

# Tubular adenocarcinoma with squamous differentiation areas in a feline foreskin (*Felis catus*): A report of clinical-surgical, pathological, and therapeutic approach

Adenocarcinoma tubular com áreas de diferenciação escamosa em prepúcio de felino (*Felis catus*): relato da abordagem clínico-cirúrgica, patológica e terapêutica

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## Abstract

Adenocarcinomas are malignant epithelial neoplasms of glandular nature and have been reported in many organs of companion animals including the lungs, thyroid, prostate, mammary glands, gallbladder, pancreas, esophagus, stomach, and intestine. In felines, reports of such neoplasms in the genitalia and associated glands are very rare and have a reserved prognosis. There are no reports in the veterinary literature describing this type of neoplasia affecting the foreskin of cats. Cytological analysis and histopathological evaluation of incisional or excisional biopsy samples can confirm the diagnosis of preputial neoplasms. The gold standard treatment consists of surgical excision of the neoplasm. In the present report, a 16-year-old male Brazilian shorthair feline was referred to the Surgical Clinic service of the Companion Animal Veterinary Hospital of UFRRJ, with a major complaint of increased volume and ulceration in the preputial and penile region with slow growth. The animal experienced dysuria, urinary retention, and pollakiuria. It had a history of recurrent urinary obstructions and urolithiasis. A penile urethrostomy was performed, and the mass was histopathologically and microbiologically analyzed due to a suspicion of fungal or neoplastic involvement. Histopathological examination showed the presence of tubular adenocarcinomas. Chemotherapy treatment was suggested in the immediate postoperative period, but it was not performed per the owner's request. One year after the foreskin resection and creation of a new urethral stoma, a new mass was found in the perineal region, and the animal died one week later.

**Keywords:** neoplasia, urethral obstruction, cat.

## Introduction

The cellular origin of cutaneous neoplasms constantly encompasses parenchymal gland tissues or lining surfaces. Malignant epithelial neoplasms of glandular nature are called adenocarcinomas (Daleck & De Nardi, 2016). Adenocarcinomas usually affect organs such as the lungs, thyroid, prostate, mammary glands, gallbladder, pancreas, esophagus, stomach, and intestine (Kusewitt & Rush, 2009; Meuten, 2008) and may be described as papillary, tubular, cystic, or squamous in nature (Kusewitt & Rush, 2009).

Neoplasias affecting cat genitalia are very rare (Daleck & De Nardi, 2016), and there are no descriptions in the veterinary literature of malignant adenocarcinoma within the feline prepuce. However, there are reports of adenocarcinoma affecting the feline mammary glands (Amorim et al,



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2004), intestine (Queiroz et al., 2017), apocrine/salivary glands (Fujiwara-Igarashi et al., 2017), prostate (Tursi et al., 2008), and uterus (Saraiva et al., 2015). In addition, there are also reports of neoplasms affecting the foreskin of dogs (Yaghoobi Yeganeh Manesh et al., 2014; Auler et al., 2014) and horses (Chacur et al., 2014).

Cytological analysis and histopathological evaluation of incisional or excisional biopsy samples can confirm the diagnosis of preputial neoplasms. The best treatment includes surgical excision of the neoplasm (Boothe, 2007). Cytology is a fast, relatively inexpensive, and non-invasive diagnostic examination, but only some types of tumors, such as lipomas and melanomas, can be diagnosed cytologically without any other methodologies (Alencar & Campos, 2017). Histopathological examination is essential to establish a definitive diagnosis and provide information regarding the extent of the neoplasia in deeper tissues (Yaghoobi Yeganeh Manesh et al., 2014).

Urethral, penile, or preputial neoplasms; recurrent or irreparable urethral obstruction; urethral strictures; and trauma are common indications for a perineal urethrostomy procedure (Fossum, 2008) to create a new, permanent urethral stoma between the pelvic urethra and the perineum skin (Smith, 2002). In felines, this also requires a penectomy (Rocha, 2012).

In felines, oncological diagnosis and treatment can be a real challenge to veterinarians and requires interaction between different specialized sectors to assess peculiar characteristics concerning the physiology and tumor behavior in an organism (Alencar & Campos, 2017). The prognosis of adenocarcinomas varies as relapse and distant metastasis occur in up to 20% animals, even after surgical resection of the tumor (Daleck & De Nardi, 2016).

