



Chemical Components Related to Reproductive Status Contained in the Urine of Female Giant Pandas (*Ailuropoda melanoleuca*)

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Introduction

- Chemical communication plays a crucial role in modulating sexual and social behavior in mammals (Brown and Macdonald, 1985).
- Giant panda (*Ailuropoda melanoleuca*) is solitary and has seldom social contact with each other, all year around except females' mono-estrus each spring. Pandas primarily use scent to interact with each other (Kleiman 1983, 1984; Swaisgood et al. 1999; Liu et al. 2002).
- Urine plays a crucial role in chemical communication between giant pandas (*Ailuropoda melanoleuca*). The detection of chemical compounds in giant panda urine is the key to determine its composition and function. Behavioral and chemical research revealed that a large information is contained in the urine of giant pandas. Endocrine (especially sex-steroid effects) influence on urinary profiles strongly (Michele L. Schaefer et al. 2010).
- Swaisgood et al. (2002) found that the urine of female pandas contains chemical cues permitting males to discriminate their estrous status, and probably serves as reproductive advertisement.
- Chemical signals is coding in digital form (qualitative) or/and analog form (quantitative) (Zhang et al. 2007).
- The main goal of our present study is to find the chemical components concerning with reproductive status in the urine of female giant pandas.

Hypothesis

Certain compositions in the urine of female panda would significant different (qualitative or/and quantitative) among reproductive stages.

Materials and Methods

Subjects were 17 females and 6 males. Panda urine samples were collected all through the pre-estrus, estrus, post-estrus and non-estrus periods in Chengdu Giant Panda Breeding and Research Base.

The reproductive status of female giant pandas was determined by testing the content of sex hormones (especially EC (ng)/Cr (mg)), this part was operated by Chengdu Giant Panda Breeding and Research Base.

Diethyl ether and gas chromatography-mass spectrometry (450-GC/320-MS; Bruker Inc.) were used to pre-treat and detect the composition of giant panda urine.

The identification of components was carried out by comparing the retention time of each peak and searching the mass spectrometry library of the National Institute of Standards and Technology (NIST).



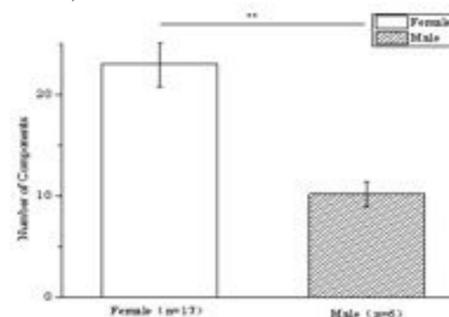
Results

1. Individuals-specific information

There are differences in the amount of compounds, the category of substances and the intensity of components.

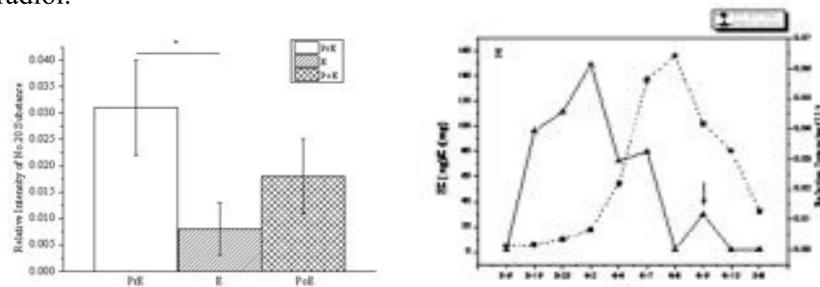
2. Gender information

The amount of compounds in the urine of female and male are significantly different ($P=0.004 < 0.01$).



3. Reproductive status information

6-(3,3-Dimethyl-oxiran-2-ylidene)-5,5-dimethyl-hex-3-en-2-one has significant differences in different estrus stages. Moreover, its content has a similar trend with estradiol that the intensity peak this substance is before the peak of estradiol.



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Conclusions

- Giant panda urine contains individual-specific information.
- Giant panda urine also contains gender-related information.
- 6-(3,3-Dimethyl-oxiran-2-ylidene)-5,5-dimethyl-hex-3-en-2-one may be related to the estrus status of female giant panda.