

'Allergyapp' – a novel app(lication) to detect contact allergens in cosmetic products

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Many Europeans are contact-sensitized (have contact allergy) to common chemicals found in consumer products. Among many others, these include fragrances and preservatives used in, for example, body lotions, deodorants, soaps, and shampoos. Patch testing is a commonly used method to determine whether a specific substance causes contact allergy (allergen), thereby enabling patients to avoid future skin contact with the culprit allergen(s) and ultimately avoid allergic contact dermatitis.

Problems in avoiding certain allergens might arise because of challenging ingredient lists (labels) on cosmetic products. Not only can these be very comprehensive, but it can also be very difficult to read and pronounce the often long and complex chemical names. Indeed, a study showed that 46% of patients found it difficult to read the ingredients' International Nomenclature of Cosmetic Ingredients (INCI) names (the use of INCI names is required by EU law) on cosmetic products, and this is therefore a significant obstacle to avoiding allergens (1). Patients with a low educational background appeared to have the most difficulties in reading ingredient lists (2).

We recently developed the 'Allergyapp' to help contact-allergic patients read and interpret ingredient lists on cosmetic products. Here we present the main experiences gained from this process in an attempt to motivate other groups, partners or countries to do the same.

The 'Allergyapp' was developed in collaboration between the cosmetic industry, the Danish Contact Dermatitis Research Group, and the National Allergy Research Centre. Initially, we performed a web-based public survey to explore whether consumers would find the idea and concept of 'Allergyapp' usable and valuable. Of 16 000 randomized selected people, 1062 responded. One of 5 found the concept very interesting and answered that they would be willing to use the app. The technical solution was then developed with two IT companies, Inriver AB (Malmö, Sweden) and Woerk Aps (Odense, Denmark). The total price was 240 000 DKK (approximately €32 000). Another IT company, Ecreo Aps (Odense, Denmark), also participated, and the software is still undergoing some development. The final cost of the app will reach approximately 2 million DKK (approximately €270 000). In the period April 2012 to April 2014, we contacted the most influential cosmetic companies in Denmark, and had approximately 30 meetings. Cooperative agreements were made with six companies (partners) representing nine brands. The essence of the agreement was as follows:

"Allergyapp undertakes to develop and maintain the app and ensure that the product database is developed continually in order to create value to the users of the app and the partner. Furthermore, Allergyapp will develop a function so that the consumer is referred to an alternative product within the product portfolio of the partner (Company Brand) when a consumer scanning the database has rejected a product. The partner undertakes to provide information according to the product line, ingredient list and corresponding EAN/BAR code. Allergyapp undertakes to enter ingredients in the product database so that the partner can enter information pursuant to the agreement. The

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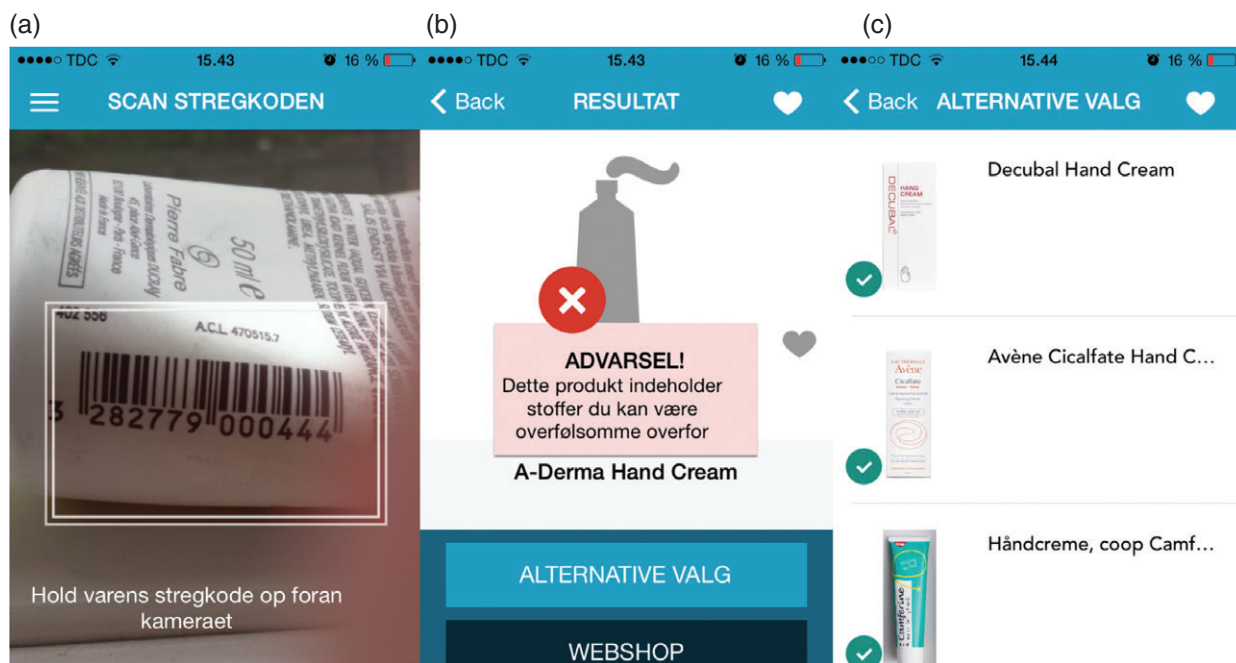


