



ABSTRACTS OF RECENT CHINESE PUBLICATIONS ON SCHISTOSOMIASIS¹ (XXXI)

377. Zhou, X.N., Huang, J.Z., Zhong, Z.M., Wu, Z., Kan, J.G., Yang, H.M., Su, T.Y., Gao, Y., Chen, J., Guo, B.Y., Chen, Y.T., Wu, F., Sun, Q.Q., Xiao, R.W. & Ye, J.F. Comparative observations on reproduction of Oncomelania snails in marshland and in areas during the flooding season. Chinese Journal of Schistosomiasis Control, 1989, 1 (2): 23-25 (In Chinese)

Experiments with caged snails were carried out in marshland and in areas during the flooding season in the summer of 1987. Six groups containing 100 male and 100 female snails without cercariae were reared in 100 x 50 x 30 cm cages covered with nylon net (14 meshes per inch). One of the cages was submerged in water at a depth of 0.5-1 m and the other 5 were placed on land as control. The snails were observed once a month for three months. It was found that the death rates were 50.97% for the snails submerged in water and 32.59% for those in the control cages, the difference between them being statistically significant ($P < 0.01$). However, the mean numbers of offspring were 153.6 for the snails submerged in water and 68.4 for those in the control cages, the difference between them also being statistically significant ($P < 0.01$). It is evident that flooding was a favourable factor for both egg hatching in adult snails and growth of their offspring.

378. Chen, C., Wu, C., Zeng, Q.R., Kuang, T.F. & Qian, B.Z. The reconfirmation of the existence of Lithoglyphopsis modestus (Gredler, 1886) in Hunan Province, China, and its artificial infection with Schistosoma japonicum. Chinese Journal of Parasitology and Parasitic Diseases, 1988, 6 (4): 261-263 (In Chinese, with English abstract)

In 1886, Gredler named a species of fresh water snail collected from Hunan Province, China, Lithoglyphus modestus. In 1939, Yen described four different species of Lithoglyphopsis, which had been collected from China and kept in the Natural Museum of Senkenberg; one of them, L. modestus, was defined as the genotype of Lithoglyphopsis. Since 1939, there have been no further reports concerning the above-mentioned snail species.

The present study reconfirms the existence of L. modestus in Hunan Province where it was found in Hengshan County. The morphology of L. modestus is described in detail. Study of the parasitological relationship between L. modestus and Schistosoma japonicum showed that L. modestus cannot serve as an intermediate host of S. japonicum despite the fact that miracidia were able to invade the snail.

¹ The WHO/SCHISTO series has been chosen as a vehicle for issuing abstracts or translations in English of papers on schistosomiasis published in the Chinese medical and scientific press as most of this material is not readily available to interested readers outside of China. The numbering of the abstracts in this document is consecutive to that of the abstracts given in the previous WHO/SCHISTO/89.99.

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379. Chen, D.J. & Gong, Z.B. Epidemiological survey of schistosomiasis in a mountainous region of Eryuan County, Yunnan Province. Chinese Journal of Schistosomiasis Control, 1989, 1 (2): 10-14 (In Chinese, with English abstract)

The schistosomiasis epidemic area in the Liantie mountainous region of Eryuan County, Yunnan Province, is situated on the western slopes of Luoping mountain at an altitude of 1700-2300 metres above sea level. The average rate of infection with Schistosoma japonicum for the persons examined in 10 villages was 53.6%, but for the 16-30-year-age group it was as high as 70.4% and the male to female ratio of infection was 1:1.26. The animal hosts were cattle, water buffaloes, pigs, dogs, horses, goats and rats, with cattle playing an important role in the transmission of the disease. Human and domestic animal faeces were scattered in areas where the snail intermediate hosts were widely distributed. The average infection rate of Oncomelania snails was 1.2%. The infected snails were dispersed mainly on the banks of earth between the terraced fields, in small ditches and on the hillside with seeping water. Half of the infected snails were within a distance of 150 m from the villages. The prevalence of schistosomiasis was related to the river system and the geographical conditions, but it was independent of altitude above sea level. The most important transmission season was from June to September and the transmission sites were the terraced areas where the farmers worked. The results showed that the epidemiological characteristics of schistosomiasis in mountainous regions were different from those in plain regions.

380. Wu, Z.W. An analysis of the role of fishermen living on their boats in the transmission of Schistosoma japonicum infection in the Dongting Lake region. Chinese Journal of Epidemiology, 1989, 10 (3): 189-191 (In Chinese)

The Dongting Lake region in China is heavily endemic for schistosomiasis. This paper reveals that over 40 000 fishermen lived and migrated on Dongting Lake in 1985. Among this fluctuating population, prevalence rates of 46.1% (425/922) by stool examination and 62.4% (266/418) by the indirect haemagglutination test were observed during the flood season which coincides with the busy May to October fishing period on Dongting Lake. This period is also the peak time when S. japonicum miracidia hatch out and infect the snails. Of 1193 fishermen living on the lake, 821 (68.82%) were found in three observation spots during this May to October period. An investigation showed that 91.44% of 514 persons studied defecated directly into the water bodies. The faeces of the fishermen living on the lake contaminate the water frequently during the flood season. Infected snails were found in all of the 13 berthing places for fishing boats. The snail infection rate and the population density of infected snails were 0.63% and 0.0164/0.11 m², respectively. The average infection rates in sentinel mice were 38.16% in May and 33.26% in October with the highest rate of 100% being found in 37 berthing places. Farm cattle left to pasture on the beaches are an important source of schistosome infection during the dry season (from November to April), for during the flood season most of the grass beaches are submerged with only a few cattle left to pasture near the lake. A few local residents were also observed to defecate in the lake. On the basis of the above observations, it is suggested that the fishermen living on their boats are the main source of S. japonicum infection during the flood season in the Dongting Lake region.

