

## Original Article

# Cardiac urticaria caused by eucleid allergen

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**Abstract:** Urticaria is a common allergic diseases, which involve respiratory and digestive system being suffered in some population. Yet, relatively little research has been done on the adverse effect on the heart. We did this research to examine the correlation between the abnormality of ECG in the patients with acute allergic urticaria and the antigen of eucleid. The antigen (allergen of eucleid and other allergens) was used to test the patients with acute allergic urticaria by skin prick test and electrocardiogram was employed to examine the patients with strong positive (moth & caterpillar) eucleid antigen. Strong positive eucleid antigen was identified in 84 cases with abnormal electrocardiographic pattern of diversity. So, the acute allergic skin urticaria caused by eucleid allergen may impose strong effect on the heart and thus lead to allergic cardiac urticaria.

**Keywords:** Allergic, cardiac urticaria, eucleid, allergen

## Introduction

Urticaria or hives is one kind of common allergic diseases, featuring rash occurrence, which may, to a certain degree, involve respiratory and digestive system being suffered in some population [1-4]. Yet, relatively little research has been done on the adverse effect of the rash on the heart [5, 6]. In order to find out the relationship between the urticaria and the abnormality of electrocardiogram, we conducted the examination in the patients suffered from urticaria by were examined by prick test of the skins with the different antigen solution for detecting the specific electrocardiographic patterns.

## Materials and methods

### *Antigen solution preparation*

Antigen solution of adult eucleid [7]: Cocoons of eucleid were collected from the peach trees for eclosion by incubation. The 100 imagines were selected to dry, levitate, weigh and degrease, being soaked in the KeKa's extractive liquid at concentration of 2% (W/V). After being filtrated and sterilized by filter, the eucleid antigen solution was prepared at a concentra-

tion ratio of 2%, stored in separate bottles and kept at 4°C.

Antigen solution of larval eucleid: A number of larval eucleids were collected and the similar antigen solution preparation was made with the procedures described above.

### *Program of prick test*

The differently prepared antigen solutions were diluted at ratio of 1:100 by distilled water and the 0.03 mL antigen solution from each pollen of paulownia, chinaberry, rape and ragweed, liver fluke, rice, wheat, fresh water crayfish, feather of chicken and duck was vaccinated into the skin of the upper arm from proximal end to distal part, respectively, with observation of the allergic reaction from the diluted antigen solution and distilled water [8]. The test results [9] were observed and registered after 15 minutes of the intervention, and the results revealed that the two spots tested by distilled antigen solution and distilled water had no reaction, whereas rubella or areola erupted around the detected sites off the tested spot described above, with positive reaction. The rubella and the areola were observed lightly positive in diameter less than 1 cm or 1.5 cm,

## Allergic cardiac urticaria

**Table 1.** The positive rate of allergic cardiac urticaria in patients with different ages of males and females

Age (years)	Male				Female			
	Positive	Negative	Total	Positive rate (%)	Positive	negative	Total	Positive rate (%)
10~	0	3	9	0.00	0	5	5	0.00
20~	14	11	25	56.00	13	23	36	36.11
30~	22	12	34	64.71	24	17	41	58.53
40~	11	11	22	50.00	12	15	27	44.44
50~	13	20	33	39.39	13	17	30	43.33
Total	60	63	123	48.78	62	77	139	44.60

Males:  $X^2=7.714$ ,  $P>0.05$ ; Females:  $X^2=8.318$ ,  $P>0.05$ .

respectively, yet the size of theirs greater than 3 cm in diameter was found strong-positive. Negative reaction was seen on the tested skins free of response to the antigen.

### Entry criteria

There were 262 patients suffered from acute allergic urticaria, of whom 123 were males and 139 were females, with an age range from 17 to 54. The major criteria for inclusion in the study were symptomatic patients with urticaria, fever, chest distress, dyspnoea, cardiopalmus or tachycardia. This research was under the condition of all the subjects were informed and licensing, and approved by the medical ethics committee of Anhui University of Science & Technology.

### Statistical method

Data analyses were performed using SPSS 13.0 software. Chi-square test was used to compare positive rate of allergic cardiac urticaria and incidence rate of abnormal electrocardiogram characterized of patients. And value of  $P<0.05$  was considered statistically significant.

