

Resource saving in patch test procedure

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ABSTRACT:

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Background: Skin markers and adhesive tapes both were necessary in performing patch testing to identify the actual location of the allergens and stabilize the allergen chambers.

Objective: We aimed to compare the durable of in-house marking ink with commercially marking pens used in patch testing, and the attachment of Finn Chamber[®] on Scanpor[®] tape with or without additional 3M[™] Micropore[™] tape adhesion.

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Materials and Methods: We randomly divided the back of 30 patients attended Siriraj contact dermatitis clinic for patch testing during April to September 2013. In-house marking ink was applied on one side and commercially marking pens, either Chemo Skin Marker-Regular™ or AllergEAZE® Skin Marker were applied on another side. The visibilities of the markers were graded into 4 levels by blinded dermatologist on Day 4 (D4). The attachment of Finn Chamber® with or without additional 3M™Micropore™ tape adhesion were evaluated on Day 2 (D2).

Results: Commercially marking pens showed 100% visibility in 13 cases, 12 cases with 50-99% visibility, and 5 cases with <50% visibility. In-house marking ink showed 100% visibility in 22 cases and 50-99% visibility in 8 cases. The persistent of in-house marking ink was better than the commercially marking pens with a statistical significance (p -value = 0.005). Finn Chamber® attachment was not statistically significant difference between with or without additional 3M™ Micropore™ tape adhesion (p -value=0.5).

Conclusion: Our in-house marking ink is durable and provided cost-effectiveness more than the commercially available marking pens. No additional 3M™ Micropore™ tape usage are needed in patch testing process due to similar Finn Chamber® attachment compare with Finn Chamber® on Scanpor® tape alone.

Key words: marking ink, marking pens, plaster, adhesive, patch testing

บทคัดย่อ :

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การประหยัคทรัพยากรการทําทดสอบภูมิแพ้โดยการปิดบนผิวหนัง: เปรียบเทียบสํ้าเครื่องหมายและการใช้พลา
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**ฝ่ายเภสัชกรรม คณะแพทยศาสตรศิริราชพยาบาล มหาวิทยาลัยมหิดล

บทนำ : การทําทดสอบภูมิแพ้โดยการปิดบนผิวหนังจำเป็นต้องใช้สํ้าเครื่องหมายบนผิวหนังโดยรอบบริเวณที่ทําทดสอบเพื่อบอกตำแหน่งของสารทดสอบภายหลังนำแผ่นแปะออก และในประเทศไทยที่มีอากาศร้อน แพทย์มักจะปิดพลาสเตอร์ทับเพื่อป้องกันแผ่นทดสอบเลื่อนหลุด

วัตถุประสงค์ : เพื่อเปรียบเทียบความคงทน ชัดเจนของสํ้าที่ผลิตขึ้นใช้ในโรงพยาบาลศิริราช (in-house marking ink)และสํ้าปากกาของบริษัทการค้า (commercially marking pens)ในการทําทดสอบภูมิแพ้โดยการปิดบนผิวหนังและเปรียบเทียบการติดแนบของแผ่นทดสอบ (Finn Chamber®) ระหว่างการใช้และไม่ใช้เทปกระดาษ (3M™Micropore™ tape) ติดเพิ่มเติม

วัสดุและวิธีการ : การศึกษาทำในผู้ป่วย 30 ราย ที่มาทำทดสอบภูมิแพ้โดยการปิดบนผิวหนัง ณ คลินิกผิวหนังแพ้สัมผัส หน่วยตรวจโรคผิวหนัง โรงพยาบาลศิริราช ระหว่างเดือนเมษายนถึงกันยายน 2556 โดยแบ่งแผ่นหลังของผู้ป่วยอย่างสุ่มเป็น 2 ข้าง ข้างหนึ่งใช้สีที่ผลิตขึ้นใช้ในโรงพยาบาลศิริราช (in-house marking ink) อีกข้างใช้สีปากกาของบริษัทการค้า (Chemo Skin Marker-Regular™ หรือ AllergEAZE® Skin Marker อย่างใดอย่างหนึ่ง) ความชัดเจนแบ่งเป็น 4 ระดับ ประเมินโดยแพทย์ผิวหนังประจำคลินิก 2 คน ในวันที่ 4 หลังเริ่มทดสอบ การติดแนบของแผ่นทดสอบประเมินโดยนักวิทยาศาสตร์ประจำคลินิก ในวันที่ 2 หลังเริ่มทดสอบ

ผลการศึกษา : ความชัดเจนสีปากกาของบริษัทการค้ามีความชัดเจน 100% 13 ราย ความชัดเจน 50-99% 12 ราย และความชัดเจน <50% 5 ราย ในขณะที่สีที่ผลิตขึ้นใช้ในร.พ.ศิริราชมีความชัดเจน 100% จำนวน 22 ราย และความชัดเจน 50-99% จำนวน 8 ราย โดยสีที่ผลิตขึ้นใช้ใน ร.พ.ศิริราช มีความชัดเจน คงทนมากกว่าสีปากกาของบริษัทการค้า อย่างมีนัยสำคัญทางสถิติ (p -value= 0.005) ส่วนการติดแนบของแผ่นทดสอบ (Finn Chamber®) ระหว่างใช้และไม่ใช้เทปกระดาษ (3M™ Micropore™ tape) ปิดเพิ่มพบว่าไม่ต่างกันอย่างมีนัยสำคัญทางสถิติ (p -value= 0.5)