381. Zhong, J.H., Zhang, S.J. & Liu, Z.D. Relationship between water level and acute schistosomal infection in the Boyang Lake. Chinese Journal of Schistosomiasis Control, 1989, 1 (2): 8-9 (In Chinese, with English abstract)

The reported study was carried out during 1982-1984 in 8 counties (Nanchang, Jinxian, Yugan, Boyang, Duchang, Xingzi, Yongxiu and Xinjian) of Jiangxi Province that are situated around Boyang Lake. The monthly ratios of those exposed to contaminated water as opposed to those with acute schistosomiasis or to those developing clinical manifestations of schistosomiasis were assessed in order to determine the relationship with average lake-water level of each month. Statistical analysis revealed that the rank correlation coefficients were $r_{s1} = 0.8252$ and $r_{s2} = 0.7762$ ($P < 0.01$), respectively, both showing a significant correlation. These results indicate that the water-level is an important epidemic factor in schistosomiasis transmission in the lake region.

382. Zhong, J.H., Zhang, S.J., Liu, Z.D., Xiong, Y.X., Huang, F.K., Xu, G.G., Liu, Y.M., Peng, B.X., Xiang, J.Y., Liu, R.H. & Yan, J.L. An investigation of acute schistosomiasis in the Boyang Lake region in 1987. Chinese Journal of Parasitic Disease Control, 1989, 2(2): 77-78, 138 (In Chinese, with English abstract)

In the Boyang Lake region 2165 cases of acute schistosomiasis occurred in 1987, the highest incidence recorded during the past 25 years. The ratio of male to female cases was 3.3:1, with 51.1% of the cases found in the 11-20-year age group. Farmers accounted for 60.4% of the cases infected at 11 water-contact places along the lake shore. Most of the patients (72.1%) had contact with cercariae infested waters from July to October, and 76% of them had no history of past schistosomal infection. The increase in acute cases probably resulted from: (1) increase in snail density; (2) low coverage of chemotherapy for infected persons; (3) lack of personal protection; and (4) increased contact with infested waters of persons without immunity to schistosome infection.

383. Huang, Y.X., Zhou, J.X., Wu, Y.X., Chen, J.Y., Wu, H.Z., Cheng, H.J., Xu, S.C. & Yang, X.Z. A study on the differential diagnosis of schistosomal and non-schistosomal cirrhosis. Chinese Journal of Internal Medicine, 1988, 27 (7): 402-404 (In Chinese, with English abstract)

Biochemical tests were used to examine 20 patients (14 males, 6 females, aged 37-57 years) with schistosomal cirrhosis and another 20 patients (19 males, 1 female, aged 21-68 years) with cirrhosis of non-schistosomal origin. Significant differences were seen between the two groups with regard to:

- the activities of serum aspartate aminotransferase (AST), alanine aminotransferase (ALT) and cholinesterase (CHE);
- the ratio between serum albumin and globulin, i.e., 1.4 ± 0.1 for schistosomal cirrhosis (sc) and 0.9 ± 0.1 for non-schistosomal cirrhosis (n-sc);
- the levels of serum gamma-globulin, i.e., 21.1 ± 1.7 for sc and 27.7 ± 1.4 for n-sc;
- the levels of serum bilirubin, i.e., $0 \mu\text{mol/l}$ for sc and $6-19 \mu\text{mol/l}$ for n-sc;
- thymol and zinc turbidity tests, i.e., 10.5 ± 0.7 for sc and 16.0 ± 3.0 for n-sc.

These biochemical test results are valuable for differential diagnosis. The activities of serum gamma-glutamyl transferase (GGT) and its isoenzymes as well as of the isoenzymes of lactic dehydrogenase (LDH) are also useful indices in the differentiation of the two types of cirrhosis.

384. Wu, Z.M., Zhang, W.J., Liu, B.K. & Shi, J. Hepatic cirrhosis in schistosomiasis identified by computed tomography scanning. Jiangsu Medical Journal, 1989, 15 (2): 79-80 (In Chinese, with English abstract)

This paper reports the results of computed tomography (CT) scanning in 20 patients with hepatic schistosomiasis due to infection with Schistosoma japonicum. In all the patients, fresh or calcified eggs were found by microscopic faecal examination or by rectal biopsy.

Typical CT findings included: (a) "turtle-back"-like calcification in 6 out of 17 cases of liver calcification; (b) liver pseudolobe was present in 8 patients who all suffered from late cirrhosis (stages III-IV); (c) in 10 patients adipose tissue in the porta hepatis infiltrated deep into the liver along the portal vein; (d) disproportion of the liver lobes was observed in 14 patients: atrophy of the right lobe and hypertrophy of the lateral segment of the left lobe; and (e) most of the patients had portal hypertension.

Clinically, the disease could be divided into simple type (16 patients) and mixed type (4 patients), with the latter type being accompanied by posthepatitis cirrhosis.