This report aimed to describe the clinical-surgical and histopathological aspects and the treatment of a preputial adenocarcinoma in a cat.

## Signalment and history

A 16-year-old castrated, male, Brazilian, short-haired feline weighing 3.8 kg (semi-domiciled) was referred to the Surgical Clinic service of the Companion Animal Veterinary Hospital of UFRRJ after presenting with urinary retention and stranguria.

The client reported that the animal had weight loss and a 45-day history of foreskin ulceration. The cat urinated by dripping. The cat had experienced recurrent urinary obstructions in addition to previous urolithiasis.

Blood samples were collected for hematological and serum biochemical evaluations and ELISA test (Enzyme-Linked Immunosorbent Assay - SNAP FIV/FeLV Combo - Alere®) for feline immunodeficiency antibody and feline leukemia antigen. In addition, urine samples were collected for urinalysis and culture. Due to the patient's age and possible comorbidities, abdominal ultrasound, chest radiography, and cardiorespiratory evaluation were performed.

The main differential diagnoses for the foreskin lesions included fungal infection or neoplastic disease. Due to the difficulties with urination, surgical treatment was indicated, and preputial resection and subsequent perineal urethrostomy were performed. Samples of the removed foreskin and penis were submitted for histopathological analysis and fungal culture.

## Results and discussion

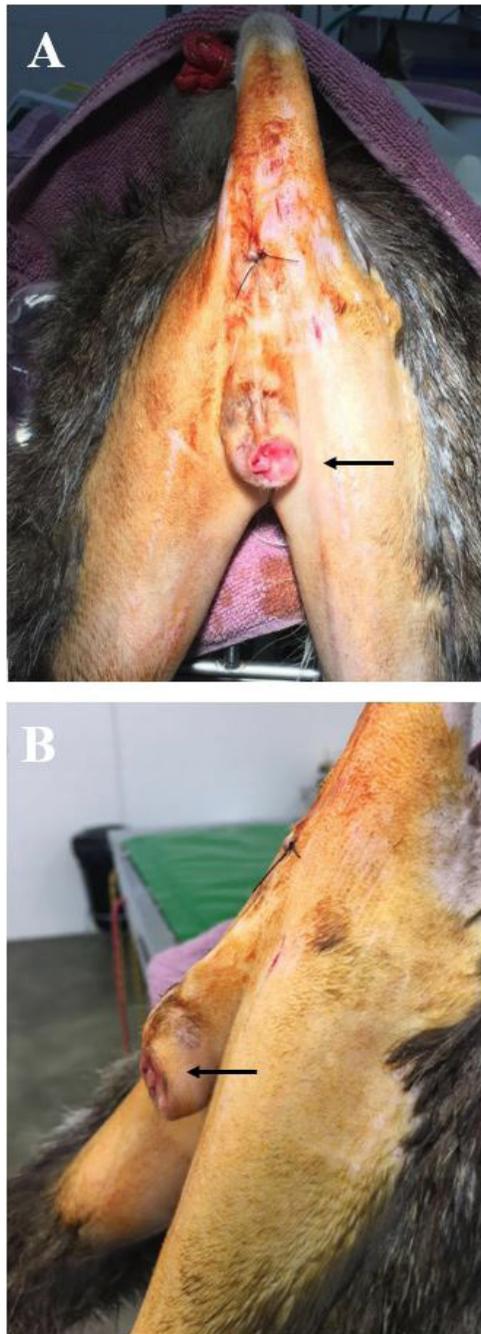
During clinical examination, the patient had normal mucous membrane color, with 8% dehydration, bristling fur, and a body condition score of 3/9. These signs may have been related to paraneoplastic syndromes, such as anorexia-cachexia in 27% of feline oncologic patients (Daleck & De Nardi, 2016). On palpation, penile stiffness was identified, but its exposure was not possible. The urinary bladder was replete and after gentle compression, fine urinary flow was noted. The patient was tested negative for feline immunodeficiency antibody and feline leukemia antigen.

Based on the clinical examination, the established differential diagnoses were sporotrichosis and neoplasia. The feline had free access to the outdoors, and hence, sporotrichosis was possible as it usually occurs due to traumatic implantation in the dermis, either through contaminated vegetable fragments or organic soil matter (Rippon, 1988) or through scratches and bites from felines affected by the disease (Almeida et al., 2018). Its definitive diagnosis is made by fungal

isolation and identification in biologic samples (Rocha, 2014). No fungal growth was observed on microbiological culture.

