A review of quality surveillance projects on cosmetics in Taiwan

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Abstract

The Food and Drug Administration in Taiwan is responsible for the quality regulation and control of cosmetics. In order to have a clear understanding of the trends in the product quality monitoring outcomes and the regulatory control measures over the past years, this study has put together the reports of nine cosmetic surveillance projects conducted between 1982 and 2012. The findings can be used as a reference in developing a more solid quality monitoring plan and management system for cosmetic products. Results show that permanent wave products, hair dye products, and phthalate esters in cosmetic products have the highest average noncompliance rates at 39.2%, 14.2%, and 11.2%, respectively. These are followed by the average noncompliance rates of mercury in products, sunscreen products, and microorganisms in products, at 8.5%, 7.1%, and 5.5%, respectively, and the remaining three projects averaging below 4.1%. Since 1997, when new standards were announced and assistance to manufacturers was reinforced, the noncompliance rates of permanent wave products decreased annually, until 2007, when it was fully qualified for the standards. Overall, the study showed that the noncompliance rates of permanent wave products and for levels of phthalate esters, mercury, and hydroquinone in cosmetic products have all decreased in the previous years. The results of surveillance projects conducted after 2005 revealed only one noncompliance sample with lead, arsenic, and cadmium, whereas the surveillance projects on permanent wave products and chloroform- and 1,4-dioxane-containing products revealed full compliance with regulation standards. However, the noncompliance rates for microorganisms in cosmetics and the ingredients in hair dye products and sunscreen products were still high. These high-risk products must be monitored. These surveillance projects are conducted to ensure the safety of cosmetics in the market.

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1. **Introduction**

According to The Law for the Control of Cosmetic Hygiene, cosmetics are defined as products designed for topical use, such as moisturizers, deodorants, and makeup [1]. Cosmetic products in the market frequently contain diverse and complex ingredients, and if they have been contaminated by hazardous substances, the products may harm consumers. Therefore, monitoring the quality of and the risk involved in the usage of cosmetic products is of utmost importance to accomplish the important goal of protecting consumers’ health.

The postmarketing surveillance of cosmetics is an important public service offered by the government, which serves to prevent and control cosmetics-related security incidents. In order to reach the expected effectiveness of quality surveillance, it is necessary to have an overall plan and to conduct risk assessments. The Taiwanese government has been surveying the quality of general and medicated cosmetics since 1982. In 2004, the government combined the resources of local health bureaus, making this a nationwide project called “Quality Surveillance of Drugs, Medical Devices and Cosmetics”, which aimed to continue the monitoring of cosmetic products.

In Taiwan, cosmetics are classified as general cosmetics and medicated cosmetics. All medicated cosmetics, whether imported or domestic, have to be registered with the Taiwan Food and Drug Administration (TFDA), before they are manufactured or introduced into the market [1]. Because the ingredients in general cosmetics are much safer for human use, with reference to the management model of the European Commission and U.S. Food and Drug Administration, we have adopted the practice of postmarketing health and safety monitoring, with a focus on “product labeling” and “hazardous ingredients”. The findings of the present study, constructed from compiled results and trend analysis, can be used as a reference for developing a more solid quality monitoring plan and management system for cosmetic products.

2. **Methods**

2.1. **Source**

This study summarizes and discusses the results of cosmetics quality research and surveillance reports from the Annual Scientific Report of the National Laboratories of the Food and Drug Administration, the Annual Scientific Report of the Bureau of Food and Drug Administration, and the Annual Report of Food and Drug Research.

2.2. **Principles of the monitoring plan**

The postmarketing product surveillance plan is based on the following: (1) high potential hazard and risk of product usage; (2) likelihood of causing health effects in specific groups of users; (3) domestic (consumer groups, congress, and other related units) and international concerns; (4) large supply, broad circulation, and high consumption; (5) results of previous monitoring reports; and (6) response to emergencies and administration needs.