CT may reveal the severity of liver cirrhosis as well as give the precise diagnosis.

385. Mao, S.C., Ye, X.C., Liu, J.X. & Zhang, J.W. CT brain scanning in the diagnosis and localization of cerebral schistosomiasis. Chinese Journal of Parasitology and Parasitic Diseases, 1989, 7 (2): 115-118 (In Chinese, with English abstract)

Computed tomography (CT) scanning was performed on 25 patients with cerebral schistosomiasis. Images of the granuloma caused by the schistosome eggs showed a high density mass shadow while those of the oedema of the white matter showed a low density shadow. By combining CT scanning with case history, clinical signs and immunological testing, it was possible to make a correct diagnosis for each of the patients regarding the site and nature of the pathology. The correlations between the CT scanning images and the clinical pathology were analysed and a better treatment regimen was discussed according to the experience gained. In some of the patients treated with praziquantel, follow-up by CT scanning showed that pathological changes related to the granuloma disappeared during the 3-12 month follow-up period.

386. Huang, W.H. & Wan, Z.H. A computer programme for automatic recognition of schistosome eggs. Chinese Journal of Parasitology and Parasitic Diseases, 1988, 6 (4): 296-298 (In Chinese, with English abstract)

The digital image processing system used in this study is composed mainly of the IBM Personal Computer with Plug-Compatible, PCVISION Frame Grabber. The accuracy rates in recognizing schistosome eggs were 88.2% for stools processed by the nylon filter concentration method and 85.4% for those processed by the Kato-Katz technique. The false positive rates were 1.8% and 2.2% respectively. Not only can this image processing system process and analyse the morphological characteristics of the schistosome eggs in the stool but it can also print out automatically the report as well as the tables and statistical data of the observation results. Finally, it shows promise as a possible diagnostic method for schistosomiasis and deserves further investigation.

387. Shi, Y., Dell, R., Diesfeld, H.J., Burger, R., Han, J.J. & Ruppel, A. Diagnostic proteins with a relative molecular weight of 31 000/32 000 in Schistosoma japonicum: reactivity with patient sera and monoclonal antibodies. Chinese Journal of Parasitology and Parasitic Diseases, 1988, 6 (4): 245-248 (In Chinese, with English abstract)

Sera of patients infected with Schistosoma japonicum and of mice also infected with this parasite were tested in immunoblots for their reactivity with proteins of the adult schistosome. This study demonstrated: the presence in S. japonicum of proteins sharing the diagnostic antigenicity of S. mansoni proteins and with approximately the same relative molecular weight (M_r) of 31 000/32 000; the reactivity of these proteins with monoclonal antibodies; and their association with the schistosome gut. The proteins, however, differ between the two species at least with respect to one epitope and the relative mobility of one component. The specificity of S. japonicum proteins was confirmed in tests on the sera of patients with other parasitic diseases. These results further support the possible application of the schistosome proteins M_r 31 000/32 000 to the serodiagnosis of infection with S. japonicum.

388. Yang, W. & Kuang, L.X. Analysis of antigens of four adult trematodes by enzyme-linked immunoblotting (ELIB). Chinese Journal of Zoonoses, 1989, 5 (3): 11-13 (In Chinese, with English abstract)

Adult-worm antigens and immune sera of Fasciola hepatica, Clonorchis sinensis, Fasciolopsis buski and Schistosoma japonicum were prepared for use in antigen analysis by the enzyme-linked immunoblotting (ELIB) technique. Rabbit immune serum and S. japonicum-infected serum were also used.

Each antigen was found to consist of 3-7 different polypeptides which were heavily stained in sodium dodecyl sulfate-polycrylamide gel electrophoresis (SDS-PAGE) mapping, but they differed in total frequency, i.e., 57, 43, 35 and 47 for Fasciolopsis buski, Fasciola hepatica, C. sinensis and S. japonicum, respectively. In ELIB, the bands (antigenic polypeptides) were seen at a relatively high frequency (20-40) and they were heavily stained by homologous rabbit immune sera; various numbers of cross-reactive bands with heterogenous rabbit immune sera or S. japonicum-infected rabbit sera were also seen. For these four antigens, at least ten specific bands were identified.

389. Zhu, J.Y. & Li, Y.H. Diagnostic value of and factors influencing the immunoenzymatic staining test (IEST) for schistosomiasis japonica. Chinese Journal of Schistosomiasis Control, 1989, 1 (2): 30-34 (In Chinese, with English abstract)

In order to study the diagnostic value of and factors influencing the immunoenzymatic staining test (IEST) for schistosomiasis due to infection with Schistosoma japonicum, tissue-egg frozen section (TEFS) was made from the hepatic tissue of mice 6-8 weeks after their infection with S. japonicum, the most suitable thickness of the section being 7 μ m. Sera were collected from rabbits as well as from 150 patients with S. japonicum infection and 150 healthy controls. The antigenicity of liver TEFS was markedly higher than that of adult worm frozen section (AWFS) and of liver tissue-egg paraffin embedded section. TEFS, as antigen in the IEST for diagnosis of S. japonicum infection, is considered to be highly sensitive (96.7%) and highly specific (98.7%), with low cross-reaction rates (3.3% for both Clonorchis sinensis and Paragonimus westermani infections, and 0% for healthy controls). The sensitivity of TEFS-IEST is much higher than that of AWFS-IEST (90.8%) and the circumoval precipitation test (COPT) (90.7%). The main advantages of TEFS-IEST are low cost of the antigen, high sensitivity and rapid yield of results.