สรุปผล : สีที่ผลิตขึ้นใช้ในร.พ.ศิริราชมีความคงทนและคุ้มค่ามากกว่าสีของบริษัทการค้า และไม่จำเป็นต้องใช้เทปกระดาษปิดเพิ่มในการทำทดสอบภูมิแพ้โดยการปิดบนผิวหนังทำให้คลินิกประหยัดทรัพยากรปากกาและพลาสติก

คำสำคัญ : สีที่ใช้ทำเครื่องหมาย, ปากกาสำหรับทำเครื่องหมาย, เทปกระดาษ,

การทำทดสอบภูมิแพ้โดยการปิดบนผิวหนัง

Introduction

Patch testing is a gold standard method for the diagnosis of allergic contact dermatitis. The process of the procedure is to place the allergens in Finn Chamber® on unaffected skin on the upper back for 48 hour. According to the guidelines of the International Contact Dermatitis Research Group, the reactions have to read on D2, D3 (D4) and/ or D7.¹ The markers were used to identify the location of the allergens after removing the chamber. Thailand is a humid and tropical country located at equator region, having 3 seasons of *winter* (November thru February - *Dry, Cool*- daytime high temperatures are between 30-35 °C (86-95 °F), humidity between 50% - 60%, March thru June – *Hot*

Season - temperatures can soar to 40 °C (104°F) and July thru October - *Rainy Season*. This tropical climate causing perspiration which presumed to interfere with the remainder of the markers and adherent of the chambers. Thai patients usually have sweating due to daily activities, public transportation and hot weather. Therefore, 3M™ Micropore™ tape were regularly used at the edge of Scanpor® tape to secure Finn chamber® which routinely practice at our contact dermatitis clinic for a long time. The purpose of our study was to save cost of patch test procedure by comparing the persistence of in-house skin marker with commercial skin marker and the attachment of Finn Chamber® on

Scanpor[®] tape with or without additional 3M[™] Micropore[™] tape adhesion.

Material and methods

The study was approved by the Siriraj Institutional Review Board, Siriraj Hospital, Mahidol University, Bangkok, Thailand. We recruited 30 patients who performed patch test during hot and rainy season, from April to September 2013. After removed Finn Chamber[®] (SmartPractice, Phoenix, Arizona, USA) on Scanpor[®] tape (Alpharma AS, Norgesplaster Facility, Kristiansand, Norway) on D2, each patient's back were randomly divided side by side; one side for in-house skin marking ink and another side for commercially marking pens either Chemo Skin Marker-Regular[™] (Chemotechnique Diagnostics, Vellinge, Sweden), or AllergEAZE[®] Skin Marker (SmartPractice, Phoenix, Arizona, USA). All patients were advised to avoid water contact on the back during patch testing period as usual patch test procedure. The persistent of skin marker was evaluated by two dermatologists (W.B. and P.K.) on D4 (approximately 48 hour after drawing on the back). The visibility of the markers were graded into 4 levels of visibility; 100%, 50-99%, <50%, and poor (not enough for result interpretation).

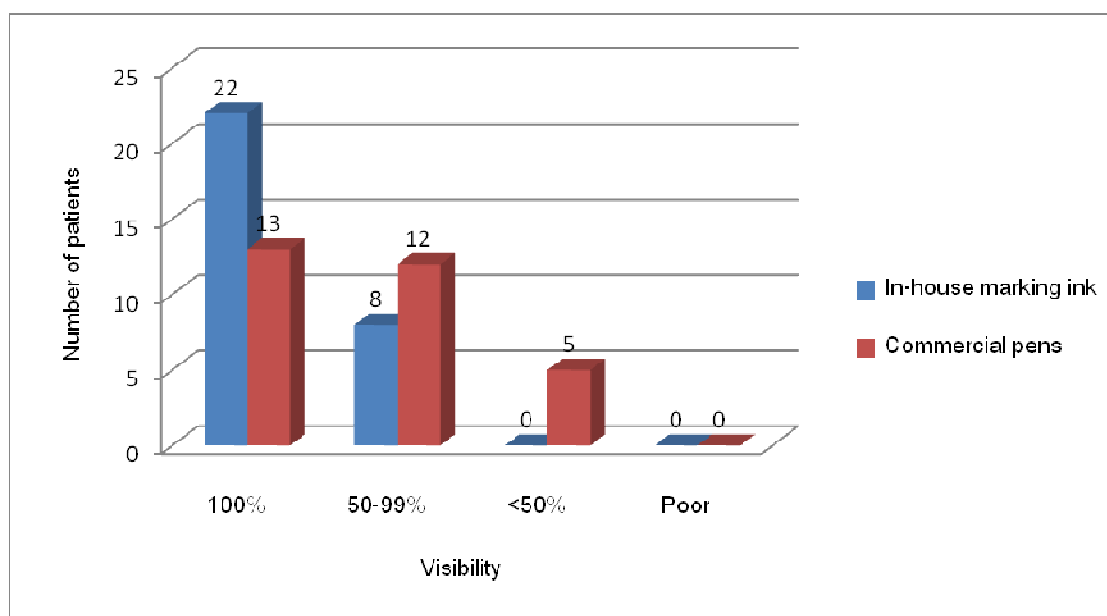
The patient's back were randomly divided side by side; one using additional 3M[™] Micropore[™] tape and