2.3. **Details of the monitoring projects and their sampling**

The present monitoring survey reviewed nine projects, including projects monitoring permanent wave products, hair dye products, products containing phthalate esters or heavy metals, microorganisms in cosmetic products, sunscreen products, and products containing chemicals such as hydroquinone (HQ), salicylic acid, methanol, chloroform, and 1,4-dioxane. These products were tested either by the TFDA or were outsourced to external agencies. The sampling was primarily done by the local health bureaus, although the background surveillance for part of the samples was conducted by the TFDA. All tests were conducted according to the methods published by the TFDA or by following internationally recognized or validated methods.

3. **Results**

The reports of nine surveillance projects on cosmetics, conducted between 1982 and 2012, were reviewed in the present study (Tables 1 and 2).

3.1. **Quality surveillance of permanent wave products**

In order to monitor permanent wave products in a simple and effective manner, the Department of Health (DOH) specified limits for the contents of such products with thioglycolic acid and bromate salts in 1990, 1997, and 1998, to ensure that these products met health and safety requirements [2]. These criteria for evaluating the permanent wave products were in accordance with The Law for the Control of Cosmetics Hygiene. However, it is important to mention that prior to 1997, the contents of permanent wave products were only required to match the specifications as per their registration. Yet, after 1997, safety limits were set by specifying that the proportion of thioglycolic acid must be between 2.0% and 11.0%, depending on different categories, and the proportion of bromate salts should be less than 11.5%. The surveillance of postmarketing permanent wave products was conducted nine times between 1984 and 2007. The results demonstrated that before the permitted limits of the contents of these products were announced in 1997, the incidence of noncompliance in these products was high, with a noncompliance rate greater than 40%. The main reason for noncompliance was that the composition of the product did not match the original specifications. Another major reason for noncompliance was that the products failed to meet the pH recommendations. After the specification of permitted limits of the contents of these products, noncompliance rates improved significantly, decreasing to 5.7% in 1998, 3.6% in 2004, and 0% in 2007 [3].

3.2. **Quality surveillance of hair dye products**

Hair coloring is a modern fashion trend. For safer use and prevention of adverse effects, the DOH has established standards for the ingredients of hair dye products. According to these standards, all products must be registered through the TFDA for inspection prior to import or manufacture. In 1998,
the DOH also announced that the products should add precautionary instructions to protect the consumers. These criteria for hair dyes are in accordance with the regulations of the Cosmetics Containing Medicines Basis, which was introduced in 2010. Prior to 2010, the contents of hair dyes were supposed to match the specification as per their registration. The quality surveillance of hair dye products was conducted in 1992, 2000, 2002, and 2010[4]. The noncompliance rates were 26.7%, 0.9%, 19.5%, and 29.4%, respectively (Fig. 1). The government survey found that most products had not been registered, had a counterfeit license number, or did not have correct labeling in previous years, thus making it difficult to determine the products’ compliance. This indicates that the management and enforcement of the standards for such products should be strengthened. In addition, our review revealed that in recent years, research and development of

