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RESIDUES OF GENTAMICIN IN BUFFALO CALVES (*BUBALUS BUBALIS*) AND DOMESTIC FOWL (*GALLUS DOMESTICUS*)

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GENTAMICIN is one of the broad spectrum antibiotics and has gained considerable importance in veterinary medicine during the last decade. Detailed pharmacokinetic studies of gentamicin have been conducted in various mammals, some of the avian and lower vertebrate species. However, the data on the tissue persistence of gentamicin following multiple parenteral administration is only limited to human beings[1], guinea pig foetuses[2], sheep[3] and cows[4]. Inspite of the availability of a good deal of data on the therapeutic efficacy of gentamicin in many diseases, this antibiotic has not yet been approved by the Food and Drug Administration (FDA) for clinical use in food animals. Knowledge

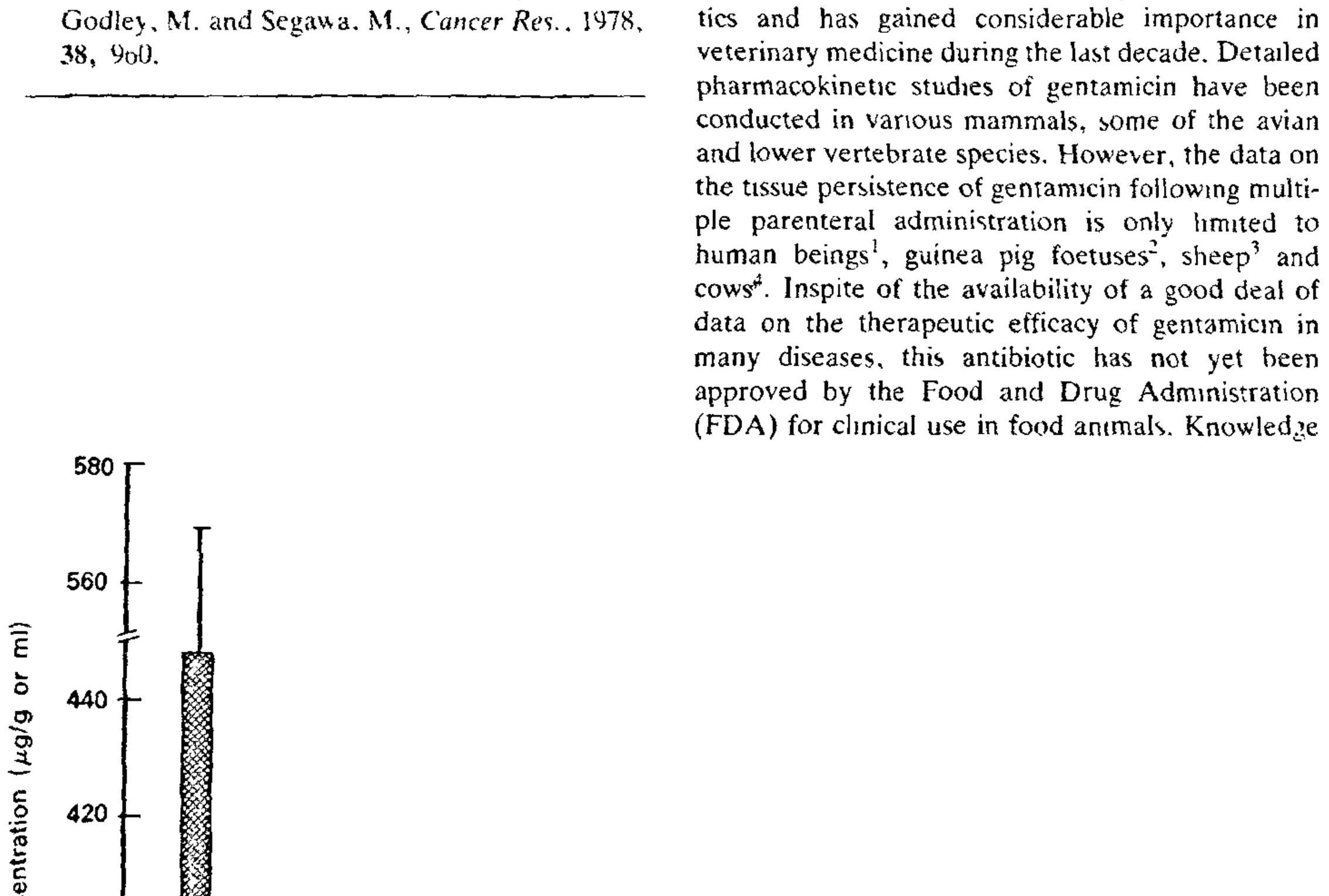

Figure 1. Concentration of gentamicin in body tissues and fluids of buffalo calves administered with a loading dose (6.22 mg/kg, im) and maintained with 5.06 mg/kg (im), every 8 h daily, for seven days.