the other solely Finn Chamber[®] on Scanpor[®] tape. 3M[™] Micropore[™] tape (1 inch wide) was vertically attached at the left and right edges of Scanpor[®] tape in one selected side. The attachment of the test chambers was scored on D2 by technicians (P.E. and M.B.).

Data was analyzed by SPSS software version 17.0. McNemar-Bowker Test was used to compare the visibility of markers in both groups. The difference was considered statistical significant for *p*-values of less than 0.05.

Result

The result of the study is shown in **Figure 1**. Commercially marking pens shows 13 volunteers with 100% visibility, 12 volunteers with 50-99% visibility, and 5 volunteers with <50% visibility. On the other hand, in-house marking ink shows 22 volunteers with 100% visibility and 8 volunteers with 50-99% visibility. The persistent of in-house marking ink was significantly better than the commercial marking pens (*p*-value = 0.005). **Table 1** shows the ingredients of commercially available marking pens and our in-house marking ink. The cost of the commercial marking pen and our marking ink was 2.2 baht, and 0.12 baht per patient, respectively.



**p*-value= 0.005

Figure 1 Comparison of in-house and commercial skin marker

Table 1 Composition of various skin markers

Skin marker	Ingredients	Duration of the marking
Chemotechnique Skin Marker ¹	Methylrosanilin (gentian violet), 1%; silver nitrate, 10%; denaturated ethanol/aqua in equal parts ad 100%	5–7 days
Chemotechnique UV Skin Marker (yellow fluorescent ink) ¹	Disulphonic acid derivate of stilbene, 2%; dimethylsulphoxide (DMSO)/denaturated ethanol in equal parts ad 100%	5–7 days
T.R.U.E. TEST® Skin Markers	Gentian violet ink	NA*
Our in-house marking ink	Silver nitrate, 11%; basic fuchsin, 0.275%; purified water and alcohol 95% qs.	5 days

*Not Available

The complete adhesion of the Scanpor[®] tape were 27 subjects (90%) in Micropore[™] side compared to 29 subjects (96.7%) in no Micropore[™] side. There was no Finn Chamber[®] detachment in 28 subjects (93.3%) in

Micropore[™] side compared to 29 subjects (96.7%) in no Micropore[™] side. The adhesion of the tested chambers with or without 3M[™] Micropore[™] tape

enhancement was no statistical significant difference between two groups (p -value = 0.5).

Discussion

Patch testing is a diagnostic procedure which requires the result reading at D2, D4 and/ or D7 after application. The use of skin markers is necessary for identify the actual location of allergen, especially at D4, and some patients required delayed reading at D7. There are many factors affect the persistent of skin markers on the patients' skin; including sweating, friction, rubbing off by clothes, and daily activities. Moreover, residual adhesive tape on the patients' back may decrease the penetration of the marking ink.² Thailand is a tropical country with hot and humid weather all year long, which potentiate the sweating. Wilson *et al* studied the marker substantivity in United States which is in temperate region.² They showed that grids drawn with three marking pens were all easily read at 48, 72, and 96 hours after application. However, their study was performed in only five subjects; dermatologists and dermatology resident volunteers, during cool weather. Those environments were totally different from ours, both climate and patients setting.

Our study result shows that in-house marking ink is durable and resistant to perspiration and 18 times lower-cost than the imported commercially marking pens. The

only disadvantage of in-house marking ink was the usage method. Our ink comes in the small glasses bottle containers and the technicians need the toothpicks to apply onto the skin. This process requires the technician's experience to control the appropriate ink volume. Too much ink may irritate the patients' skin. On the other hands, the commercially marking pens are easily to use, however, the patients' sebum, the tape adhesive residues, and the allergens in petrolatum can destroy their tips.³ In addition, the pens may dry during storage, this make the cost quite expensive.

Conclusion

Our in-house marking ink is durable than the commercially available marking pens and provides cost-effectiveness in patch testing procedure. The study showed no significant benefit of using additional tape for enhancement. The Finn Chamber[®] were mostly fixed, even during the hottest season of the year. This findings lead to adjustment of procedure, which can reduce the cost in patch testing process.

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