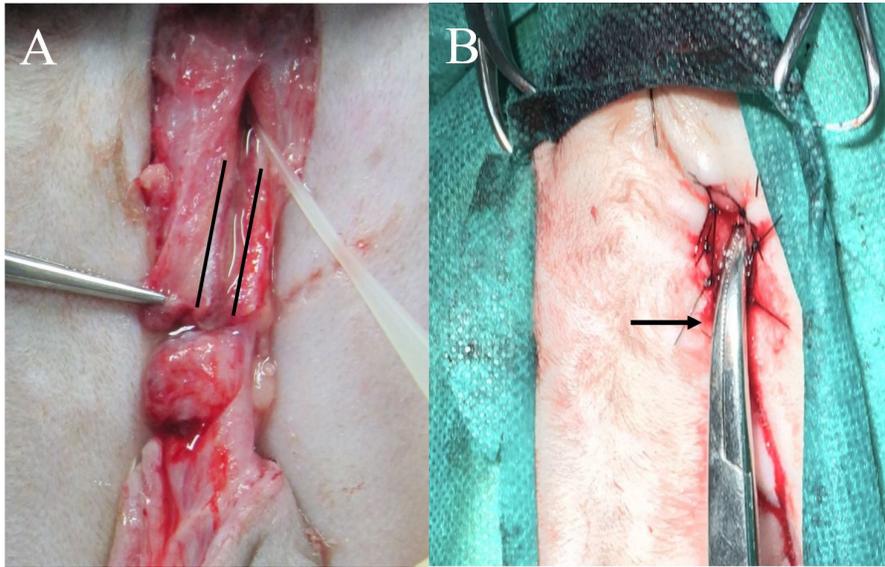
Given the elderly nature of the patient and cutaneous presentation of the lesion, the most probable diagnoses included common feline skin neoplasms such as basal cell carcinomas, mastocytomas, squamous cell carcinomas, and fibrosarcomas (Daleck & De Nardi, 2016).

The clinical signs of animals affected by preputial neoplasms are usually minimal, except when there is ulceration or the preputial orifice is involved (Boothe, 2007). In this report, there was extensive ulceration, about 0.5 cm in diameter, causing evident increase in preputial volume (Figure 1A and B) and urethral stricture associated with drip urination.



**Figure 1.** Male feline, 16-year-old, Brazilian short-haired, with foreskin adenocarcinoma. A) Macroscopic image of the lesion in caudal view. Note the foreskin region with increased volume and ulceration (arrow); B) Macroscopic image of the perineal region after penectomy followed by perineal urethrostomy.

Complementary examinations such as hemogram and biochemical analysis are fundamental to establish the risks related to anesthetic, surgical, and chemotherapeutic procedures (Alencar & Campos, 2017; Daleck & De Nardi, 2016). The patient's hemogram showed mild anemia (normochromic microcytic), possibly associated with iron deficiency and chronic disease. Mild leukocytosis and neutrophilia were evident and probably related to the inflammatory process in the wound region.

