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Differences of Eosinophil Response among Three Species of Rodents, Rat, Jird and Mouse, during the Course of *Brugia pahangi* Infection

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Abstract: Peripheral blood eosinophil responses of Wistar rats, Mongolian jirds and BALB/c mice were examined during the course of *Brugia pahangi* infection. Eosinophil responses developed during early prepatent phase of infection (peaking at 2−4 weeks) independent of host species. Patent phase eosinophil responses were different from each other, namely, mice lacked this phase response. Jirds showed weak and transient eosinophil response (at 10−15 weeks) but it was completely suppressed to normal level within 16th week of infection in contrast to those continuous response in rats over 60th week.

Key words: Brugia pahangi, eosinophilia, Wistar rat, Mongolian jird, BALB/c mouse

Lymphatic filariasis have been investigated in various rodents, however, their applicability to a model for human filariasis has not been fully evaluated because of variety in their response during the course of infection, i. e., differences in susceptibility or differences in protective capacity against challenge infection (Philipp *et al.*, 1984). Therefore, it is important to compare their effector mechanisms against filarial infection with a common parameter such as eosinophil response to parasites. Eosinophilia is one of the most characteristic feature of parasitic infections and eosinophils have been identified as important effector cells not only for filariae (Higashi and Chowdhury, 1970; Greene *et al.*, 1981) but also for other parasites (Butterworth *et al.*, 1982). Thus, the eosinophil response to *Brugia pahangi* was examined in some laboratory rodents, rats and Mongolian jirds as susceptible hosts and mice as resistant hosts.

Infective larvae (L3) of *B. pahangi* were obtained from *Aedes aegypti* mosquitoes infected 14 days previously by blood meals on infected jirds. Wistar rats, Mongolian jirds

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and BALB/c mice were infected by subcutaneous injection of 500, 100 and 100 L3 at inguinal region, respectively.

Animals were bled every week from the retro-orbital plexus. Absolute eosinophil counts were made using Hinkelman's diluting fluid. Cell counts were performed in a Neubauer's hemocytometer. Microfilaria counts were also made according to the Knott's procedure (Knott, 1935) and/or by direct smear methods on 20 μl of blood.

Eosinophil responses were quite different between susceptible hosts and resistant hosts. Namely, susceptible hosts (rats and jirds) showed two distinct phases of eosinophil responses, one in the prepatent phase (peaking in 2-4 weeks) and another in the patent phase (after 9-10 weeks), in contrast to only former response in mice (Fig. 1). Since the first eosinophil responses (at 2-4 weeks) were observed in the early prepatent period and

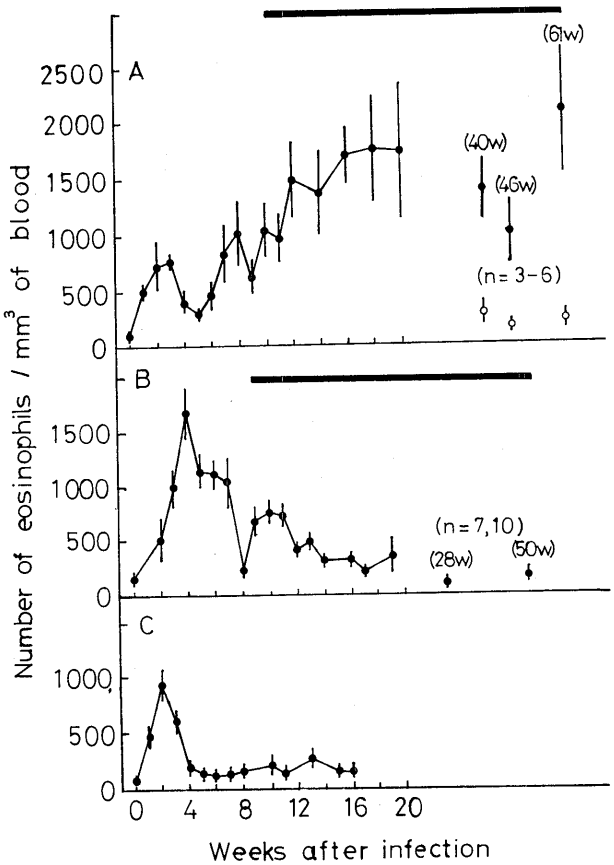

Fig. 1. Mean blood eosinophil counts during the course of *Brugia pahangi* infection in (A) male Wistar rats, (B) male Mongolian jirds and (C) male BALB/c mice (n=5,10 and 10, respectively unless otherwise stated in the figure). The values are the mean and standard error of mean (SEM, vertical bars) of eosinophil numbers. ●=infected animals. ○=uninfected age-matched controls. Horizontal solid bars indicate microfilaria positive.

independent on host species, they might be induced by developing stages of larvae. The second eosinophil responses might be induced by antigenic stimuli originated from microfilariae, because it began at the 9−10th week of infection, the time when these animals became microfilaremic. It is, however, clearly different in the pattern of patent phase eosinophil responses between rats and jirds. i.e., eosinophil response of jirds is weak and transient (reduced to normal level within 15th week of infection) in contrast to continuous responses of rats over 60th week of infection. It has been reported that lymphocyte unresponsiveness was induced in the jird−Brugia system in this timing (after 13 weeks postinfection) (Lammie and Katz, 1983). Eosinophil hyporesponsiveness might be related to that phenomena, and it may cause defective protective immunity to secondary infection of *B. pahangi* in the jird model (Klei *et al.*, 1980).

To trace the relationship between microfilaremia and eosinophilia in rats, animals were treated with intraperitoneal injection of 200 mg/kg of diethylcarbamazine (DEC) for consecutive 10 days. Blood eosinophil count increased in the first 5 days of treatment, then decreased rapidly as microfilarial count decreased. Eosinophil count reached a normal level after an amicrofilaremic condition. This result supports the above hypothesis that the latter eosinophil responses might be caused by microfilariae. In human filariasis, peripheral blood eosinophilia has been reported (Arisato, 1954), and the tropical pulmonary eosinophilia is considered to be induced by microfilariae (Webb *et al.*, 1960). Therefore, the Wistar rat might be a good model for an investigation of human eosinophilia caused by microfilariae.

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Brugia pahangi 感染ラット，ジャード，マウスにおける好酸球応答の差異

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雄の Wistar ラット，モンゴリアンジャード，BALB/c マウスにおける*Brugia pahangi* 感染後の末梢血好酸球の動態を調べた．感染後早期（ピークは２－４週）の好酸球応答は，動物種間で差がなく認められた．慢性期の好酸球応答は動物種間で差が認められた．すなわち，マウスにおいてはこの時期の好酸球応答は認められなかった．ジャードでは感染後10−15週で一過性に弱い好酸球応答が認められたが，持続的なミクロフィラリア血症にも拘らず16週までに正常値にもどった．一方，ラットにおいてはミクロフィラリアの出現している期間持続して好酸球の応答が認められた．

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