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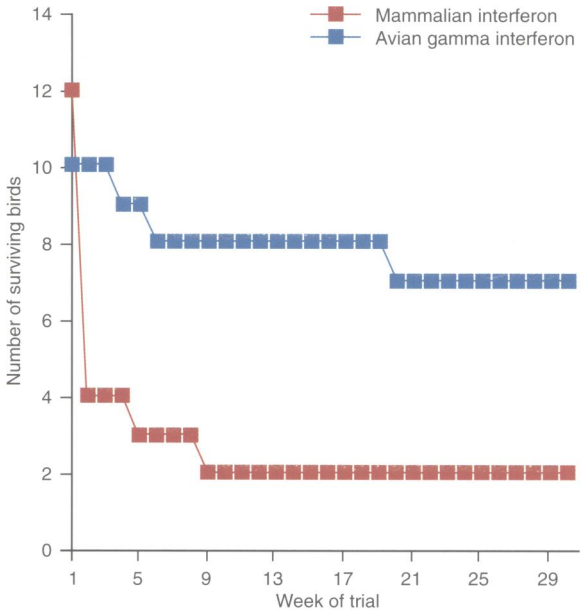

FIG 1: Comparison of survival rates of grey parrots after treatment with avian gamma interferon or a mammalian interferon of feline origin

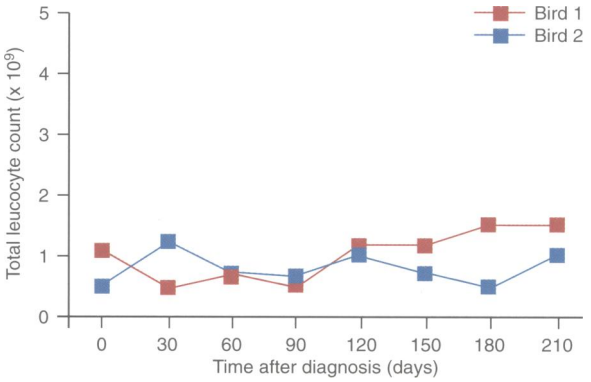

FIG 2: Total leucocyte counts in two surviving birds treated with an alpha type 1 mammalian interferon of feline origin

Interferon treatment of circovirus infection in grey parrots (*Psittacus e erithacus*)

M. STANFORD

PSITTACINE beak and feather disease (PBFD) is an important fatal disease of parrots caused by a circovirus (Ritchie and others 1989). PBFD virus is a small (15 to 17 nm) DNA virus spread through feather dust, faeces or crop fluids (Ritchie and others 1991a) and it is very resistant in the environment. It attacks rapidly growing cells and clinically can cause a chronic progressive feather dystrophy or an acute immunosuppressive disease depending on the age of the host when infected, due to its effects on bone marrow. The immunocompromised birds develop fatal secondary infections, the most common of which is severe pulmonary aspergillosis. Diagnosis is by PCR using a viral-specific DNA probe for PBFD virus from blood or feather pulp samples (Niagro 1990). There is no known treatment and control involves euthanasia of infected birds combined with disinfection of aviaries. The majority of adult birds can eliminate the virus, but this appears to be uncommon in young grey parrots (Ritchie and others 1991b).

Grey parrots (*Psittacus e erithacus*) infected with circovirus before involution of the bursa of Fabricus show a profound leucopenia and rapidly succumb to secondary infections, reflecting their inability to mount an immune response. Circovirus inclusions can usually be observed in the bursa of Fabricus (Pass and Perry 1984). In 2001, 137 grey parrots were presented to the author's clinic with circovirus infection confirmed by PCR. All of these birds died despite supportive treatment.

The interferons are a group of small protein and glycoprotein cytokines naturally produced by the immune system following natural infection or vaccination (Hudson and Hay 1989, Theze 1999). They protect a bird from biological attack by suppressing cell proliferation, inhibiting viral replication and augmenting the activity of macrophages and T lymphocytes. Initially, the use of interferon was limited because of the difficulty of manufacturing the protein in large enough quantities, but the recent development of recombinant DNA technologies has made interferon economic and easy to produce (Tossing 2001). An alpha type 1 interferon of feline origin has recently been produced commercially for the treatment of canine parvovirus in Europe (Minagawa and others 1999). The use of interferons and other cytokines has also been researched in the poultry industry in a bid to reduce the use of vaccines and in-feed antibiotics, with significant success (Lowenthal and others 1999, Bedford 2000). The aim of the present study was to evaluate the use of interferons for the treatment of circovirus infection.

