Study of the histometry and Smooth Muscle Alpha Actin (ASMA) in smooth muscles of the small intestine of camel

Fatahian Dehkordi, R.A.[1]; Kiani, F.Z.[2] and Nasiri, I.[2]

Received: 06.09.2017 Accepted: 10.04.2018

Abstract

Immunoreactivity of alpha-smooth muscle actin (ASMA), along with histometric values was evaluated in camel small intestine in both sexes. A total of 8 camels (both sexes male and female) were selected from Najaf Abad slaughterhouse and then the abdominal cavity was dissected and the small intestine was removed. The one cm fragment from three parts was fixed in formalin and from some specimens sections were prepared and stained with hematoxylin-eosin and the remainder were immunohistochemically stained with alpha actin antibodies. The results showed that there are the longest villi of the intestine in jejunum, the largest diameter of the villi in the ileum and the deepest crypt of the intestine in the duodenum. Morphometric results showed that the mean of the thickness of the mucous and submucosal layer in the duodenal region was more than the jejunum and ileum this organ. The mean thickness of the muscular layer in both sexes in the intestinal jejunum region is less than the duodenum and ileum this organ. Different intensities of alpha-actin expression were observed, as the lowest alpha-actin intensity in jejunum and the highest intensity of α-actin expression of smooth muscle in ileum was observed. Due to the lowest thickness of the muscle layer in jejunum, the lowest expression of alpha-actin in this region was observed. The expression of smooth muscle alpha-actin in the small intestine of the camel was evident, but its severity was different.

Key words: Alpha Smooth Muscle Actin, Immunohistochemistry, Morphometry, Small intestine, Camel

1- Associate Professor, Department of Basic Sciences, Faculty of Veterinary Medicine, Shahrekord University, Shahrekord, Iran

2- DVM Student, Faculty of Veterinary Medicine, Shahrekord University, Shahrekord, Iran

Corresponding Author: Fatahian Dehkordi, R.A., E-mail: fatahian_1349@yahoo.com

Refrences

Berseth, C.L. (1996). Gastrointestinal motility in the neonate. Clinics in Perinatology, 23(2): 179-190.

Eurell, J.A. and Frappier, B.L. (2013) Dellmann's textbook of veterinary histology. 6th ed. John Wiley & Sons. P: 210.

Fatahian Dehkordi, R.A.; Baghai, R. and Rahimi, R. (2016). Morphometric properties and distribution of alpha-actin in the smooth muscle cells (ASMA) of the small intestine during development in chicken. Journal of Applied Animal Research, 44(1): 492-497.

Fatahian Dehkordi, R.A.; Daryalal, Y. and Lajmiri, E. (2015). Expression of alpha-smooth muscle actin as special and morphometric assessment in the small intestine during the postnatal development in hamster. Journal of Histotechnology, 38(2): 45-50.

Fatigati, V. and Murphy, R.A. (1984). Actin and tropomyosin variants in smooth muscles. Dependence on tissue type. Journal of Biological Chemistry, 259(23): 14383-14388.

Gamba, E.; Carr, N. and Bateman, A. (2004). Deficient α smooth muscle actin expression as a cause of intestinal pseudo-obstruction: fact or fiction? Journal of Clinical Pathology, 57(11): 1168-1171.

Geiger, B.; Dutton, A.H.; Tokuyasu, K.T. and Singer, S.J. (1981). Immunoelectron microscope studies of membrane-microfilament interactions: distributions of alpha-actinin, tropomyosin, and vinculin in intestinal epithelial brush border and chicken gizzard smooth muscle cells. Journal of Cell Biology, 91(3): 614-628.

Gunning, P.; Ponte, P.; Okayama, H.; Engel, J.; Blau, H. and Kedes, L. (1983). Isolation and characterization of full-length cDNA clones for human alpha-, beta-, and gamma-actin mRNAs: skeletal but not cytoplasmic actins have an amino-terminal cysteine that is subsequently removed. Molecular and Cellular Biology, 3(5): 787-795.

Guo, D.C.; Papke, C.L.; Tran-Fadulu, V.; Regalado, E.S.; Avidan, N.; Johnson, R.J. et al. (2009). Mutations in smooth muscle alpha-actin (ACTA2) cause coronary artery disease, stroke, and Moyamoya disease, along with thoracic aortic disease. The American Journal of Human Genetics, 84(5): 617-627.

Hasanzadeh, S. and Orojee, S. (2003). Gross Morphology, Histology and Histomorphometry of the ileum in river buffalo. Buffalo Journal, 19(3): 273-282.

Jani, P.U.; McCarthy, D.E. and Florence, A.T. (1992). Nanosphere and microsphere uptake via Peyer's patches: observation of the rate of uptake in the rat after a single oral dose. International Journal of Pharmaceutics, 86(2-3): 239-246.

Junqueira, L.C.; Carneiro, J. and Kelly, R.O. (1983). Basic histology. 6th ed., London, Prentice Hall International. Pp: 282-311, 346.

Kanamori, Y.; Ishimaru, K.; Nanno, M.; Maki, K.; Ikuta, K.; Nariuchi, H. et al. (1996). Identification of novel lymphoid tissues in murine intestinal mucosa where clusters of c-kit+ IL-7R+ Thy1+ lympho-hemopoietic progenitors develop. Journal of Experimental Medicine, 184(4): 1449-1459.

Lesson, T.; Lesson, C. and Paparo, A. (1988). ext and atlas of histology. 1st ed., Orlando, Florida, USA, W. B. Saunders Co. Pp: 434-463.

Lu, X.; Zhao, J. and Gregersen, H. (2005). Small intestinal morphometric and biomechanical changes during physiological growth in rats. Journal of Biomechanics, 38(3): 417-426.

Pekas, J.C. and Wray, J.E. (1991). Principal gastrointestinal variables associated with metabolic heat production in pigs: statistical cluster analyses. The Journal of Nutrition, 121: 231-239.

Perrin, B.J. and Ervasti, J.M. (2010). The actin gene family: function follows isoform. Cytoskeleton, 67(10): 630-633.

Schildmeyer, L.A.; Braun, R.; Taffet, G.; Debiasi, M.; Burns, A.E.; Bradley, A. et al. (2000). Impaired vascular contractility and blood pressure homeostasis in the smooth muscle α-actin null mouse. The FASEB Journal, 14(14): 2213-2220.

Springer, M.L.; Ozawa, C.R. and Blau, H.M. (2002). Transient production of α-smooth muscle actin by skeletal myoblasts during differentiation in culture and following intramuscular implantation. Cell Motility and the Cytoskeleton, 51(4): 177-186.

Vigueras-Villaseñor, R.M.G.; Cravioto, C.; Hernández-González, J.; Castañeda, R.R. and César, J. (1992). Cambios cuantitativos de la mucosa gástrica de la rata durante el primer año de vida. Acta Médica, 28: 17-24.

Wang, J. and Peng, K. (2008). Developmental morphology of the small intestine of African ostrich chicks. Poultry Science, 87(12): 2629-2635.

Weisbrodt, N.W. (1987). Motility of the small intestine. in: Johnson LR(ed.). Physiology of the gastrointestinal tract. Raven Press, New York. 631-663.

Yamamoto, Y.; Kubota, T.; Atoji, Y. and Suzuki, Y. (1996). Distribution of alpha-vascular smooth muscle actin in the smooth muscle cells of the gastrointestinal tract of the chicken. Journal of Anatomy, 189(3): 623- 630.