| Year | Permanent wave products | Hair dye products | Sunscreen products | Microorganisms in products | Mercury in products | Lead, arsenic, and cadmium in products |
|------|-------------------------|-------------------|-------------------|--------------------------|-------------------|-------------------------------------|
| 1982 | —                       | —                 | —                 | 20 (2/10)                | —                 | —                                   |
| 1984 | 90.0 (27/30)            | —                 | —                 | —                        | —                 | —                                   |
| 1985 | 80.0 (72/90)            | —                 | —                 | —                        | —                 | —                                   |
| 1986 | —                       | —                 | —                 | —                        | —                 | —                                   |
| 1987 | —                       | —                 | —                 | —                        | —                 | —                                   |
| 1990 | 95.7 (67/70)            | —                 | —                 | —                        | —                 | —                                   |
| 1992 | —                       | 26.7 (8/30)       | —                 | 10.4 (21/201)            | —                 | —                                   |
| 1993 | 62.0 (67/108)           | —                 | —                 | —                        | —                 | —                                   |
| 1994 | 42.5 (51/120)           | —                 | —                 | —                        | —                 | —                                   |
| 1998 | 5.7 (6/105)             | —                 | —                 | —                        | —                 | —                                   |
| 1999 | —                       | —                 | 12.4 (17/137)     | —                        | —                 | —                                   |
| 2000 | —                       | 0.9 (1/118)       | 6.3 (10/159)      | —                        | —                 | —                                   |
| 2001 | —                       | —                 | 3.5 (4/114)       | —                        | —                 | —                                   |
| 2002 | —                       | 19.5 (16/82)      | 3.9 (4/103)       | —                        | —                 | —                                   |
| 2004 | 3.6 (6/165)             | —                 | —                 | —                        | —                 | 0.0 (0/121)                         |
| 2006 | —                       | —                 | 10.0 (5/50)       | 0 (0/51)                | —                 | 0.5 (1/191)                         |
| 2007 | 0 (0/68)                | —                 | —                 | 3.4 (5/149)             | —                 | —                                   |
| 2008 | —                       | —                 | —                 | 7.4 (4/54)              | —                 | —                                   |
| 2010 | —                       | 29.4 (15/51)      | —                 | —                        | —                 | —                                   |
| 2011 | —                       | —                 | —                 | —                        | —                 | 1.0 (1/99)                          |
| 2012 | —                       | —                 | —                 | 9.4 (5/53)              | —                 | —                                   |
| Average noncompliance rate | 39.2 (296/756) | 14.2 (40/281) | 7.1 (46/644) | 7.1 (37/518) | 8.5 (118/1383) | 0.7 (2/290) |

a The table presents noncompliance rates (noncompliance number/total sampling number).

| Year | Products with hydroquinone | Products with salicylic acid | Products with phthalate esters | Products with methanol | Products with chloroform | Products with 1,4-dioxane |
|------|---------------------------|-------------------------------|-------------------------------|------------------------|-------------------------|--------------------------|
| 1994 | 12 (14/100)               | —                             | —                             | —                      | —                       | —                        |
| 1996 | 2.0 (2/102)               | —                             | —                             | —                      | —                       | —                        |
| 1997 | 0.0 (0/50)                | —                             | —                             | —                      | —                       | —                        |
| 2000 | —                         | 3.1 (2/65)                    | —                             | —                      | —                       | —                        |
| 2001 | 3.8 (3/79)                | —                             | —                             | 7.8 (4/51)             | —                       | —                        |
| 2002 | 4.6 (4/87)                | —                             | —                             | —                      | —                       | —                        |
| 2004 | —                         | —                             | —                             | 0.9 (1/112)            | —                       | —                        |
| 2005 | 1.6 (4/247)               | —                             | —                             | —                      | —                       | —                        |
| 2006 | —                         | —                             | —                             | 1.9 (2/103)            | 0.0 (0/103)             | —                        |
| 2007 | —                         | 5.3 (3/57)                    | —                             | —                      | —                       | —                        |
| 2009 | —                         | —                             | 14.9 (13/87)                  | —                      | —                       | —                        |
| 2011 | —                         | 0.0 (0/31)                    | 9.1 (4/44)                   | —                      | —                       | 0.0 (0/81)               |
| 2012 | —                         | —                             | 7.1 (4/56)                   | 3.6 (2/56)             | —                       | —                        |
| Average noncompliance rate | 4.1 (27/665) | 3.3 (5/153) | 11.2 (21/187) | 2.8 (9/322) | 0.0 (0/103) | 0.0 (0/81) |

a The table presents noncompliance rates (noncompliance number/total sampling number).
“shampoo and hair dye” products have increasingly aimed to make these products more convenient. In 2008, because consumer organizations had issues with unscrupulous products and reports of allergic reactions, the DOH issued a public press release disapproving the use of such “shampoo and hair dye” products, advising the consumers not to purchase or use the products, and emphasizing the necessary precautions to be followed when using hair dye products.

