 5 per cent. suspension in water, 2 gramme per kilogramme Dequadin chloride failed to kill any mice in the series of 20 tested. Rats receiving 0.05 per cent. Dequadin chloride in their drinking water for 26 weeks survived and showed no depression of growth compared with controls. That the therapeutic activity of Dequadin is essentially local was pointed out by Babbs, Collier *et al* who showed that in mice infected intraperitoneally with virulent cocci, Dequadin was effective when given intraperitoneally but not when given subcutaneously.

Clinical reports on the local application of Dequadin have borne out the laboratory findings. Trotter<sup>2</sup> used Dequadin chloride impregnated in gelatin sponge as a bacteriostatic and haemostatic dressing for tooth sockets, in over 900 patients. He found it effective in counteracting and preventing sepsis and in promoting healing.

This compound evoked my interest in the treatment of trichomoniasis in the female as it appeared to be the first non-antibiotic substance which is claimed to inhibit the growth of nearly all common pathogenic bacteria found in the vagina as well as yeasts and, at the same time, being non-toxic to human tissue. While it is admitted that the treatment of trichomonal infections by local application has proved in the past unsatisfactory, it is submitted that the eradication of trichomonas vaginales rests more with the restoration of the normal bacterial flora and consequent production of an acid pH than perhaps with the actual extermination of the trichomonads. It was with this end in view that the compound Dequalinium (Dequadin) exhibiting a high antimicrobial activity was selected for clinical evaluation.

During the one hundred and twenty-one years that have elapsed since trichomonas vaginales was reported by Donn , it is true to state that only a relatively small proportion of cases have been cured in the true sense of the word. It has been observed that the incidence may be as high as 60 per cent. and it is superfluous to elaborate how world-wide the condition has been reported or to stress the varying degrees of discomfort and misery it can produce. That trichomonas vaginales can exist without giving rise to any clinical symptoms until quite mild trauma such as sexual intercourse or devitalisation of the vaginal mucosa due to ill health or from other causes occurs, and then secondary infection may well lower the resistance of the vaginal epithelium when the trichomonas vaginales multiply with great rapidity and symptoms become severe and distressing. The severity of these conditions being such as to preclude sleep and in extreme cases, producing oedema and soreness of the vulva of such a severity as to cause actual retention of urine.

In this particular trial, 43 women between the ages of 14½ and 55 years who previously had failed to respond in any satisfactory degree to any other forms of orthodox treatment including the use of pessaries containing oxytetracycline, immediately responded to treatment with Dequadin although complete eradication of the trichomonas vaginales occurred only in 40 per cent. of cases; however, in the remaining cases all the clinical symptoms were greatly diminished and all but one case in the series obtained marked and rapid relief from their symptoms within 24 to 72 hours after inserting the pessaries.

#### *Patients Presented with Various Predominant Symptoms*

The symptoms most frequently complained of were those of vaginal discharge and irritation — only a few complained that the discharge was offensive. Others presented with intolerable irritation of the vulva had very little vaginal discharge; no cases of bartholinitis were seen although several had infection of the paraurethral ducts. One case on examination revealed a cervical polyp and in another, carcinoma of the vaginal wall. Two married women complained of the onset of dyspareunia, and in three cases the male consort presented with a purulent urethritis in which trichomonas vaginales were present in large numbers. All cases in this series were of marked chronicity. Both married and unmarried women were implicated, two cases had venereal infection, one was infected in the urethra only as evidenced by the wet slide method.

### *Method of Diagnosis*

This was made in the clinic and at the time of examination by the wet slide method using dark ground illumination.

Specimens were taken from the posterior fornix and from the urethra by means of a loop. Whenever the patient had actual symptoms it was found that in the majority of cases there were a large number of pus cells present and lesser numbers of *E. coli* and usually a marked absence of Doederlein's bacilli. About 40 per cent. of cases had a measure of "mixed" organisms present.

Progress of the cases was judged by diminution in the symptoms and improvement in the pus squame ratio. It often took many weeks for the normal bacterial flora to become re-established and in chronic cases this failed to occur even after months of continuous treatment in the older women.