390. Xie, Y.X., Chen, Y.Y., Qian, C.Y., Huang, J.Z. & Liu, Y. Detection of circulating antigens of Schistosoma japonicum in rabbits by the staphylococcus A-coagglutination test. Shanghai Journal of Immunology, 1989, 2 (1): 64 (In Chinese)

Staphylococcus A (SPA)-coagglutination was used to assess the curative effect of drug treatment in rabbits infected with Schistosoma japonicum. Six groups of rabbits were infected with 300, 250, 200, 100, 50 and 30 S. japonicum cercariae, respectively, and 12 normal rabbits were used as controls. At 38-44 days after infection, the rabbits were examined by the circumoval precipitation (COP) test, the SPA-coagglutination test, and the stool sedimentation and hatching test. At 46 days after infection, all of the infected rabbits were treated with a total dose of 100 mg/kg body weight of praziquantel given over two days.

It was found that 94.7% (36/38) of the infected rabbits were positive for eggs or miracidia in stool examinations, 100% (38/38) were positive in the COP test and 97.4% (37/38) were positive in the SPA-coagglutination test. Of 36 stool positive rabbits, 35 were also positive in the SPA-coagglutination test, representing a coincidence rate of 97.2% (35/36).

At 1-3 months after drug administration in 16 praziquantel-treated rabbits, the percentage of positively reacted eggs in the COP test was over 3%, a negative conversion rate of 75% (12/16) was observed in the SPA-coagglutination test, and no worm was detected upon dissection. In the positive control group, 6 rabbits continued to be positive in the COP test, 4 were positive in the SPA-coagglutination test, while the remaining 2 which were doubtfully negative at the two month follow-up became positive at the three month follow-up. Whether such a phenomenon was due to a rise and decline of serum circulating antigen in the rabbits is not clear and requires further investigation.

391. Li, Y.L. & Iverson, B. Effects of radiation-attenuated Schistosoma mansoni cercariae on serum antibodies in mice. Acta Universitatis Medicinae Tongji, 1989, 18 (2): 125-127 (In Chinese, with English abstract)

Antigens of Schistosoma mansoni schistosomula with relative molecular weights (M_r) of 97 000, 67 000, 46 000, 32 000 and 21 000 could be recognized by sera from mice infected with normal S. mansoni cercariae. Sera from mice that had been inoculated with 48kR irradiated cercariae of S. mansoni could recognize M_r 112 000 and M_r 52 000 antigens of S. mansoni schistosomula, in addition to the above-mentioned antigens. These results suggest that the immune response to radiation-attenuated cercariae may be different from the immune response to normal cercariae.

392. He, M.L. & Li, L.W. Allergic reactions after intradermal injection with schistosome antigen: report of 3 cases. New Chinese Medicine, 1989, 20 (4): 193 (In Chinese)

An allergic reaction to an intradermal injection of schistosome antigen is rare. However, between 1983 and 1986, 3 cases of serious allergic reactions following skin tests with schistosome antigen were seen in a hospital.

Case 1 was a 13-year-old boy. His main clinical manifestations were dizziness, sweating, panting, faint pulse and low blood pressure 10 minutes after an intradermal injection of schistosome antigen. The symptoms subsided after an injection of 1 mg adrenaline and the infusion of glucose in normal saline.

Case 2 was a 48-year-old man in whom, 18 minutes after an intradermal injection of schistosome antigen, a cutaneous herpes appeared around the site of the injection accompanied by unbearable itching and soon followed by congestion and swelling of the mucosa of the oral cavity. The injection of chlorpheniramine and the oral administration of an anti-allergic drug relieved the symptoms.

Case 3 was an adult male who suffered from general urticaria and itch 40 minutes after receiving the antigen injection. He recovered after taking an antihistamine and an anti-allergic drug.

The authors suggest that the different types of allergic reactions might be due to the release of some active materials such as histamine as a result of the schistosome antigen injection.

393. Pan, X.Q., Guo, Q. & Yao, M.Y. Studies on adenylate cyclase in Schistosoma japonicum. Chinese Journal of Parasitology and Parasitic Diseases, 1988, 6 (4): 278-281 (In Chinese, with English abstract)

The activity of adenylate cyclase in Schistosoma japonicum was assessed by a radiometric method. The ^3H -cAMP formed during enzymatic reaction was separated from the substrate ^3H -ATP by a short Dowex-1x2 (i.e. 100-200 mesh) column measuring 0.5 x 3 cm. The radioactivity of ^3H -cAMP was then measured using the liquid scintillation technique.

The optimum pH for the enzyme activity in S. japonicum homogenate is 7.5. Male and female worms possess almost the same degree of activity, which increases with age in worms 20 to 48 days old. The enzyme activity in 40-day-old adult worms was 80 000±3000 counts per minute per worm pair. The activity of adenylate cyclase on the surface membrane of the male worm was onefold higher than that of the female worm.

Nithiocyanine, metrifonate and niridazole at 3.3×10^{-4} had no effect on the activity of adenylate cyclase in S. japonicum homogenate. Enzyme activity on the surface membrane of the worm was slightly inhibited by 3.3×10^{-4} of furapromidum, whereas saturated praziquantel (pyquiton) inhibited such activity by 50%.