3.3. Quality surveillance of sunscreen products

Sunscreen products are very common and fast selling; therefore, the problems of quality often become topics of attention for the media and consumer groups. According to the Statute for Control of Cosmetic Hygiene in Taiwan, there are provisions limiting the amounts of the ingredients of sunscreen products [1]. According to this statute, medicated cosmetics must be registered in advance (titanium dioxide-containing products have been considered general cosmetics since 2009). To protect consumer rights and health, the quality survey of postmarketed sunscreen products was carried out six times between 1999 and 2006 [5–10]. In addition, the TFDA has issued several press releases to remind the consumers to be careful while using such products. Our review revealed that the noncompliance rates of these products declined from 1999 to 2001, but slightly increased from 2002 to 2006. The incidence of unregistered sunscreen products was 12.4% in 1999, 10.5% in 2001, 11.1% in 2005, and 18.0% in 2006 (Fig. 2). This rose to a marked 28.2% in 2002, but improved after 3 years. Thus, the results of the six surveillance projects on sunscreen products over the years revealed that noncompliance rates have exhibited an increasing trend, especially in domestic products. This indicates that these products should continue to be monitored.

3.4. Quality surveillance of phthalate esters in cosmetics

Phthalate esters are generally added to increase the ductility of nail polishes and to make the fragrances of various cosmetics last longer. They are widely used in cosmetics, but have been reported to have teratogenic effects and to interfere with the human endocrine system [11]. To ensure that consumers avoid the usage of marketed cosmetics contaminated with phthalate esters, the DOH announced to the public to refrain from using some phthalates such as dibutyl phthalate, benzyl butyl phthalate, di-2-ethylhexyl phthalate, and di-n-octyl phthalate. In 2008, the DOH declared that if traces of phthalate esters are unavoidable in some raw materials owing to a limit in the available technology during the manufacturing process, the total residual amount of phthalate esters should not exceed 100 ppm. The TFDA conducted quality-monitoring surveys of such products in 2009, 2011, and 2012 [12]. The results of our review indicated that noncompliance was still relatively common but showed a gradual decline. The noncompliance rate decreased from 14.9% in 2009 to 7.1% in 2012. In view of these results, it is important to note that the TFDA reported that it would continue to monitor high-risk products (e.g., nail polish, perfume) and oversee the manufacturers to increase product quality.

3.5. Quality surveillance of microorganisms in cosmetics

Cosmetics are nutrient-rich products. Favorable conditions for microbial growth, such as oxygen, moisture, and temperature, may cause microorganism contamination and product degradation, thereby affecting consumer health. A background investigation was conducted in this regard between 1982 and 1992 [13,14]. These projects used eye cosmetics, baby products, lotions, and creams as the main testing samples. Management standards for microorganisms in products were not set in Taiwan until 2005. Therefore, for the present study, we used the standards of the World Health Organization as a yardstick to evaluate compliance. Noncompliance rates were found to be 20.0% and 10.4%, with the main reason for
noncompliance being an excessive amount of aerobic bacteria, yeast, and fungi. In order to protect consumer health, the DOH brought the “Microbial Guideline of Cosmetics” into effect from April 1, 2005 [15]. In terms of the microbial safety limits for the products, specifically for use on babies, on the mucosa, and in the eye area, the guideline mentioned that the total viable count for aerobic mesophilic microorganisms should not be more than 100 CFU/mL. The same for the other products was determined as not exceeding 1000 CFU/mL. The guideline also specified microorganisms that were not permitted in a product sample, which included Escherichia coli, Pseudomonas aeruginosa, and Staphylococcus aureus. Our review revealed that the 2006 investigation discovered three noncompliant samples that had been manufactured prior to the declaration of the guideline; however, the three samples were still determined as conforming to regulations [16]. In 2007, 2008, and 2012, the noncompliance rates showed an increasing trend [17,18]. The main reason for noncompliance during this period was an excessive number of bacteria in the samples. The major noncompliant samples were baby products, eye products, and mucous products. Thus, our findings revealed that monitoring efforts on such high-risk products should be reinforced.