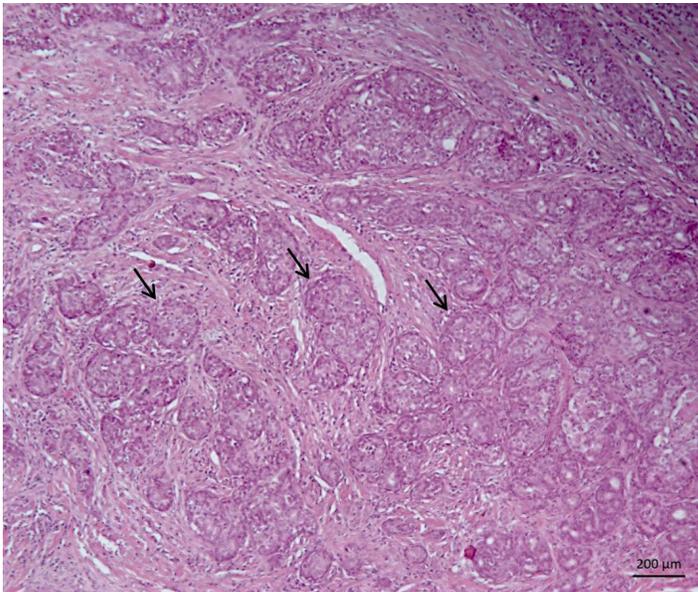


**Figure 2.** Male feline, 16-year-old, Brazilian short-haired, with foreskin adenocarcinoma. A) Catheterized urethra (rigid probe) after being longitudinally incised and the ischiocavernosus and ischiourethralis muscles sectioned. Note the short gutter generated after penectomy; B) Final image of urethrostomy site. Note that it is possible to enter the urethra with a Crile hemostatic tweezer.

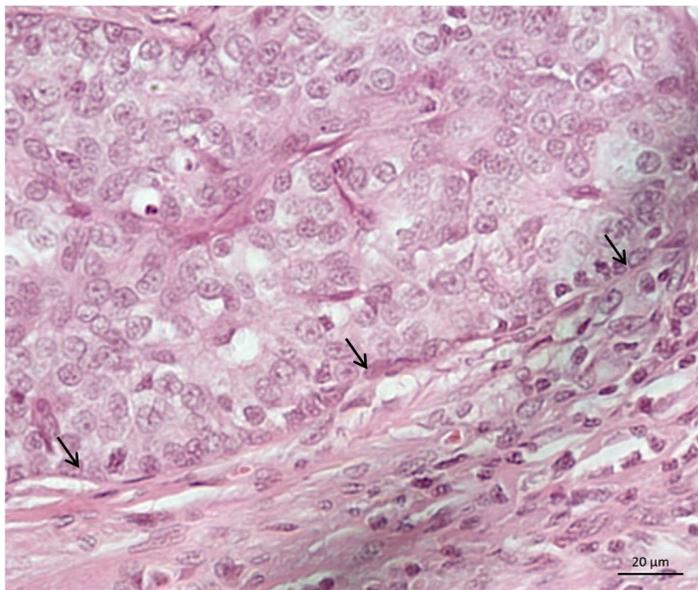
After placing a tobacco pouch suture around the anus with polyamide wire (number 3.0), a perineal urethrostomy using the modified Wilson & Harrison (1971) technique was used to make an elliptical incision around the foreskin and scrotum. Subsequently, the penis was bluntly dissected and the ischiocavernosus and ischiourethralis muscles were sectioned at their insertions on the ischium for better penile exteriorization. Reaching the bulbourethral gland, ventral and lateral dissections were performed 5 mm further, and a penectomy was performed by a transverse incision with a scalpel. Next, a longitudinal incision was made in the penile urethra nearly reaching the pelvic urethra, allowing for full visualization, since catheterization was not possible (Figure 2A). The mucosal end of the urethra was sutured to the skin with simple interrupted sutures using a 5-0 polyamide wire (Figure 2B). The tobacco pouch suture was removed, and the area was cleaned with a sterile physiological solution.

Surgical removal with broad margins is advisable for malignant neoplasms, and the first surgery usually offers the best opportunity to get local tumor control (Ryan et al., 2012). Due to extensive preputial involvement and loss of anatomical conformation of the penis and foreskin, much of the urethra was removed. For this reason, the operative technique was hampered and the remaining urethra was smaller than that after a usual urethrostomy. After surgery, there was jet urinary flow by the patient and no postoperative urethral stricture or dysuria was noted.

Macroscopic analysis showed the presence of a firm, light brown preputial mass measuring about 2 × 2.9 cm. Histopathology showed the proliferation of malignant neoplastic cells of epithelial origin in nested or individualized cell grouping with accentuated pleomorphism (Figures 3 and 4). The neoplastic cells extended from the superficial to the deep dermis, with broad eosinophilic cytoplasm, ovoid or pleomorphic nucleus, fine chromatin and evident nucleolus or nucleoli. There was marked anisocytosis and anisokaryosis. Permeating the neoplasia, there was a marked and diffuse inflammatory infiltrate composed mainly of eosinophils, neutrophils, and plasmacytes.



**Figure 3.** Proliferation of malignant neoplastic cells of epithelial origin in cluster arrangement separated by moderate fibrous stroma, H&E, 10 $\times$ .