394. Chen, J.Q., Hua, X.X., Li, Y. & Kong, C.H. The killing effect of mouse neutrophils on schistosomula of Schistosoma japonicum during cultivation in vitro. Acta Academiae Medicinae Hubei, 1989, 10 (1): 1-5 (In Chinese, with English abstract)

A study was made to evaluate the killing effect of murine peritoneal neutrophils supplemented with immune rabbit sera and/or with complement on schistosomula of Schistosoma japonicum cultivated in vitro. The schistosomula death rate was measured every 24 hours for 96 hours. The results showed that when neutrophils and schistosomula were mixed in a ratio of 2000:1, 5000:1 and 8000:1, the schistosomula death rates were 10.0±4.24%, 13.04±4.97% and 11.11±5.24%, respectively. When schistosomula were put in the following "killer" mixtures: (1) neutrophils, immune sera and complement, (2) neutrophils and heat-inactivated immune sera and (3) neutrophils and complement, their death rates were 51±4.9%, 20.5±4.1% and 22.6±4.5%, respectively, after 24 hours of cultivation, and 93.3±3.2%, 68.6±7.9% and 41.8±3.7%, respectively, after 96 hours of cultivation. Statistically significant differences were observed between the killing effects of mixtures 1 and 2 ($P < 0.01$), and between the 3 "killer" mixtures and the control mixture ($P < 0.01$) which consisted of schistosomula and medium only. Moreover, comparisons were made regarding the killing effect of neutrophils from normal and infected mice and regarding the susceptibility of schistosomula of different ages to neutrophils. There was no significant difference ($P > 0.05$) in the killing effect of neutrophils from normal and infected mice. The susceptibility of schistosomula to neutrophils was measured by death rate which was 82.8±3.34%, 75.61±6.71% and 62.2±7.23% for 0-hour-old schistosomula in the "killer" mixtures 1, 2 and 3, respectively, and 13.2±2.45%, 17.3±3.82% and 9.4±2.83% for 24-hour-old schistosomula in the three mixtures, respectively. It is suggested that the susceptibility of 24-hour-old schistosomula to neutrophil-mediated killing was significantly lower than that of 0-hour-old schistosomula ($P < 0.01$). In conclusion, the killing effect of neutrophils is enhanced by the synergistic action of immune serum and complement.

395. Wang, Z.H., Zhang, J.W., Yi, Z.H., Gao, S.N., Cai, S.X., Huang, J.P., Hu, J., Wang, H.C., Ma, B.B., Luo, B.K. & Hu, G.C. Study on chemotherapy with pyquition (praziquantel) in the control of schistosomiasis japonica. Chinese Journal of Schistosomiasis Control, 1989, 1 (2): 19-21 (In Chinese, with English abstract)

Chemotherapy with pyquition (praziquantel) was conducted in Liuyuan village, Chenghe District, Jiangling County, Hubei Province, an area which is heavily endemic for schistosomiasis. Starting in 1984, pyquition at a dosage of 50 mg/kg body weight was given for three successive years to those with schistosome eggs in their stools and to those with positive serological tests for schistosomiasis. On the other hand, infected cows and buffaloes were given a single dose of 1.5-2 mg/kg of nithiocyanine (amoscanate) for the first two years and a single dose of 30 mg/kg of pyquition for the third year.

The prevalence rate of Schistosoma japonicum infection in the local inhabitants dropped from 57.5% in 1984 to 14.4% in 1987, representing a reduction of 74.9%. The infection rate among children in the 3-9-year age group fell from 38.8% in 1984 to 4.8% in 1987, representing a reduction of 87.7%. Among the infected individuals the mean number of S. japonicum eggs per gram of faeces fell from 25.3 in 1984 to 1.5 in 1987, representing a reduction of 94.1%. At the same time, the snail infection rate dropped by 91.5%. In conclusion, it seems that schistosomiasis was under effective control following the expanded chemotherapy programme in this area.

396. Yue, W.J., Xiao, S.H. & Mei, J.Y. Effect of Pseudomonas jinanensis vaccine on pyquition (praziquantel) treatment of murine schistosomiasis japonica. Chinese Journal of Parasitology and Parasitic Diseases, 1988, 6 (4): 301-303 (In Chinese, with English abstract)

Pseudomonas jinanensis vaccine (PJV) is a nonspecific immunogenic substance. Its effect on macrophages was studied in mice, and the results are reported in this paper. The phagocytic percentage and the phagocytic index of macrophages harvested from the abdominal cavity of mice receiving PJV at a subcutaneous dose of 0.4 mg per day were found to be significantly higher than those in untreated mice. When the PJV injection was combined with a single oral dose of 400 or 300 mg/kg body weight pyquition (praziquantel) administered to mice 3 hours after inoculation of Schistosoma japonicum cercariae, the worm reduction rates were 89.0% and 87.5%, respectively. These rates are higher than those in animals treated with pyquition alone. It is considered that by raising the nonspecific immunological functions of the host, PJV may enhance the efficacy of pyquition on the 3-hour-old schistosomula.

