

Uterine adenocarcinoma with transcoelomic metastases in breeder hens (*Gallus domesticus*)

D G Bwala^a, N M Duncan^{b*} and S P R Bisschop^a

ABSTRACT

Hens involved in a Newcastle disease study were euthanased at regular intervals according to a designed protocol. Of these, 7.14 % ($n = 42$) of the 82-week-old specific pathogen-free breeder hens were found to have well-delineated firm white to yellowish nodules of varying sizes in the abdominal cavity. Histologically, the nodules were identified as an adenocarcinoma originating in the uterus. Transcoelomic spread was evidenced by the presence of similar neoplastic cells embedded in the serosa and outer longitudinal muscle layer of the intestines as well as the liver.

Keywords: adenocarcinoma, hens, uterine tumour.

Bwala D G, Duncan N M, Bisschop S P R **Uterine adenocarcinoma with transcoelomic metastases in breeder hens (*Gallus domesticus*)**. *Journal of the South African Veterinary Association* (2011) 82(1): 53–55 (En.). Poultry Reference Centre, Faculty of Veterinary Science, University of Pretoria, Private Bag X04, Onderstepoort, 0110 South Africa

INTRODUCTION

Tumours in commercial poultry are mostly caused by infection with avian herpes, leukosis and retroviruses³ and thus most studies on avian tumours have been focused on those with viral aetiology, probably due to their economic importance and also because they serve as a model for human cancer studies¹⁰.

Adenocarcinomas in poultry are among the groups of tumours of unknown aetiology, and have been reported by several veterinary pathologists and reviewed¹².

The term adenocarcinoma⁹ or peritoneal carcinomatosis¹³ has been applied to tumours whose origin cannot be ascertained but that spread widely over the peritoneum and other visceral organs and are frequently observed in aged hens⁸. Spontaneous neoplasms or adenocarcinomas affecting various organs have been reported in specific pathogen-free (SPF) hens^{4,5} and most of these tumours are thought to originate in the oviduct or ovary^{2,6,11}. A study in Irish abattoirs reported 419 birds with nodules, 80.4 % of which were tumours, and 71.8 % of the tumours were adenocarcinoma of the intestine and reproductive tract¹⁵. A prevalence of 5–81 % for oviductal adenocarcinomas in

end-of-lay hens⁷ and 92.9 % for ovarian and oviduct adenocarcinomas¹ in 305 4-year-old layers has been reported¹.

Generally, information on the incidence of nonviral tumours in commercially raised chickens and turkeys is limited, probably due to their shorter life span than that required for the development of such tumours^{10,12}. Also, there are few reports of tumours that are not virally induced because structured surveys are not conducted to assess the situation as they are generally perceived as incidental conditions. Nonviral tumours are also probably considered to be of less economic importance¹². The present communication reports cases of uterine adenocarcinoma in SPF breeder hens (*Gallus domesticus*) encountered during an experimental virus challenge study.

MATERIALS AND METHODS

Forty-two commercial Hyline Brown layers (52 weeks old) and 42 SPF White Leghorn breeder hens (82 weeks old) selected for a Newcastle disease vaccine trial were randomly assigned into 8 groups. Birds were then vaccinated with La Sota vaccine after acclimatising for 2 days and subsequently challenged 10 days later with a virulent isolate of Newcastle disease virus belonging to lineage 5d/VIIId. Eight birds (4 SPF and 4 commercial) were euthanased on days 2, 4, 6, 8 and 10 post-vaccination and post-challenge. The euthanased birds were necropsied and various organs required for the trial were collected. The

organs with nodules encountered at necropsy were also sampled. Gross findings were recorded and samples of the organs including those with nodules were preserved in 10 % neutral buffered formalin, trimmed and then routinely processed and stained with standard haematoxylin and eosin (H&E) and then examined by light microscopy.

RESULTS

All the birds were in a relatively good bodily condition throughout the trial. Two of the hens euthanased on day 2 post-vaccination and another 1 euthanased on day 6 post-challenge, however, had prominent keel bones and shrunk breast muscles. The coelomic cavity of all 3 hens was filled with firm white to yellowish growths of varying sizes. The nodules were found on the oviduct, pancreas, liver, heart, spleen, proventriculus, intestines and the mesentery (Figs 1 & 2). There were adhesions between the various organs and especially between the intestinal loops. The intestinal mesentery was also extensively involved resulting in clumping of the intestine. The follicles were inactive with no mature or developing ova and the oviducts were small, flaccid and non-functional.