### *Method of Treatment*

Douching was forbidden at any time since in my opinion the introduction of so-called antiseptics into the vagina destroys or upsets the normal bacterial flora, this being conducive to trichomonas vaginales infestation, apart from the risk of reinfection from the douche nozzle.

The patient was instructed to insert a Dequadin Pessary each night and morning, when in the approved position, i.e., supine with knees drawn up and the treatment was continued for a period of 10 days and then after further examination, was instructed to continue the treatment during the remainder of the month, and care was taken to ensure that treatment was continued throughout the menstrual period. At the end of the first 10 days the patient was re-examined and the number of trichomonas vaginales per field present was noted, together with any change in the cytology and bacteriology. The course was repeated even if trichomonas vaginales were not demonstrated in the specimens.

In approximately 40 per cent. of cases, the symptoms had completely subsided, trichomonas vaginales were absent and the presence of a low pus squame ratio with some return of Doederlein's bacillus was seen. In the remaining cases all symptoms were greatly diminished but trichomonas vaginales were present in varying numbers although here again the pus squame ratio had improved.

If left without further treatment, however, some of these cases relapsed after varying periods of from two to sixteen weeks but all except one were brought under control rapidly by reinstatement of treatment. All except one reported that this was the first time that they had any measure of comfort and in the one case in which exacerbation of her symptoms had occurred, the microscopical findings in no way suggested that any deterioration in the cytology of the vagina had occurred and the number of trichomonas vaginales present was greatly diminished. Only one patient complained of the pessary substance running out on rising, and in four cases of non-specific vaginitis all showing alpha haemolytic streptococci rapidly cleared when Dequadin Pessaries were used. Two cases of severe moniliasis following oral antibiotic therapy were also rapidly cleared.

*Discussion*

That several factors may influence the course of trichomonal infection in the female is suggested in addition to the now accepted sequelae of reinfection from the male consort.

The known high incidence of trichomonal infection which is reported by some investigators to be as high as 60 per cent. which does not necessarily exhibit any clinical symptoms, suggests that some alteration in the habitat must occur before symptoms develop.

That devitalisation of the vaginal tissues either from trauma or secondary infection does occur, and that the altered pus squame ratio and the absence of Doederlein's bacilli in acute trichomonal infections suggests that this may be due to the presence of pathogenic bacteria. The use of the compound Dequalinium with its wide antimicrobial spectrum appears to exert a localised action in the vagina restoring the normal bacterial flora, the result of this action is shown by a decrease in the pus squame ratio and an increase in the number of Doederlein's bacilli. That the ovarian hormones have an important part in controlling the glycogen content of the vaginal cells is confirmed by the fact that treatment with hormones does increase the glycogen content thus enabling the action of Doederlein's bacilli to restore the normal pH of the vagina. It has been noticed in some patients exhibiting a marked degree of psychological instability that on examination they had a reduction in the number of Doederlein's bacilli present.

*Summary*

Although complete eradication of the trichomonas vaginales occurred only in 40 per cent. of cases of marked chronicity, however, in the remaining cases all the clinical symptoms were greatly diminished. All but one case in this series obtained marked and rapid relief from their symptoms within 24 to 72 hours of inserting the pessary and in those cases where trichomonas vaginales were still present the pus squame ratio had improved and some return of Doederlein's bacilli was seen. A number of cases relapsed after varying periods of from two to sixteen weeks but all except one were brought under control rapidly by reinstatement of treatment with Dequadin.

## REFERENCES

1. BABBS, M., COLLIER, H.O.J. *et al* (1956) *J.Pharm.Pharmacol.* 8, 110.
2. TROTTER, P. (1956) *Lancet*, 1, 1042.
3. FOWLER, N.G., JONES, B.V., (1957) *Vet.Rec.* 69, 387.

This clinical trial is still proceeding, and since the above was written 11 further cases have been treated, including two with monilia infection and the results to date confirm my previous remarks.

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