### 3.6. Quality monitoring of heavy metals in cosmetics

Heavy metals may be introduced into cosmetics from raw materials and during the manufacturing process. Considering the health hazards of heavy metals, they have been classified as important monitoring projects over the years. Mercury salts are used for bleaching the skin, but with prolonged use, mercury is deposited in the skin, causing pigmentation, allergic dermatitis, and chronic mercury poisoning, which leads to organ injury [19]. Nine monitoring surveys were conducted by the TFDA on mercury in cosmetics, from 1985 to 2005 [20,21]. The results of our review showed that the noncompliance rates of mercury in cosmetics ranged from 12.4% to 15.0% from 1985 to 1987, which declined to 0.4% in 2005. With the banning guidelines declared by the government [1], cosmetics contaminated with mercury were gradually phased out from the market. The samples inspected by the Health Bureau generally came from cosmetics stores, pharmacies, department stores, convenience stores, etc., which led to a low detection rate of mercury in the samples.

Moreover, the noncompliant samples, all with complete labeling and abiding to importation rules, were primarily of domestic origin. In addition, in recent years, with the TFDA examining the cosmetics, the detection rate of mercury salts has been generally low. Moreover, the noncompliant samples, all with complete labeling and abiding to importation rules, were primarily of unknown origins or had been purchased from abroad.

In addition to mercury, the heavy metals lead, cadmium, and arsenic are toxic. They can accumulate in human tissue and are strongly associated with cell disease, which may damage the immune system, consequently threatening people’s health. Along with the ban imposed by the government on such products [1], the total permissible residual amount of lead and cadmium was limited to less than 20 ppm, and that for arsenic was limited to less than 10 ppm. To evaluate the compliance with these regulations, the TFDA conducted quality-monitoring projects in 2005 and 2011 [22,23]. We found that only two cosmetic samples had exceeded the standards in these 2 years (noncompliance rates were 0.5% and 1.0%, respectively), and both samples were imported products. In view of such findings, the TFDA reported that it would continue to monitor for heavy metals in cosmetics.

### 3.7. Quality monitoring of HQ in cosmetics

HQ is one of the most effective inhibitors of melanogenesis, and is widely used for the treatment of melanosoma and other hyperpigmentary disorders. However, it has been reported to cause irritation, dermatitis, chemical burns, and other side effects [24]. The DOH announced in 1990 that HQ was classified as a drug and that it could not be added to cosmetics. The surveillance of the HQ content of commercial products was conducted seven times between 1994 and 2005 [21]. The noncompliance rate was as high as 12% in 1994, but then followed a downward trend, reaching 1.6% by 2005. This indicated that the businesses had reduced the use of illegal HQ in cosmetics. Studying the results of surveys over the years, we found that most samples of noncompliance were imported products, which may be indicative of disparities in the laws related to cosmetics between countries. Taiwan and Japan have the same management guidelines. In the United States, HQ cannot be used in creams and lotions, and it cannot be used for whitening purposes; however, it is permitted to be used in cleaning products so long as it does not exceed 1%. The EU Commission regulation states that HQ can only be used in hair dye products (limited to 0.3%) and artificial nails (limited to 0.02%), but not in whitening cosmetics [25].