**Figure 4.** Proliferation of neoplastic cells in cluster arrangement with broad and eosinophilic cytoplasm, rounded to ovoid nucleus and evident nucleolus. The arrows separate the neoplastic cells and the moderate fibrous stroma, H&E, 63 $\times$ .

There was a mild to moderate amount of stroma. The presence of tumor necrosis within some groups of neoplastic cells and individual cell necrosis was noted. Six mitotic figures (typical and atypical) were found in 10 fields at 400 $\times$ , in addition to a moderate amount of neoplastic cells phagocytizing inflammatory cells or cellular remains (emperipolesis). The epidermis was intact and thin in some areas, while ulceration and suppuration occurred in other areas.

Adenocarcinomas are tumors of high malignancy and tend to produce metastases (Kusewitt & Rush, 2009; Meuten, 2008). In this case, metastasis was not observed in preoperative imaging exams (abdominal ultrasound and thoracic radiography).

The prognosis for malignant neoplasms is generally reserved and will depend on the degree of tumor advancement as well as intrinsic factors of the affected individual (Meuten, 2008).

Although there was no metastasis noted in the preoperative exams, the patient's prognosis remained reserved. Postoperative chemotherapy was indicated to prevent future metastases, and radiotherapy treatment was recommended to control local tumor relapse. In this case, the tutor declined these two complementary treatments and relapse occurred within one year of surgery. The animal died one week after the patient's tutor noticed a new increase in local volume, and the owner declined having a necropsy of the patient.

Although foreskin adenocarcinoma is a rare neoplasm in felines, it is imperative that veterinarians should be aware of the existence of tumors in this region and should broaden the possibilities of differential diagnoses to include neoplasia when urethral obstruction occurs in this species.

## Conclusion

Perineal urethrostomy surgery was effective for patient treatment, generating normal urine flow and allowing the definitive diagnosis of adenocarcinoma after submitting the sample for histopathological examination.