Fig. 1. Overview screenshots from 'Allergyapp'. (a) The SCAN screen has a white double-lined box in the middle of the display, and when a product is scanned, the EAN code should be centred here. (b) When the scan is complete, a result is shown. If the product contains the marked allergen(s), a warning and a red X will appear; if the product does not contain the allergen(s), a green tick is shown. Below the result is a button for alternative choices. (c) When alternative choices are selected, a list of similar products without the allergen(s) is shown and marked with green ticks.

responsibility for the accuracy of the data input lies with the partner".

The companies that are currently engaged and collaborate include those producing the following brands: LaRochePosay (L'Oréal), Ducray, Avène, and A-Derma (Apotekernes amba, Pierre Fabre), Decubal (Actavis Denmark), Änglamark, X-tra (COOP Denmark), Neutral (Unilever), Eucerin (Beiersdorf), and Neutral (Unilever Denmark). These companies represent <20% of the market, but we expect more brands to join 'Allergyapp' in the near future.

Today, 'Allergyapp' is free and can be downloaded from Apple's App Store for use on iPhones™. The app functions by scanning the bar codes on marketed cosmetic products in Denmark that are produced by members part of the 'Allergyapp' consortium. The ingredient list is checked online 'on demand' via a data connection. The database contains all ingredients and product information. This ensures that the database is up to date at all times. By scanning the bar code, the contact-allergic (and non-allergic) individual can obtain information about whether a certain product contains a particular allergen.

We find the 'Allergyapp' simple and easy to use. When the app is opened, a login box appears for login or creation of a new user profile. Next, the camera switches on, and it is possible to scan the EAN code on a product by focusing the code in the box in the middle of the screen. In the menu bar, it is possible to mark one or more allergens and add them to 'My Allergies'. In subsequent scans of the product's EAN code (Fig. 1a), the app will say whether the product contains the marked allergen(s) (Fig. 1b). When a product with the culprit allergen is scanned, a warning box will appear, and the app will, if possible, suggest a choice of alternative products (Fig. 1c). If the product is not in the database, it is possible to add the product to the database. Afterwards, the app can recognize the added product but not the ingredients. The EAN code and ingredient list are linked by the company that produces the product.

When a company changes the ingredients in a product, the EAN code stays the same. The companies provide 'Allergyapp's' database with new updates on products at all times, which is necessary to keep the ingredient lists up to date. The EAN codes do not account for batch-to-batch variation of one product. We have decided that if ingredients are changed in a new batch, there will be a warning

on the app: 'the product may contain ingredients you do not tolerate'. This warning will be removed as soon the shops have completely sold all former batches.

Discussion

The rapidly growing app 'universe' is filled with health apps. When allergy apps are searched for, the selection is still wide, but most of the apps are about asthma or food allergies, or contain long lists of allergy-causing substances. The latter mostly consist of reference books with lists of ingredients in alphabetical order. A patient with contact allergy can find it difficult to identify safe products, owing to complicated ingredient lists on consumer products. This is where the 'Allergyapp' or a similar app might be useful. The app has been developed to make daily life easier for people with contact allergy, helping them to avoid certain lotions, shampoos, soaps, deodorants, cosmetics or other consumer products containing the allergen, and thereby helping the user to choose products that are safe to use. Other solutions to help users avoid

allergens have been researched, and a suggestion to improve the readability is to adjust the typographical design and different ordering of the ingredients on the cosmetic label. This method has been shown to help in the creation of more accessible product information, although the consumer still has to know the complicated INCI names (3).

A future goal is to make companies add their products' ingredient lists and EAN codes to the 'Allergyapp's' database, to expand the app's utility by having as many cosmetic products available as possible. It is important to state that the app has been created as an easier way to access already available product information. Moreover, it has been created exclusively for the person with a contact allergy, to prevent unwanted allergic reactions. In the future, the aim is to create a comprehensive database, and to make the app international for use in many countries. Another important step is to make 'Allergyapp' available for any smartphone platform, not just Apple's iPhone™, to reach as many consumers as possible.

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