397. Min, W.P., Huang, W.C. & Xia, B.F. Effect of praziquantel chemotherapy on the formation of hepatic granulomas induced by Schistosoma japonicum eggs in mice. Chinese Journal of Parasitic Disease Control, 1988, 1 (1): 35-37 (In Chinese, with English abstract)

Mice experimentally infected with Schistosoma japonicum were treated with a curative dose of praziquantel on either day 35 (PQT1) or day 45 (PQT2) after infection. The following changes in the hepatic granuloma induced by the eggs of Schistosoma japonicum were observed after treatment: (1) in PQT1 mice, only small granulomas, if any, were noted and their volume was reduced by 73.0% as compared with the untreated controls on day 45 post-infection and by 98.6% on day 115 post-infection; (2) no significant difference in granuloma volume between PQT2 mice and the controls was observed before treatment, but the volume was reduced by 43.2% at two weeks after treatment and by 95.7% on day 115 post-infection in PQT2 mice. At 8 weeks after treatment the structure of the liver tissue had nearly returned to normal. It is suggested that praziquantel could not only inhibit the formation of hepatic granulomas induced by S. japonicum eggs but also limit the development of granulomas that had formed in the liver.

398. Guo, J.L., Yuan, X.B., Chen, Q.C., Lu, X.P., Zhan, G.Y. & Ding, H.L. Study on sustained-release tablets of praziquantel. Chinese Journal of Schistosomiasis Control, 1989, 1 (2): 38-40 (In Chinese, with English abstract)

A sustained-release formulation of praziquantel tablets was investigated in order to reduce the frequency of the side effects. Normal tablets were chosen as control for the dissolution test and blood concentration determination. As in the normal tablets, the powder in the sustained-release tablets was soluble in the artificial gastric and intestinal fluids containing more than 15% alcohol. The sustained-release tablets showed a solubility of $43.8 \pm 3.9\%$ after 2 h in the artificial gastric fluid and of $71.6 \pm 2.0\%$ and $83.1 \pm 0.75\%$ after 3 h and 5 h, respectively, in the artificial intestinal fluid. The drug release conformed to the first order kinetic equation with the release constant (k) being 0.4013 h. In addition to the different fluids, the effect of tablet compression pressure on solubility is important. When the pressure was in the range of 4-7 kg, the change in solubility of the sustained-release tablets was less than $\pm 10\%$. When the pressure increased to 10-11 kg, the drug was soluble only to an extent of $4.81 \pm 0.12\%$ and $8.20 \pm 0.15\%$ after 1 h and 2 h, respectively, in artificial gastric fluid and of $22.61 \pm 0.90\%$ and $56.22 \pm 1.27\%$ after 3h and 5 h, respectively, in artificial intestinal fluid.

399. Wang, D.Z. Three cases of acute intracranial hypertension occurring in the course of treatment of cerebral schistosomiasis with praziquantel. Jiangxi Journal of Medicine and Pharmaceutics, 1989, 3 (24): 167-168 (In Chinese)

Eight patients with cerebral schistosomiasis were treated with praziquantel at the dosage of 120 mg/kg body weight for four days. In the course of treatment, intracranial hypertension occurred in three male patients. Two of them were diagnosed by pathological examination of the brain tissue under craniotomy. Clinical presentations included headache, vomiting, convulsion and in one case, aphasia. The increase of intracranial pressure in the three patients was identified during lumbar puncture. The cerebrospinal fluid dropped out very fast in all three patients, i.e. 82, 112 and 120 drops per minute, respectively. The symptoms were relieved in two patients after intravenous treatment with mannitol, and in the third patient, they disappeared automatically.

400. Wang, J.X. New trends in the pathogenesis of acute schistosomiasis in Anqing Prefecture, Anhui Province. Chinese Journal of Parasitology and Parasitic Diseases, 1989, 7 (1): 39 (In Chinese)

Six schistosomiasis outbreaks occurred one after the other in a residential area in Anqing Prefecture from 1982 to 1986. 193 cases were definitely diagnosed as acute schistosomiasis.

In five of the outbreaks 168 cases had become infected along the river strand that was luxuriant with willow trees, while in one of the outbreaks 25 cases became infected in a cultivated area. The total of 193 cases became infected as follows: playing in water, 107 cases (55.4%); swimming, 53 cases (27.5%); herding, 13 cases (6.7%); handling water for domestic use, 9 cases (4.7%); fishing, 6 cases (3.1%); and repairing boats, 5 cases (2.6%). Of the 193 cases, 120 (62.2%) became infected in July, 51 (26.4%) in August, 21 (10.9%) in June, and only 1 in May. Onset of acute schistosomiasis occurred between June and October: 117 cases (60.6%) in September, 64 (33.2%) in August, 8 (4.2%) in July, 3 (1.5%) in October and 1 (0.5%) in June. A marked postponement of the infection and onset seasons was noted as compared with previous records. The age distribution of the 193 cases was as follows: 81 cases (42.0%) were 4-10 years old; 84 (43.5%) were 11-15 years old; 15 (7.8%) were 16-20 years old; 13 (6.7%) were over 21 years old. Thus, acute infection occurred mostly in children.

In conclusion, the major causes of the six outbreaks were high local snail density and their high positivity rate for Schistosoma japonicum, frequent human contact with infective water, and lack of immunity in children. Health education for children should be strengthened.