### 3.8. Quality monitoring of salicylic acid in cosmetics

Salicylic acid, also known as beta hydroxy acid, is generally used for softening the skin and acne prevention. As salicylic acid is easily absorbed by the skin, it can cause not only irritation but also lead to salicylism at high concentrations, including nausea, vomiting, and dyspnea, or even coma, shock, and death, following long-term use [26]. According to the Statute for Control of Cosmetic Hygiene in Taiwan, issued in 1999, cosmetics with salicylic acid content of 0.2–1.5% are classified as medicated cosmetics (this upper limit was revised to 2.0% in 2008). Therefore, it was made mandatory to register such products in advance [27]. Products with a salicylic acid concentration of less than 0.2% were classified as general cosmetics, and therefore did not require registration because the salicylic acid was essentially used as a preservative. The quality surveillance of salicylic acid in cosmetics was conducted in 2000, 2007, and 2011 [28–30], and we found that the noncompliance rates were 3.1%, 5.3%, and 0%, respectively. In 2000, we identified one
noncompliant sample with salicylic acid levels beyond the permitted limit, and another sample with tretinoin, a banned ingredient. In 2007, two domestic products were identified that did not match the permitted limit. One of these was an imported product that was beyond the medicated cosmetics’ content limit of 1.5%, whereas the other was found to have a content limit exceeding 0.2% but had not been registered. Recently, foot masks have been identified as high-risk products when they have salicylic acid added to soften keratin. In 2009, a consumer was found to exhibit serious side effects when using such products. In 2011, the TFDA conducted a quality monitoring of foot masks, looking at the amount of salicylic acid they contained and their pH. It was found that only one domestic product was considered noncompliant because it had a pH of 1.8 (much lower than the permissible limit of 3.5, although this specification is only for α-hydroxyacids), as it did not contain α-hydroxyacids, but the content of salicylic acid was within permissible limits.

3.9. Quality monitoring of methanol, chloroform, and 1,4-dioxane in cosmetics

Oral or skin exposure to methanol can cause poisoning, blindness, and even death. In 1988, the DOH declared that alcohol-containing products, including nail polish, hairspray, perfume, and other products, are classified as general cosmetics, and should not contain in excess of 0.2% of methanol (v/v) [31]. To prevent illegal manufacturing by unethical vendors, an annual monitoring program was conducted in 2001, 2004, 2006, and 2012 [32,33]. In comparison to the high noncompliance rate (7.8%) in 2001, the remaining monitoring programs indicated rates of less than 4% (3.6% in 2012). Across all these programs, the noncompliant product was nail polish containing excessive levels of methanol.

Chloroform and 1,4-dioxane are industrial solvents commonly used in the manufacturing process. Chloroform is a volatile and anesthetic gas that has an inhibitory effect on the central nervous system. Long-term exposure through dermal contact may cause irritation, redness, and a burning sensation [34]. Since 2005, the DOH declared that the two compounds are classified as banned ingredients in cosmetics [35]. Furthermore, 1,4-dioxane is a by-product of a polyoxyethylene-type nonionic surfactant, a common ingredient in cosmetics. Long-term exposure can lead to inhibition of the central nervous system, severe abdominal and back pain, hepatomegaly, liver and kidney damage, and other side effects [36]. In 2005, the DOH stated that 1,4-dioxane cannot be used as an ingredient in cosmetics products [35]. However, in 2009, it declared that if the production of 1,4-dioxane cannot be avoided during the manufacturing process, trace amounts of 1,4-dioxane in the final product should not exceed 100 ppm. We found that monitoring of these two compounds is necessary. Furthermore, the quality monitoring of chloroform in nail polish and 1,4-dioxane in cleaning cosmetics was conducted in 2006 and 2011, respectively [33,37]. The results of the two programs revealed no incidence of noncompliance.

4. Discussion

With the evolution of the modern lifestyle, cosmetics have become indispensable daily necessities. The diversity and availability of cosmetics in the market, the illegal manufacturing by malevolent businesspersons, and the rising concerns of the consumers, elected representatives, and consumer protection groups on security issues for cosmetics highlight the importance of the management of the health and safety aspects of cosmetics. There is a need to build efficient monitoring mechanisms that maintain the quality of commercial cosmetics and provide more protection for the consumers.

4.1. Trend analysis of the results of quality monitoring over the years

4.1.1. Analysis of average noncompliance rate

A review of the results of nine surveillance projects showed that permanent wave products, hair dye products, and products containing phthalate esters had the highest average noncompliance rates, at 39.2%, 14.2%, and 11.2%, respectively. This was followed by mercury in products, sunscreen products, and microorganisms in products, with noncompliance rates of 8.5%, 7.1%, and 5.5%, respectively. The noncompliance rates for the three remaining projects were all below 4.1% (Tables 1 and 2). The noncompliance rate for lead-, arsenic-, and cadmium-containing products was 0.7%, and the surveillance of cosmetics for their chloroform and 1,4-dioxane concentrations revealed full compliance.

