Mast cells evaluation and distribution in the goat
Intestinal tract
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Summary
The mast cell is one of the connective tissue cells; it is located in different tissues of the goat body. The mast cells were large ovoid with large spherical nucleus and different shape and size granules in the cytoplasm of the control group, while it was oval in shape in the heavy infested group. The mast cells were characterized by uninucleation. Some cells in the heavy parasites infested groups showed sparsely scattered metachromatic granules. The cells were more numerous in the large intestine than those of the small intestine. The cells were numerous in the heavy parasites infested groups than that of the control groups.

Introduction
The mast cells had the ability to produce a biological active substance as heparin, serotonin and dopamine (1). It had a very characteristic role in natural cytotoxicity against tumor cells (2), also it had a protective role in the viral infection as that recorded in the bovine leukemia virus (3). It also had anti parasitic function in the heavy infested tissues (4). Gastrointestinal mast cells are involved in many pathologic effects, such as food hypersensitivity. On the other hand, they play a protective role in defense against parasitic and microbial infections. Thus, they have both positive and negative effects, but presently the mechanisms that control the balance of these various effects are poorly known. It has been suggested that stabilization of mast cells may be a key mechanism to protect the gastrointestinal tract from injury (5). The present work was aimed to study the histological distribution of the mast cells in the intestinal tract of the control and heavy parasites infested goat groups.
**Material and Methods**

Two groups of goats were raised, each of three goats. The first group was raised under good hygienic condition of food, water and routinely treated with recommended doses of antihelminthics. The second group of goats was raised in the field condition without any treatment. The fecal matters of these groups were examined for the detection of parasitic infestation. The first group was free of parasitic infestation while the second group was infested by different types of parasites.

The intestinal tracts of the two groups were collected. Small parts of the duodenum, jejunum, ileum, caecum, colon and rectum were immediately immersed in Susa fluid, and prepared for paraffin section. Cut at 4-5 u, then stained toludine blue for metachromatic granules of mast cells. These methods were done after (6). The count of the mast cells in the different parts of the intestinal tract was done by using computer program (Semaphore program). This number was an average number per section and was taken from serial sections of each region.

**Results**

The mast cells of the parasitic free goats (group.1) were oval to ovoid in shape with basophilic cytoplasm which was studded with large cytoplasmic granules. The nuclei were centrally located nonsegmented, large and had spherical or oval in shapes. The nucleus might be obscured by the metachromatic granules (Fig.1a).

The average numbers of the mast cells were varied according to their site of location. (Table.1). These numbers had increased ascendingly from the duodenum towards the rectum. The mast cells were mainly located in the lamina propria and extended to the core of the villi and between the crypts of lberkhun (Fig. 1-6). None of the examined specimens was revealed the presence of mast cells in the submucosa, tunica muscosa or tunica serosa.

The mast cells of the duodenum (Fig.1) represented 10 % of the total average number in the intestinal tract but became 26% of the cells in the small intestine. The cells were represented 16% of the cells in the large intestine. In the jejunum, (Fig.2) were represented 12 % of the total mast cells of the intestinal tract but reached 32% of the cells in the
small intestine and 19% of the cells in the large intestine. In the ileum (Fig.3). They were represent 15% of the total number in the intestinal tract but reached 40% of the cells in the small intestine and 24% of the cells in the large intestine.

The mast cells were large ovoid with different shaped cytoplasmic granules. In the caecum (Fig.4), they were represented 18% of the total mast cells number in the intestinal tract but reached 48% of the cells in the small intestine and 29% of the cells in the large intestine. In the colon (Fig.5), it represent 20% of the total mast cells number in the intestinal tract while 53% of the cells in the small intestine and 32% of the cells in the large intestine. And lastly in the rectum (Fig.6), the average number had increased more than the other parts. They represented 23% of the total mast cell numbers in the intestinal tract but reached 63% of the cells in the small intestine and 38% of the cells in the large intestine.

The second group has shown increased number of the mast cells in the different parts of the intestinal tract in comparison to those of the first group. The mast cells were large ovoid or somewhat elongated with sparsely distributed cytoplasmic granules and centrally located nuclei. (Fig.7a). In the duodenum the mast cells were large oval cells with large centrally located nuclei (Fig.7) and represented 9% of the total mast cell numbers in the intestinal tract while reached 25% of the cells in the small intestine and 14% of the cells in the large intestine. In the jejunum, (Fig.8). They represented 12% of the total mast cells number in the intestinal tract while 32% of the cells in the small intestine and 19% of the cells in the large intestine. Whereas in the ileum (Fig.9), they represented 15% of the total mast cell numbers in the intestinal tract while reached 42% of the cells in the small intestine and 25% of the cells in the large intestine.

The mast cells were large ovoid having different shapes of cytoplasmic granules in the caecum (Fig.10). They represented 18% of the total mast cell numbers in the intestinal tract while reached 50% of the cells in the small intestine and 29% of the cells in the large intestine. While in the colon (Fig.11), they represented 21% of the total mast cell numbers in the intestinal tract while reached 57% of the cells in the small intestine and 34% of the cells in the large intestine.
And lastly in the rectum (Fig.12), the number was increased more than the other parts. They represented 23% of the total mast cells number in the intestinal tract while reached 61% of the cells in the small intestine and 36% of the cells in the large intestine.