401. Tu, C.L., Yu, J.P. & Sun, T.Y. Acute appendicitis in appendiceal schistosomiasis. Acta Academiae Medicinae Shanghai, 1989, 16 (4): 319-320 (In Chinese)

Over a period of six years, 1850 cases of acute appendicitis underwent an appendectomy in the Affiliated Jinshan Hospital, Shanghai Medical University. Of these patients, 1038 were peasants of whom 580 were diagnosed as having at the same time appendiceal schistosomiasis. The resected appendices had Schistosoma japonicum egg depositions surrounded by chronic inflammatory cell infiltration and fibrous tissue with significantly thickened appendiceal wall and narrowed lumen.

The case-record study of the 1038 peasant patients with acute appendicitis showed that: (1) acute appendicitis concomitant with appendiceal schistosomiasis occurred mostly in middle-aged or elderly patients and preponderantly in males, (2) the clinical presentation was comparable to that found in peasant patients with appendicitis but without appendiceal schistosomiasis from the same area, except that they were mostly afebrile and with only a slightly elevated leukocyte count, and (3) the development of complicated appendicitis, i.e. gangrenous and perforated appendix, was more frequent in patients with appendiceal schistosomiasis than in those without, while post-operative infection was also more frequently seen in these patients.

402. Jian, S.L., Cao, W.Z., Yan, J.L., Wu, M.M., Xu, J.L. & Chen, J.D. Relationship between hepatitis B virus markers and pathological diagnosis by liver biopsy in 76 cases of advanced schistosomiasis. Journal of Clinical and Experimental Pathology, 1989, 5 (2): 93-94 (In Chinese)

The relationship between hepatitis B virus (HBV) markers and pathological diagnosis by liver biopsy was studied in 76 cases of advanced schistosomiasis.

The results showed that among 26 patients with positive orcein stain of the hepatitis B surface antigen (HBsAg) in liver tissue and more than one positive HBV marker in sera, 23 (80.8%) had chronic active hepatitis with or without cirrhosis. In 55 patients with positive HBV markers in sera and/or in liver tissue, 31 (56.4%) had chronic active hepatitis, some of them with cirrhosis. However, in 23 patients with negative HBV markers both in sera and liver tissue, only 5 had chronic active hepatitis, all with cirrhosis. A statistically significant difference ($P < 0.005$) between the groups with positive and negative HBV markers was found.

403. Cui, X., Zhao, H.W., Jiang, Y.Z., Wang, S.P., Hu, J., Shu, Q.B. & Tian, H.S. A study of schistosomiasis with concomitant HBV infection. Acta Academiae Medicinae Hubei, 1989, 10 (1): 7-10 (In Chinese, with English abstract)

Hepatitis B virus (HBV) markers in sera from 605 patients in different phases of schistosomiasis were investigated using the enzyme-linked immunosorbent assay (ELISA). These patients were classified into three groups as follows: group 1 included 129 patients with acute schistosomiasis; group 2 included 315 patients with the early stage of chronic schistosomiasis; and group 3 included 161 patients with the advanced stage of chronic schistosomiasis. A group of 227 normal persons was used as control. In addition, a pathological examination was made of liver tissue obtained from 136 patients with advanced schistosomiasis during splenectomy.

The results showed that the presence of HBV markers in patients with acute and chronic schistosomiasis was not significantly different from that in the control group. The prevalence rates for hepatitis B surface antigen (HBsAg) and antibody to hepatitis B core antigen (anti-HBc) were, respectively, 14.7% and 23.3% for group 1, 11.7% and 19.7% for group 2, 27.3% and 34.8% for group 3 and 15.45% and 15.8% for the control group, the difference between group 3 and the other three groups being statistically significant ($P < 0.05$). Similar prevalences of HBsAg and anti-HBc were found in patients with hepatosplenic schistosomiasis and in patients after splenectomy. The liver function of patients with hepatosplenic schistosomiasis who were positive for serum HBsAg was more

unsatisfactory than that of patients who were HBsAg negative as estimated by serum albumin concentrations and serum albumin to globulin ratios. Misdiagnosis was found in 18.4% of the 136 patients with hepatosplenic schistosomiasis that was later demonstrated by biopsy. An immuno-histochemical study showed that 63.3% of 60 advanced cases were positive for HBsAg in their liver cells.

404. He, Y.X., Yu, Q.F. & Hu, Y.Q. Dermal responses of various hosts to infection with Schistosoma japonicum cercariae. Chinese Journal of Parasitology and Parasitic Diseases, 1989, 7 (1): 15-18 (In Chinese, with English abstract)

The present investigation concerns the dermal reactions produced in various host species by the invading schistosomula in primary infection. Eight animal species, including mouse, rat, hamster, jird, guinea-pig, rabbit, rhesus monkey and pigeon, were used. A small area of shaven abdominal skin exposed to 300 Schistosoma japonicum cercariae was taken at different time intervals from each animal species.

The dermal responses of the various hosts to schistosomula varied with their susceptibility. In the pigeon, an unsusceptible host, the skin reaction was very severe. Cutaneous lesions were observed as early as 30 minutes to 2 hours after infection and cellular infiltration increased markedly with time. The schistosomula then became surrounded by many leukocytes with eosinophilic granules, and finally disintegrated. In various mammalian hosts, the skin reaction to the primary infection was slight, consisting of hyperaemia, oedema and cellular infiltration mainly by neutrophils, except for the guinea-pig in which cellular infiltration was eosinophilic in nature.