4.1.2. Trend analysis of the results of quality monitoring plans

Overall, the noncompliance rates of permanent wave products and products containing phthalate esters, mercury, or HQ have all decreased in the previous year (Tables 1 and 2). Considering the surveillance projects conducted after 2005, there was only one noncompliance sample for lead, arsenic, and cadmium, whereas the projects for permanent wave products and products containing chloroform and 1,4-dioxane revealed full compliance with specified standards. However, the noncompliance rates of microorganisms in products, hair dye products, and sunscreen products were still high.

4.2. Analysis of previous monitoring results and regulatory management

4.2.1. Management of medicated cosmetics

Hair dyes, permanent wave products, sunscreen products, and some products containing salicylic acid were found to be managed as medicated cosmetics. The noncompliance rates for products with salicylic acid were not high over the past three quality surveys. In 2011, the monitoring results fully complied with the regulatory standards, indicating that the administration’s monitoring efforts had been successful. The high average noncompliance rates of hair dye and permanent wave products were mostly attributable to poor quality control and absence of product registration, leading to the identification of a greater number of noncompliance incidents.
After 1997, when new standards were announced and assistance to manufacturers was reinforced, the noncompliance rates decreased annually, eventually reaching full compliance in 2007. Over the study period, hair dyes had high noncompliance rates, indicating that the quality of these marketed products has varied considerably. We found that most products did not conform to manufacturing and marketing regulations, indicating a need for increased monitoring in the future. There has been a gradual increase in the noncompliance rates of sunscreen products since 2001. One reason for this was that the products did not match original specifications. In 2010, the DOH enacted the Cosmetics Containing Medicines Basis act, which contained greater specifications of permitted criteria. Consequently, more attention will be placed on medicated cosmetics in the future.

4.2.2. Management of general cosmetics
General cosmetics do not have to apply for registration prior to selling, making it important to conduct surveillance of these products. Although the noncompliance of mercury products has been a serious issue in the past, this situation has significantly improved since 2004. Quality monitoring projects examining for lead, cadmium, and arsenic in cosmetics, conducted in 2005 and 2011, showed that only one sample exceeded the standards in both these years. Overall, the noncompliance rates were less than 1%, demonstrating that the control of heavy metals has been effective. According to the standards, both HQ and phthalate esters are banned from cosmetics. With the TFDA actively implementing monitoring projects, violations of these two criteria have been on the decline. Methanol, chloroform, and 1,4-dioxane are other ingredients that are not permitted to be added to cosmetics. The noncompliance rate of methanol was as high as 7.8% in 2001, but it has declined since 2004. The results of projects assessing chloroform and 1,4-dioxane revealed full compliance over the study period. The noncompliance rates of cosmetics based on levels of microorganisms showed a rising trend after the announcement of standards in 2006; violations were mainly attributable to an excess of bacteria. The results showed that many cosmetic products had problems with the manufacturing process and monitoring control. This surveillance project will continue to be the focus of research.

5. Conclusion
The government, cosmetic industry, and consumers should work together to ensure the safe use of cosmetics. The government should sustain the effective implementation of regulations and postmarketing monitoring through integration of international regulations and professional and technological support. In order to gain the trust of consumers, manufacturers should take primary responsibility for the production of safe cosmetics and have good self-management. On the consumer’s end, it has been reported that the government will continue to deliver correct information on the use and consumption of cosmetics. Therefore, consumers should make an effort to keep up-to-date with information about products they hope to purchase. In addition, high-risk products will be kept under continual watch by the government. Overall, this review indicated that postmarketing surveillance projects ensure the safe use of cosmetics in the market.

Conflicts of interest
All authors declare no conflicts of interest.

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