## Results

### General materials

Of the total 262 cases, 122 patients (male 60, female 62) aged from 20 to 54 underwent the intracutaneous prick test with different antigen solution. The results (**Table 1**) showed that the eucleid allergen (adult or larval) was strong-positive. The positive rate of allergic cardiac urticaria of patients with different ages had no statistical significance (Male:  $X^2=7.714$ ,  $P>0.05$ ; Female:  $X^2=8.318$ ,  $P>0.05$ ). The nine other

kinds of allergen were lightly positive or negative with regard to the pollen of paulownia, chinaberry, rape and ragweed, liver fluke, rice, wheat, fresh water crayfish, feather of chicken and duck solution use. In addition, 13 were found with a history of cardiovascular disease (rheumatic heart disease in 7, viral myocarditis in 6)

and 5 with essential hypertension in the total 122 patients.

### Clinical manifestation

General occurrence and eruption of cutaneous pruritus and wheal (urticaria) were found in 122 patients, whose erythema and dermatograph test were positive in 88 and 57. The number of patients accompanied with fever, nausea, vomiting, abdominalgia, diarrhea, mucous stool were 62, accompanied with chest distress, asthma, dyspnoea were 76, accompanied with cardio palmus were 45, and accompanied with tachycardia were 39, respectively.

### Laboratory examination

The white blood cell count was  $10 \times 10^9/L$  in 15 cases on average, and 84 patients whose percentage of neutrophilic granulocyte was larger than 0.8 were complicated with abnormal electrocardiogram. Among them, 69 patients were seen with neutrophilic granulocyte  $>0.08$ . The routine uronoscopy, liver function, and chest roentgenoscopy were normal in the 84 patients.

### Skin test of antigen

Skin tests of eucleid antigen in the 84 patients were totally strong-positive (diameter of rubella  $\geq 1.5$  cm, diameter of areola  $\geq 3$  cm) and the rest were light-positive or negative (diameter of rubella  $<1$  cm, diameter of areola  $<1.5$  cm).

### Electrocardiogram manifestation

Of the 122 patients (male 35, female 49, age range 22~51) with eucleid allergen positive, 84 were submitted to abnormal electrocardiogram and characterized by tachycardia, abnormal

**Table 2.** The incidence rate of abnormal electrocardiogram characterized of patients with allergic cardiac urticaria

Ecg findings	Positive	Negative	Total	Incidence rate (%)
Tachycardia	33	8	41	80.49
Abnormal ST-T	18	3	21	85.71
Abnormal ST	5	4	9	55.56
Abnormal T wave	3	6	9	33.33
Abnormal QRS	4	9	13	30.77
Arrhythmia	3	2	5	60.00
Frequent ventricular premature beat	6	1	7	85.71
Frequent sex premature beat	12	5	17	70.59
Total	84	38	122	68.85

$\chi^2=21.335$ ,  $P<0.05$ .

ST-T, abnormal ST, abnormal T wave, abnormal QRS, arrhythmia, frequent ventricular premature beat and frequent sex premature beat in 33, 18, 5, 3, 4, 3, 6, 12 respectively (**Table 2**). There were statistical significance in incidence rate of abnormal electrocardiogram characterized of patients with allergic cardiac urticaria ( $\chi^2=21.335$ ,  $P<0.05$ ).

#### Treatment

Upon diagnosis confirmed, the patients were given the treatment with adrenocortical hormone, adrenalin, anti-histamine and calcium preparation, and the erythema became subsided after 4 to 7 hours of the medication. The symptom relief of digestive, respiratory and circulatory system and restoring of the electrocardiographic patterns were associated with the extent of erythema eruption, with the exclusion of 43 patients due to primary heart disease.

#### Distinctive case

A 34-year-old woman sought after medical advice on April 19, 2013 and described the abrupt onset of cutaneous pruritus two days ago. On examination, different shapes of erythematous or hydrous rash spread over the limbs and face, with symptoms of dizziness, dysphoria, palpitation, chest distress, dyspnoea, nausea and general malaise.