405. Chen, G.G., Chen, H., Li, J.Y., He, W.N. & Chen, Y.Y. Preliminary study on serum amino-acid and liver micro-element in rabbit schistosomiasis. Chinese Journal of Zoonoses, 1989, 5 (2): 16-18 (In Chinese, with English abstract)

Serum amino-acid (AA) and liver micro-element (ME) in human and animal schistosomiasis have not previously been described. Sera and livers with egg nodules taken from 10 rabbits experimentally infected with Schistosoma japonicum were studied in comparison with those of normal control rabbits. The amounts of 18 common free amino-acids and of 5 necessary micro-elements (zinc, copper, iron, calcium and magnesium) were respectively detected by high-performance liquid chromatography (HPLC) and AAS. The values for glycine and histidine in infected rabbits were 1371.193 and 520.194, respectively, and were significantly higher than the respective values of 880.033 and 251.118 found in the normal controls ($P < 0.001$). The amounts of both isoleucine and lysine were markedly increased to 138.000 and 249.870, respectively ($P < 0.05$). On the contrary, the amounts of arginine and leucine in infected rabbits (i.e. 178.475 and 156.742, respectively) were much lower than in the controls (i.e. 270.726 and 190.554, respectively) ($P < 0.05$). No obvious changes were observed in the ratio of aromatic and alifatic (branched chains) amino-acids. The values for zinc and iron in the liver tissues of infected rabbits were 54.600 $\mu\text{g/g}$ and 100.00 $\mu\text{g/g}$, respectively, and were markedly higher than the values of 30.960 $\mu\text{g/g}$ and 19.240 $\mu\text{g/g}$, respectively, in the normal controls ($P < 0.01$ for zinc and $P < 0.001$ for iron). No obvious changes were observed in the contents of copper, calcium and magnesium.

406. Xu, D.W., Bao, X.Q., Wang, Y.Z., Qian, Y.N., Lu, C.Y. & Directed by Jing, W.X. A study on immunoreactivity of nephropathy in rabbits infected with Schistosoma japonicum. Chinese Journal of Schistosomiasis Control, 1989, 1 (2): 47-49 (In Chinese, with English abstract)

To study the pathogenesis of nephropathy in rabbits infected with Schistosoma japonicum, 56 rabbits divided into 5 groups were each exposed to 100, 200, 400, 800 or 1600 cercariae of S. japonicum, respectively. Another 12 rabbits were used as control. In each infected group, 2 of the rabbits with haematuria and/or proteinuria were treated with 150 mg/kg body weight pyquilon (praziquantel) on day 45 after infection.

Histopathological changes were investigated in renal section stained with haematoxylin-eosin and Schiff's periodic acid. The techniques of enzyme-labelled immunoglobulin and immunofluorescence were applied to examine the specific antigen (indirect) and nonspecific antibodies (direct) in renal sections of all infected rabbits.

Of the 56 infected rabbits, 46 (82.1%) had haematuria and/or proteinuria and, of these 46 untreated rabbits, 42 (91.3%) displayed histo-pathological changes which were mostly in the glomeruli and the severity of which was proportional to the duration of infection.

The results of immunohistochemistry showed that the antigens and the antibodies were deposited along the basement membrane of glomeruli. The deposition of antigens reached the higher level (HL) on day 45 after infection, declined to the lower level (LL) on day 60, and then remained at the relative middle level (ML), while the deposition of antibodies reached HL on day 30, declined to LL on day 45, and then rose again to HL. All these changes were not observed in the control group.

As for the treatment group, renal pathological changes were not found and immune reaction disappeared completely or partially.

In conclusion it is suggested that schistosomal nephropathy is an immune complex glomerulonephritis. Its pathogenesis may include the deposition of circulating immune complexes (CIC) and other immunological reactive material along the basement membrane of glomeruli and may also involve secondary renal lesions due to autoimmunity. The immunopathological changes of nephropathy could be reversed by effective antischistosomal therapy when this was applied in the early stage.

407. Liu, S.X., Song, G.C., Nie, J.H. & Chi, L.W. Further study on the immunity induced by mutagenic N-methyl-N-nitroso-guanidine (NTG)-attenuated cercariae of Schistosoma japonicum. Chinese Journal of Parasitology and Parasitic Diseases, 1989, 7 (2): 89-93 (In Chinese, with English abstract)

To gain a better understanding of the immunity induced by N-methyl-N-nitroso-guanidine (NTG)-attenuated cercariae of Schistosoma japonicum, investigations were carried out on mouse survival rate, worm reduction rate, liver and spleen granulation, etc., at different intervals between immunization and challenge (4, 6, 8, 10 and 12 weeks) in mice exposed percutaneously to NTG-attenuated cercariae (30 µg/ml NTG for 15 minutes). Scanning electron microscopic observation of the surface of schistosomes from immunized mice showed that better protection was achieved with the 8 week interval between immunization and challenge as demonstrated by the higher worm reduction rate, the longer survival rate and the lower degree of liver granulation. It is suggested that acquired immunity does in fact develop against a challenge in mice exposed to NTG-attenuated cercariae but that a different level of immunity is achieved at the different times post-immunization. The 8 week interval appeared to be the optimal time for acquired immunity developed against a challenge infection. The possibility of inducing different levels of immunity is discussed.

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