Microscopically, the uterine changes were characterised by transmural branching cords and sheets of neoplastic cells. Indications of acinus/tubule formation were also present within these aggregates of neoplastic cells (Figs 3 & 4). The neoplastic cells had medium to large vesicular nuclei with a single nucleolus and moderate amounts of grey, finely granular cytoplasm. The mitotic index was low. Marked fibroplasia (scirrhous reaction) was found surrounding the acinar structures (Figs 3 & 4). Transcoelomic spread was evidenced by the presence of similar neoplastic cells embedded in a prominent fibrous stroma abutting the serosa and outer longitudinal muscle layer of the intestines as well as on the capsule of the liver. The glandular origin of the neoplasm was much more evident in the metastatic foci, with tubule and acinus formation being prominent. There was no evidence of neoplasia in the ovarian and magnal tissues.

^aPoultry Reference Centre, Faculty of Veterinary Science, University of Pretoria, Private Bag X04, Onderstepoort, 0110 South Africa.

^bPathology Department, Faculty of Veterinary Science, University of Pretoria, Private Bag X04, Onderstepoort, 0110 South Africa.

*Author for correspondence.
E-mail: neil.duncan@up.ac.za

Received: September 2009. Accepted: March 2011.



Fig. 1: White-yellowish, firm, well-delineated nodules of between 5 and 10 mm attached to various organs in the abdominal cavity (arrows).



Fig. 2: Arrows showing the peritoneum and the mesentery densely embedded with smaller nodules.

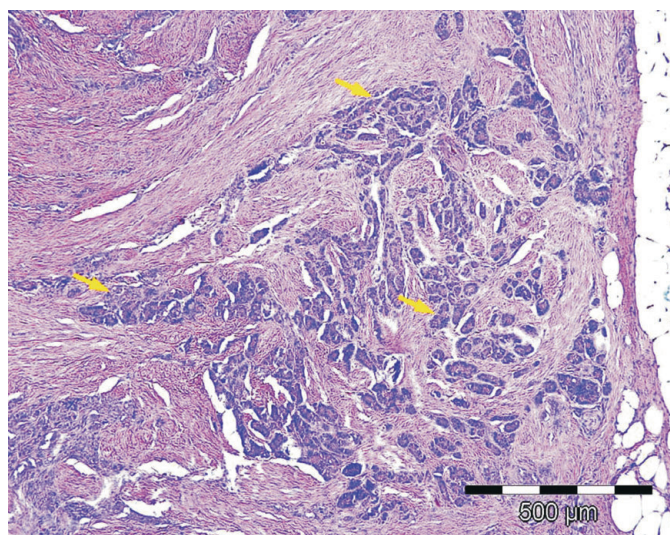


Fig. 3: Uterus showing branching cords and sheets of neoplastic cells infiltrating between the smooth muscle bundles of the complete width of the uterine wall (arrows). H&E, $\times 10$.

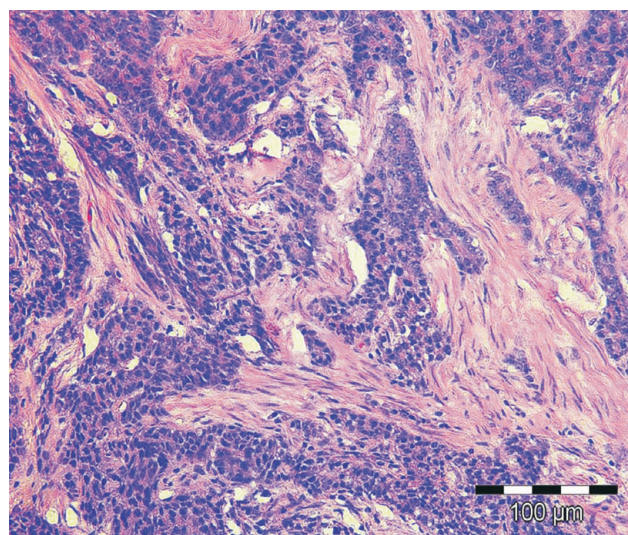


Fig. 4: Acinus/tubule formation of sheets of neoplastic cells invading the smooth muscles of the uterus. H&E, $\times 40$.