## References

- Alencar, N. X., & Campos, K. C. H. (2017). Alterações laboratoriais no paciente felino com câncer. In F. V. A. Costa, H. J. M. Souza, S. C. S. Cunha, K. B. Corgozinho. *Oncologia Felina*. (1ª ed., p. 640). Rio de Janeiro: L.F. Livros.
- Almeida, A., Reis, N., Lourenço, C., Costa, N., Bernardino, M., & Vieira-da-Motta, O. (2018). Esporotricose em felinos domésticos (*Felis catus domesticus*) em Campos dos Goytacazes, RJ. *Pesquisa Veterinária Brasileira*, 38(7), 1438-1443. <http://dx.doi.org/10.1590/1678-5150-pvb-5559>.
- Amorim, E. V., Souza, H. J. M., & Ferreira, A. M. R. (2004). Avaliação clínico-cirúrgica de nódulos mamários felinos através de citologia e histopatologia. *Brazilian Journal of Veterinary Research and Animal Science*, 4(1), 204-205.
- Auler, P. A., Gamba, C. O., Horta, R. S., Lavalle, G. E., & Cassali, G. D. (2014). Metastatic well differentiated squamous cell carcinoma in the prepuce of a dog: a report of clinicopathological, immunophenotypic and therapeutic approach. *Arquivo Brasileiro de Medicina Veterinária e Zootecnia*, 66(5), 1317-1322. <http://dx.doi.org/10.1590/1678-6741>.
- Boothe, H. W. (2007). Pênis, prepúcio e escroto. In D. Slatter. *Manual de cirurgia de pequenos animais* (3ª ed., Cap. 103, pp. 1531-1542). São Paulo: Manole.
- Chacur, M. G. M., Fachini, B. A., Yamasaki, L., Basso, K., Sanches, O. C., & Pessoa, V. M. (2014). Carcinoma das células escamosas no prepúcio com invasão vertebral em equino. *Semina: Ciências Agrárias*, 35(3), 1383-1388. <http://dx.doi.org/10.5433/1679-0359.2014v35n3p1383>.
- Daleck, C. R., & De Nardi, A. B. (2016). Citologia aspirativa por agulha fina aplicada ao estudo das neoplasias. In C. R. Daleck & A. B. De Nardi (Eds.), *Oncologia em cães e gatos*. (2nd ed., pp. 128-129). Rio de Janeiro: Roca.
- Fossum, T. W. (2008). Cirurgia da bexiga e uretra. In T.W. Fossum (Ed.), *Cirurgia de pequenos animais*. (3rd ed., pp. 672-675). Rio de Janeiro: Elsevier
- Fujiwara-Igarashi, A., Shimizu, K., Michishita, M., Yu, Y., Hamamoto, Y., Hasegawa, D., & Fujita, M. (2017). A cat with suspected laryngeal metastasis with mucosal irregularity resulting from apocrine/salivary gland adenocarcinoma in the head. *The Journal of Veterinary Medical Science*, 79(12), 1916-1919. <http://dx.doi.org/10.1292/jvms.17-0242>. PMID:29021425.
- Kusewitt, D. F., & Rush, L. J. (2009). Neoplasia e biologia tumoral. In M. D. McGavin, J. F. Zachary. *Bases da Patologia em Veterinária* (4ª ed., Cap. 6, pp. 257-273). Rio de Janeiro: Elsevier.
- Meuten, D. J. (2008). *Tumors in Domestic Animals* (4a ed., 788p.). Ames: Wiley-Blackwell.
- Queiroz, P. S., Cabral, A. P. M., Sanches, F. J., Dissenha, A., Mazzucatto, B. C., & Marcusso, P. F. (2017). Adenocarcinoma indiferenciado intestinal em felino. *Revista de Ciência Veterinária e Saúde Pública. UEM*, 4(Supl. 2), 78.
- Rippon, J. (1988). The true pathogenic fungus infections and the opportunistic fungus infections. In J. Rippon (Ed.), *Medical Mycology: The pathogenic fungi and the pathogenic actinomycetes* (3a ed., pp. 373-380). Philadelphia: W. B. Saunders Company.
- Rocha, G. L. S. (2012). *Cirurgia urológica*. In A.L.A. Oliveira. *Técnicas Cirúrgicas em pequenos animais* (Cap. 31, pp. 844-848). Elsevier: Rio de Janeiro.
- Rocha, R.F.D.B. (2014). *Tratamento da esporotricose felina refratária com a associação de iodeto de potássio e itraconazol oral* (Dissertação de mestrado). Instituto de Pesquisa Clínica Evandro Chagas, Rio de Janeiro, 62 f.
- Ryan, S., Wouters, E. G. H., Nimwegen, S., & Kirpensteijn, J. (2012). Skin and subcutaneous tumors. In S. T. Kudnig & B. Seguin (Eds.), *Veterinary surgical oncology* (pp. 55-86). West Sussex: Wiley-Blackwell.
- Saraiva, A. L., Payan-Carreira, R., Gärtner, F., Fortuna da Cunha, M. R., Rêma, A., Faria, F., Lourenço, L. M., & Pires, M. A. (2015). An immunohistochemical study on the expression of sex steroid receptors, Ki-67 and cytokeratins 7 and 20 in feline endometrial adenocarcinomas. *BMC Veterinary Research*, 11(1), 204-217. <http://dx.doi.org/10.1186/s12917-015-0530-6>. PMID:26268561.

- Smith, C. W. (2002). Perineal urethrostomy. *The Veterinary Clinics of North America. Small animal Practice*, 32(4), 917-925. PMID:12148318.
- Tursi, M., Costa, T., Valenza, F., & Aresu, L. (2008). Case Report: Adenocarcinoma of the disseminated prostate in a cat. *Journal of Feline Medicine and Surgery*, 10(6), 600-602. <http://dx.doi.org/10.1016/j.jfms.2008.02.008>. PMID:18621560.
- Wilson, G. P. 3rd, & Harrison, J. W. (1971). Perineal urethrostomy in cats. *Journal of the American Veterinary Medical Association*, 159(12), 1789-1793. PMID:5166929.
- Yaghoobi Yeganeh Manesh, J., Shafiee, R., Mohammad Bahrami, A., Pourzaer, M., Pourzaer, M., Pedram, B., Javanbakht, J., Mokarizadeh, A., & Khadivar, F. (2014). Cyto-histopathological and outcome features of the prepuce squamous cell carcinoma of a mixed breed dog. *Diagnostic Pathology*, 9(110), 1-7. <http://dx.doi.org/10.1186/1746-1596-9-110>. PMID:24903567.