**Table (1):** Showing: the average number per section of the mast cells in the different parts of the intestinal tract of the first group.

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<th>Ratio (%) to</th>
<th>Duode -num</th>
<th>Jeju- num</th>
<th>Ileum</th>
<th>Caec- um</th>
<th>colon</th>
<th>rectum</th>
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**Table (2):** Showing: the average number per section of the mast cells in the different parts of the intestinal tract of the second group.

<table>
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<th>Jeju- num</th>
<th>Ileum</th>
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Fig.1a: High magnification of a mast cell showing metachromatic granules. Toludine blue …………………...X400

Fig.2: Photomicrograph of a goat jejunum from the first group showing; different shape mast cells (M) in the lamina propria and their number was increased in compare to that of the duodenum. Toludine blue ………………………...X400

Fig.3: Photomicrograph of a goat ileum from the first group showing; different shapes mast cells (M) in the lamina propria. Also showing increased number of mast cells. Toludine blue ………………………...X400

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Fig. 12a: High magnification of the previous figure showing; sparsely granulated mast cells, Toludine blue ............X400
Discussion

The mast cells are normally distributed in the gastrointestinal tract (7) and in their CT where their cytoplasmic granules contain heparin (8). They are found in the vicinity of the small blood vessels of the organs (9).

The present result revealed that the metachromsia was the main characteristic feature of the mast cells. Although this phenomenon could be appeared perfectly in mature mast cells than in the degranulated cells. On the other hand metachromsia is found in mature mast cell but precursor, immature, degranulated and atypical mast cells may demonstrate limited or no metachromsia while they express granules and membrane specific proteins (10).

The present data revealed that the mast cells were mainly distributed in the lamina propria but not in any other part of the intestinal tract wall and were increased ascendingly from duodenum to the rectum; similar findings were recorded in the gastrointestinal tract of rat. (11) In contrast, the pig intestinal tract showed, mast cells in other parts of the wall rather than the lamina propria (12).

The number of the mast cells increased ascendingly from the duodenum to the next parts and reached their maximum in the rectum. This is due to the large intestine is more susceptible to the parasitic infestation more than the small intestine. Both of the mast cells and the lymphocytes played an important role in defense mechanism especially in the intestinal tract (13).

The mast cells appeared large with sparse cytoplasmic granules in the second group. This degranulation may be due to degranulation in areas of active disease, suggesting that the inflammatory mediators released from these cells contribute to the pathophysiology of these disorders. (14).

Mast cells are important effectors cells providing granule and membrane mediators as well as cytokines in allergic and inflammatory diseases. The study of surface molecules such as immunoglobulin receptors and adhesion molecules has greatly expanded our understanding of mast cell physiology (9). Activatory and inhibitory receptors have been defined with critical roles in maintaining cell functional activity. An active role for mast cells in antigen presentation to T cells has recently been shown, and direct interaction between mast
cells and B cells providing signals for specific IgE production has been demonstrated (15). Mast cells have different functions in promoting and modulating inflammation and in remodeling the extracellular matrix (16).

Morphology and metachromasia have been the two fundamental criteria for the recognition of tissue mast cells. The description of mast cells as mononuclear metachromatic cells needs to be amplified to include cells with multilobulated nuclei. Among the present data, the mast cells of goat were mononuclear type and no multinuclear or segmented nuclei were seen. In contrast in human mast cells may have segmented nuclei analogous to mouse mast cells which can possess multilobular nuclei at various tissue localizations (17). Those multilobulated mast cells express the normal protease phenotype as well as c-kit and have an electron microscopy structure similar to mononuclear mast cells at the same tissue localization (17).

References
تقييم وتوزيع الخلايا السارية في القناة المعوية في الماعز

حسام فؤاد عطيه - إيهاب محمود الزغبي
قسم الانسجه والخلايا-كليه الطب البيطري- جامعه الزقازيق/ فرع بنها

أجريت هذه الدراسة على مجموعتين من الماعز، الأولي كانت سليمة وخالية من الديدان و الطفيلات والثاني كانت معاناة في الحقل بدون أي علاج
ولقد لوحظ أن الخلايا السارية في المجموعة الأولى كبيرة الحجم وذات نواه وسطية وحببيات سيتو بلازمية كبيرة، ونلاحظ أن عددها كان أقل من المجموعه الثانية وقد ازداد هذا العدد في اتجاه امتعان الغليظه

كما لوحظ أن الخلايا السارية في المجموعة الثانية كانت كبيرة الحجم وذات نواه طويلة وحببيات سيتو بلازمية كبيرة ولكنها كانت أقل عددًا. ولنلاحظ أن عددها اقل من المجموعة الأولى وازداد العدد في اتجاه امتعان الغليظه تصاعديا.

ولنلاحظ أيضا ان توزيع الخلايا السارية قد تركز في الطبقة الاساسية المخاطية ولم يلاحظ في أي طبقه اخري من طبقات جدار الأمعاء.