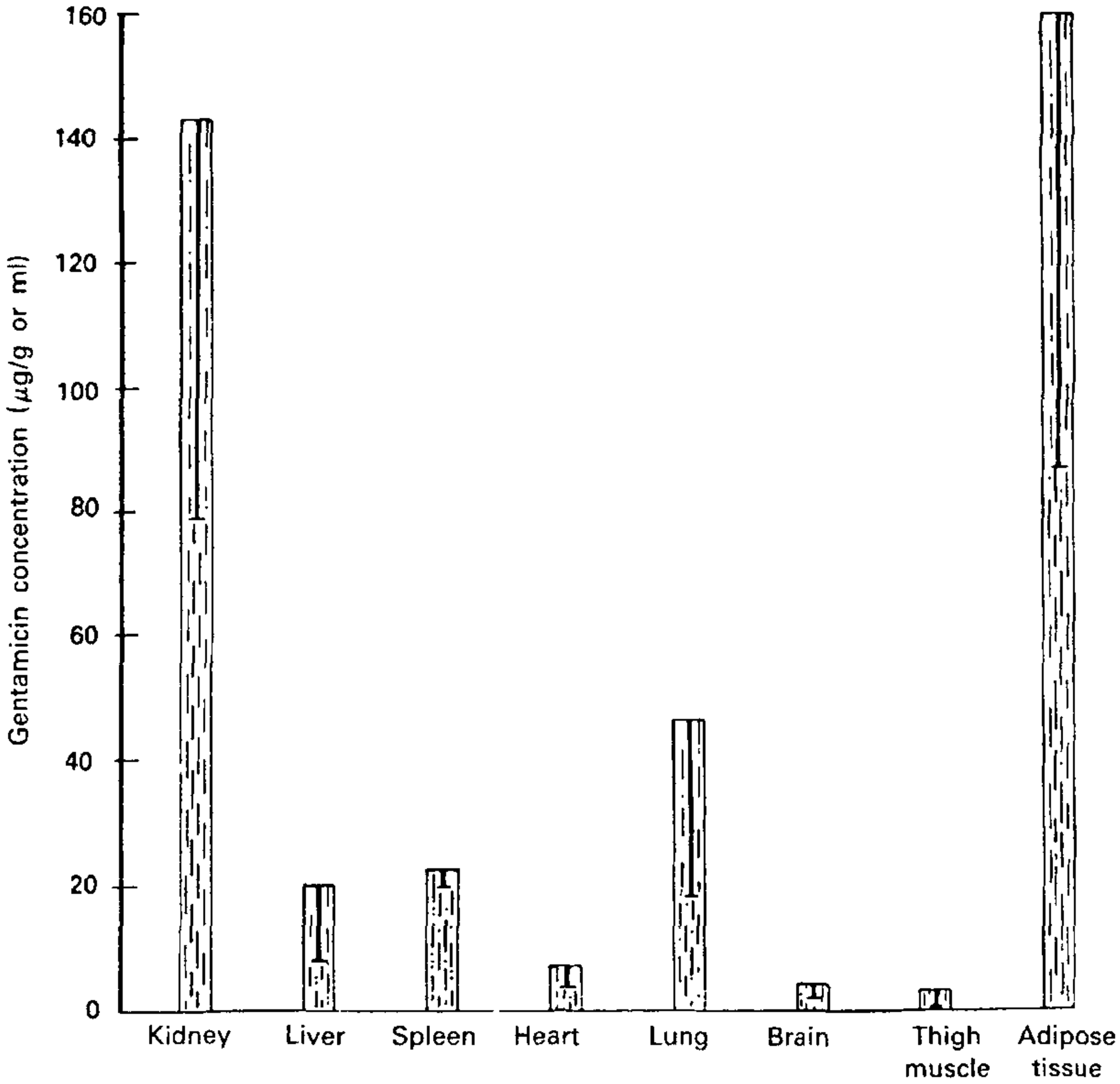

Figure 2. Concentration of gentamicin in body tissues of WLH chickens administered with a loading dose (11.91 mg/kg, im) and maintained with 9.83 mg/kg, (im), every 6 h daily, for seven days.

of drug residues in various body tissues of food animals has public health significance. The present communication reports gentamicin residues in various body fluids and tissues of buffaloes and chickens.