Twelve grey parrots, which presented to the practice with clinical signs of circovirus infection, were subsequently confirmed by positive viral-specific DNA probe PCR tests (Georgia method) on both blood and feather pulp samples. All 12 birds exhibited profound leucopenia with total leucocyte counts, obtained by a direct method using a Neubauer counting chamber (Campbell 1995), of less than 1×10^9/litre(normal range 3×10^9 to 15×10^9/litre) in all cases. Each bird was injected daily with 1 million iu of an alpha type 1 interferon of feline origin (Virbagen Omega; Virbac Animal Health) intramuscularly for 90 days. Additional measures involved fogging the birds for 15 minutes twice daily with F10 Super Concentrate disinfectant (F10SC) (Health and Hygiene) at a dilution of 1:125 to reduce the potential risk of secondary infections. The fogger produced a droplet size of 6 µm. F10SC is a quaternary ammonia disinfectant used in commercial

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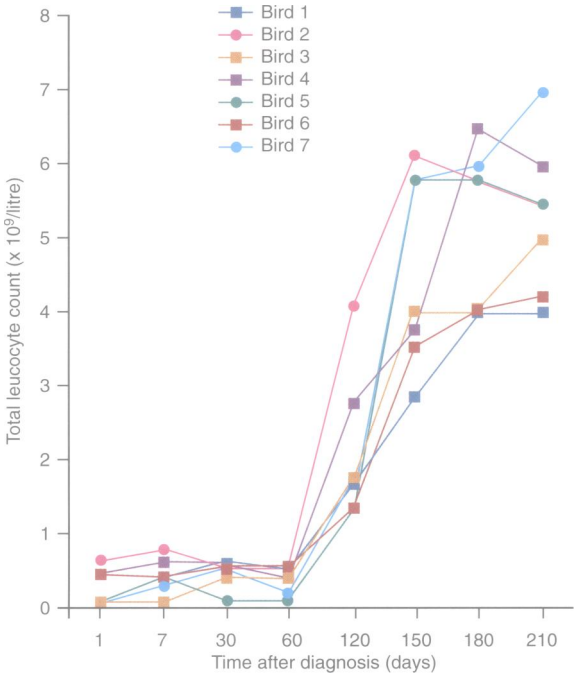

FIG 3: Total leucocyte counts in seven surviving birds treated with avian gamma interferon

poultry units to reduce aspergillus spore counts (Temperley and others 2003). It has also been administered by nebuliser to psittacine birds for the treatment and prevention of respiratory disease (Chitty 2002). The birds were monitored by determination of serial total leucocyte cell counts at 30-day intervals. Only two birds were still alive at week 30 (Fig 1). Both surviving birds were still leucopenic (Fig 2) and were found to be PCR positive for circovirus on samples obtained in week 30. The birds were euthanased.

A second group consisting of 10 grey parrots had presented with clinical signs of circovirus and were confirmed by PCR. All 10 birds were severely leucopenic. These birds were treated using an avian gamma interferon derived from poultry cell cultures (Lowenthal and others 1995). The birds were injected once daily with 1 million iu of avian gamma interferon intramuscularly for 90 days. The birds were fogged with F10SC as previously described. Seven of the 10 birds were still alive at week 30 (Fig 1) and the increase in total leucocyte counts in these birds over the time period is shown in Fig 3. By day 180, all seven birds exhibited normal total white blood cell counts. Using a t2 comparisons of means test, the difference between the total leucocyte count in the same birds between day 210 and day 1 was found to be statistically significant (with 95 per cent confidence limits). Samples of blood and feather pulp taken in week 30 were negative for circovirus by PCR in all seven birds. Nine months after the initial diagnosis the birds were still alive and had not exhibited any clinical signs of circovirus infection

On the basis of this study, gamma interferon of poultry origin would appear to have a potential use in the treatment of circovirus infection in young grey parrots. Despite the costs involved in daily injections and quarantine of the birds, this treatment was considered cost effective in relation to the high cost of baby psittaciforms. Mammalian interferon was not satisfactory. Interferons are considered to be species specific and a mammalian interferon would not be expected to have a significant action in avian patients, even though cross-species reactivity has been reported in birds (Kaiser and others 1998). No side effects were seen from the repeated interferon injections in any bird. The results are encouraging and a double-blind, placebo trial is now required.

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