DISCUSSION

These cases were diagnosed as uterine adenocarcinoma with transcoelomic metastases based on the histological morphology of the uterine neoplasm. The neoplasm was characterised by branching cords and sheets of cells infiltrating between the smooth muscle bundles of the uterine wall. These changes were absent in the magal tissue and ovary. Metastatic abdominal adenocarcinomas may originate from either the ovary or the oviduct and their differentiation may be difficult¹¹. In these cases the absence of neoplastic cells in the ovarian and magal tissues confirms the site of origin as uterine in nature. According to a previous report¹², most adenocarcinomas of the oviduct originate in the upper magal portion of the oviduct, but occasional cases of adenocarcinomas do occur in the

shell gland (uterus) and infundibulum. Although this was not a structured research study, the prevalence of 7.14 % recorded agrees with previous findings of a prevalence rate of 5–81 % for oviductal adenocarcinoma⁷.

These adenocarcinomas were encountered in 82-week-old White Leghorn hens, which tallies with the reviewed published findings¹ that ovarian and oviductal adenocarcinomas are among the most frequently encountered tumors in older White Leghorn hens. The SPF birds used in the study had been laying eggs for approximately 62 weeks and prolonged reproductive activity and ageing has been suggested to have a direct relationship to the occurrence of oviductal adenocarcinomas in fowl^{4,15}, presumably because the high egg production is associated with continuous gonadotrophin production, resulting in the excess stimu-

lation of oestrogen-sensitive target organ epithelium¹⁴.

In conclusion, neoplastic diseases, irrespective of their aetiology or the organ affected, cause economic loss and therefore the recording and reporting of these diseases remain vital.

ACKNOWLEDGEMENT

We are grateful to the Poultry Reference Centre, Faculty of Veterinary Science, University of Pretoria, for funding the diagnostic bills and Dr Kerstin Junker for her assistance with the micrograph pictures.

REFERENCES

1. Alfonso M, Adochiles L, Hendrickson V M, Carver D K, Rodriguez G C, Barnes H J 2005 Metastatic adenocarcinoma in the lungs of older laying hens. *Avian Diseases* 49: 430–432.
2. Campbell J G 1969 *Tumours of the fowl*. Lippincott, Philadelphia, PA: 180–182.

3. Fadly A M 2003 Neoplastic diseases. In Saif Y M, Barnes H J, Glisson J R, Fadly A M, McDougald L R, Swayne D E (eds) *Diseases of poultry* (11th edn). Iowa State Press, Ames, IA: 405–407
4. Fredrickson T N 1987 Ovarian tumors of the hen. *Environmental Health Perspectives* 73: 35–51
5. Fredrickson T N, Helmboldt C F 1991 Tumors of unknown etiology. In Calnek B W, Barnes H J, Beard C W, Reid W M, Yoder H W (eds) *Diseases of poultry* (9th edn). Iowa State University Press, Ames, IA: 459–470
6. Giles J R, Shivaprasad H L, Johnson P A 2004 Ovarian tumor expression of an oviductal protein in the hen: a model for human serous ovarian adenocarcinoma. *Gynecologic Oncology* 95: 530–533
7. Goodchild W M 1969 Adenocarcinoma of the oviduct in laying hens. *Veterinary Record* 84: 122
8. Haritani M, Kajigaya H, Akashi T, Kamemura M, Tanahara N, Umeda M, Sugiyama M, Isoda M, Kato C 1984 A study on the origin of adenocarcinoma in fowls using immunohistochemical technique. *Avian Diseases* 28: 1130–1134
9. Ilchmann G, Bergmann V 1975 Histologische und elektronenmikroskopische Untersuchungen zur Adenokarzinomatose der Legehennen. *Archiv für Experimentelle Veterinärmedizin* 29: 897–907
10. Kumar R, Nair M G, Lakkawar A W, Varshney K C 2004 Ovarian adenocarcinoma in a guinea fowl (*Numida meleagris*) – a case report. *Veterinarski Arhiv* 74: 245–249
11. Reece R L 1997 Tumours of unknown etiology. In Calnek B W (ed.) *Diseases of poultry* (10th edn). Iowa State University Press, Ames, Iowa: 459–463
12. Reece R L 2003 Neoplastic diseases. Other tumours of unknown etiology. In Saif Y M, Barnes H J, Glisson J R, Fadly A M, McDougald L R, Swayne D E (eds) *Diseases of poultry* (11th edn). Iowa State Press, Ames, IA: 541–564
13. Sokkar S M, Mohammed M A, Zubaidy A J, Mutalib A 1979 Study of some non-leukotic avian neoplasms. *Avian Pathology* 8: 69–75
14. Swarbrick O, Campbell J G, Berry D M 1968 An outbreak of oviduct adenocarcinoma in laying hens. *Veterinary Record* 82: 57–59
15. Talebi A, Collins J D, Dodd K 1993 Nodular lesions found in Irish poultry during veterinary inspection at poultry meat plants. *Avian Pathology* 22: 715–724