Gentamicin sulphate was administered intramuscularly (im) to both buffalo calves and chickens. The respective loading doses were 6.22 and 11.91 mg/kg. Subsequently, the plasma levels (≥ 3 μg/ml) were maintained with maintenance doses of 5.06 or 9.83 mg/kg at 8 or 6 h intervals in buffalo calves and chickens, respectively, for 7 days. On the 8th day, all the animals/birds were sacrificed by decapitation and some of the body fluids and tissues were collected. The body tissues were homogenized in aminoglycoside dilution buffer. For the quantitative measurement of gentamicin in body fluids and tissues, solid phase ^{125}I labelled Coat-A-Count radio immunoassay (RIA) kits (Diagnostic Products Corporation, Los Angeles, USA) were used.

The levels of gentamicin in various body fluids and tissues of buffaloes and chickens are illustrated in figures 1 and 2 respectively. Figure 1 reveals that therapeutically effective levels of drug (≥ 3 μg/ml or g^{-1}) were observed in almost all the body fluids and tissues except heart, brain and bile. In cerebrospinal fluid (CSF), only traces of drug (0.29 ± 0.11 μg/ml) could be detected. The highest concentration was observed in kidneys (447.95 ± 121.26 μg/g) followed by urine (330 ± 72 μg/ml). In the case of chickens the therapeutic levels of gentamicin were observed in all the body tissues examined (figure 2). Highest concentration of the drug was present in adipose tissue (159.73 ± 72.5 μg/g), followed by kidneys (143 ± 64 μg/g), lungs, spleen, liver, heart, brain and thigh muscles.

The present results suggest the accumulation of the antibiotic in various body tissues following repeated administration since the concentration of

the drug in the body tissues was very low after a single intravenous administration both in buffalo calves and chicken[5,6]. Accumulation of this antibiotic in various body tissues has also been observed upon repeated administration in the case of human beings[1], guinea pig foetuses[2], sheep[3] and cows[4]. Tissue persistence of gentamicin in both buffaloes and chickens questions the use of this antibiotic in food animals vis-a-vis warrants the human consumption of the meat (beaf/chickens) of such treated animals/birds since gentamicin is known to possess a high potential for oto- or nephrotoxicity.

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STUDIES ON THE ADRENOCORTICAL CELLS IN THE PIGEON, *COLUMBA LIVIA* DURING ITS REPRODUCTIVE CYCLE

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RECENT studies on seasonally breeding wild species of birds suggests a low production of corticosteroids during the sexually active phase and a relatively high production during the nestling phase[1–3]. Hence it was deemed of interest to study the structure and steroidogenic potential of the adrenal gland in the domestic pigeon, *Columba livia* during different phases of the reproductive cycle.

The reproductive cycle in the pigeon is divided into preincubation, incubation and squab feeding phases. Five pigeons of each sex from each phase of the reproductive cycle were selected from the pigeon colony maintained by the Zoology Department. The body weight of the pigeons was recorded at autopsy. They were sacrificed by decapitation and both the adrenals were dissected out and weighed to the nearest mg. One adrenal gland from each bird was fixed in Bouin's fluid and processed for routine histological studies. The other gland was used for histochemical localization of Δ^5-3β-hydroxysteroid dehydrogenase (Δ^5-3β-HSDH) and sudanophilic lipids[4,5]. The cortical cell activity was evaluated by measuring the nuclear diameter of the cortical cells and the number of cortical cells per unit area[6] in histological sections and the data were statistically analysed using Student's *t* test.

The observations on body weight, relative adrenal weight, number of cortical cells per unit area, cortical cell nuclear diameter, Δ^5-3β-HSDH activity and sudanophilic lipids in the cortical cells during different phases in both the sexes of pigeons are shown in table 1.

The gravimetric data on the adrenal glands and histometric data on the adrenocortical cells during different phases of reproduction in *C. livia* suggests that the adrenocortical cell activity is more during squab feeding and preincubation phases in both the sexes than during the incubation phase. The histological findings are supported by histochemical localization of Δ^5-3β-HSDH activity, which was maximum during squab feeding and preincubation phases with concomitant depletion of sudanophilic lipids. In white-crowned sparrow[7] and in pied flycatcher[2,3] a low cortical activity during the early phase of the reproductive cycle (sexual phase) and high cortical activity during nestling phase has been reported. The difference in our observations and those of Lorenzen and Farner[7], and Silverin[2,3] could be due to the fact that the birds in their study were caught from the wild whereas *C. livia* is a domesticated continuous breeder. The increased adrenocortical activity in *C. livia* during preincubation phase is correlated with increased sexual activity, as more corticosteroids could be needed during this phase, similar to that reported in the fowl wherein plasma corticosterone levels increase just before ovulation[8]. The functional significance of the increase in cortical cell activity during squab feeding