P.H.: She had had a similar medical history in her childhood, with involuntarily light or severe symptoms alternatively, followed by spontaneous regression without any medical treatment. Ten years ago, the wheals suddenly appeared

all over her body accompanied by chest distress and palpitation, but the erythema would subside and other symptoms disappeared right after the therapy. However, recurrent attacks were noted on April days each year and yet faded away approximately in one week time.

F.H.: The patient was born in Huainan, with Sichuan origin. The father had positive history of

asthma and erythema in his youth, but the mother was free of such disease. She had a 9-year-old son. After his 3 years, he caught yearly trachitis and asthma. Upon asthma attacking, the chest distress, short breath, dyspnoea, erythema and purpura would occur.

P.E.: T38.2°C, P76/min, BP16/9.3 kPa. Well-developed and nourished, alert and cooperative in examination. No enlarged or non-tender bilateral axillary fossas and inguinal lymph node and other superficial lymph nodes. Normally shaped skull, no deciduous pilus. Normal five sense organs, no swollen lymph nodes or deformed chest. Rough sound of respiration and the irregular cardia auscultation. No touch of any mass liver or spleen in abdomen, normal activity of articulation of limbs and nervous system. Stethendoscope: normal cardiae and lungs. Electrocardiogram: Sinus arrhythmia occurred as the arrhythmia attacked.

Laboratory data: Blood Rt: Hb120 g/L, RBC4.15 $\times 10^{12}$ /L, WBC 9.4 $\times 10^9$ /L, Neu 0.74, Lym 0.24, blood eosinophilic granulocyte 0.02, blood platelet 124 $\times 10^9$ /L. Blood sedimentation: 10 mm/h, Routine uronoscopy: 1~3/HP. Routine stool examination: normal.

Prick test: Eucleid +++, Ragweed pollen ++, Feather of chicken and duck +, the rests were all negative.

Skin Manifestations: Eruption of the uredo, rubella and different-shaped rashes but subsided in several hours, and yet followed by newly exploded rashes in variety and rubella and flared gradually over the trunk and lumbar

region, with flush edge of the rubella, severe pruritus and tumefaction in the face as well. Positive dermatographia.

Diagnosis: Acute allergic urticaria caused by eucleid.

Treatment: ① oral antihistamines, ② sedation, ③ adrenocortical hormone by transfusion.

### Discussion

Eucleid belongs to Encleidae family, Lepidoptera order, Insecta class, and is an important pathogen causing the caterpillar dermatitis [10, 11]. Detailed reports from Li [12] showed that the acantha of larva eucleid are pipe-like shaped and contains venom. The venom was identified as a kind of toxic protein by the staining of Commassie brilliant blue G-250 after electrophoresis [13]. Its pathopoiesis is the result of mechanical injury attributable to poisonous acantha and allergen in local skin resulted from toxicity protein [14]. The important clinical manifestations of the victims are development of skin rash, areola, hydrops and the like [15]. To date, few reports are available on allergic cardiac urticaria caused by eucleid. In this study [16], the 84 cases were confirmed eucleid allergic cardiac urticaria on basis of their clinical manifestations, sensitivity test to eucleid and the change of electrocardiographic patterns. The disease is pathologically characterized by abnormal electrocardiogram in the duration of urticaria and the symptom is similar to that of the general cardiac urticaria previously described in literatures [17], and the electrocardiogram changes of cardiac urticaria were defines as tachycardia, abnormal ST, sinus arrhythmia accompanied by bradycardia [18], sinoauricular block-II [19], short term tachycardia, ventricular fusion beat. The characteristics of electrocardiogram in patients with severe allergic cardiac urticaria resemble greatly that of acute myocardial infarction. The findings in this report is clearly consistent with conclusions already described except for such common characteristics as urticaria, uredo, the individual clinical manifestation in specific patients such as the distinctive symptoms of respiratory, digestive and circulatory system, etc. The effective treatment of the cardiac urticaria should rely on keeping off the allergen as early as possible. Prompt medication of adrenocortical hormone, anti-histamine and calci-

um preparation is recommended. Of the therapies described, intravenous drip of dexamethasone can quickly relieve the symptoms in several hours. By proper treatment, the patients will recover in a week, with excellent prognosis.

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### Disclosure of conflict interest

None.

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