Final Report on the Safety Assessment of Glucose Glutamate[1]

Glucose Glutamate is the ester of glucose and glutamic acid used in a small number of cosmetic products as a skin conditioning agent—humectant. Current concentration of use information was not available. Glucose Glutamate that conforms to the specifications of the *Japanese Cosmetic Ingredients Codex* may be used as an ingredient in all cosmetic categories except eyeliner preparations. Its use is not prohibited in the European Union. No safety test data, however, were available as a basis for a safety assessment. Additional data needed in order to complete a safety assessment include: (1) concentration of use data; (2) chemistry data, including method of manufacture and impurities data; (3) UV absorption data; if absorption occurs in the UVA or UVB range, photosensitization data are needed; (4) dermal absorption data; if dermal absorption occurs, 28-day dermal toxicity and developmental toxicity data are needed; (5) skin irritation and sensitization data; (6) two genotoxicity studies, one using a mammalian system; if positive, a 2-year dermal carcinogenicity assay performed using National Toxicology Program (NTP) methods is needed. Until these data are provided, the available data are insufficient to support the safety of Glucose Glutamate in cosmetic formulations.

INTRODUCTION

Glucose Glutamate is the ester of glucose and glutamic acid that functions as a skin conditioning agent—humectant (Wenninger, Canterbery, and McEwen 2000).

CHEMISTRY

Glucose Glutamate (CAS No. 113114-16-2) is the ester of glucose and glutamic acid that has the empirical formula $C_{11}H_{19}NO_9$ (Wenninger, Canterbery, and McEwen 2000). Glucose Glutamate is also known as Glutamic Acid, Reaction Products with Glucose (Wenninger, Canterbery, and McEwen 2000).

Glucose Glutamate occurs as a viscous, tannish, opaque paste with a characteristic "sugary" odor (Nikitakis and McEwen 1990). It is dispersible in water and very slightly soluble in alcohol. The pH of an aqueous solution of Glucose Glutamate is 4.0 to 5.0. The amount of total solids is 55% to 60%, of total sugars is 26% to 28%, and of total nitrogen is 1.4% to 2.4%.

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Published data on the manufacture and production, analytical methods used for detection, ultraviolet radiation absorbance, or impurities that may be present in cosmetic grade Glucose Glutamate were not found.

USE

Cosmetic

The product formulation data submitted to the Food and Drug Administration (FDA) in 1997 stated that Glucose Glutamate was contained in a total of eight cosmetic product formulations (Table 1).

Concentration of use values are no longer reported to the FDA by the cosmetic industry (FDA 1992). However, the product formulation data submitted to the FDA in 1984 stated that Glucose Glutamate was used at concentrations of ≤5% (Table 2).

International

Glucose Glutamate is listed in the Japanese *Comprehensive Licensing Standards of Cosmetics by Category (CLS)* (Rempe and Santucci 1997). Glucose Glutamate that conforms to the specifications of the *Japanese Cosmetic Ingredients Codex* has precedent for use without restriction in all CLS categories except eyeliner preparations, for which there is no precedent for use. Glucose Glutamate does not appear in Annex II (list of substances that must not form part of the composition of cosmetic products) or Annex III (list of substances that cosmetic products must not contain except subject to the restrictions and conditions laid down) of the *Cosmetics Directive of the European Union* (European Economic Community 1995).

ABSORPTION, DISTRIBUTION, AND METABOLISM

Published data on the absorption, distribution, and metabolism of Glucose Glutamate were not found.

ANIMAL TOXICOLOGY

Published animal toxicology studies using Glucose Glutamate, including reproductive and developmental toxicity, genotoxicity, and carcinogenesis studies, were not found.

CLINICAL ASSESSMENT OF SAFETY

Published data on the clinical irritation and sensitization potential of Glucose Glutamate were not found, nor were any other clinical test data found.

TABLE 1
Product formulation data (FDA 1997)

Product category	Total no. formulations in category	Total no. containing ingredient
Shaving cream	138	1
Cleansing preparations	630	1
Body and hand preparations (excluding shaving)	776	3
Moisturizing preparations	743	2
Skin fresheners	181	1
1997 total for Glucose Glutamate		**8**

SUMMARY

Glucose Glutamate is the ester of glucose and glutamic acid that functions as a skin conditioning agent. In 1997, it was reported to the FDA that Glucose Glutamate was used in eight cosmetic formulations; in 1984, it was reported to be used at concentrations of ≤5%. No other published data or any unpublished data were available.

DISCUSSION

Section 1, paragraph (p), of the Cosmetic Ingredient Review (CIR) Procedures states that "A lack of information about an ingredient shall not be enough to justify a determination of safety." In accordance with Section 30(j)(2)(A) of the Procedures, the Expert Panel informed the public of its decision that the data on Glucose Glutamate were insufficient to determine whether Glucose Glutamate, for purposes of cosmetic use, is safe or unsafe.

TABLE 2
Concentration of use data (FDA 1984)

Product category	1–5%	0.1–1%	0–0.1%	Total in product category
Hair conditioners		1		1
Shampoos (noncoloring)	2	1		3
Other makeup preparations		1		1
Face/body/hand preparations (excluding shaving)		3	1	4
Moisturizing products		3	5	8
Night preparations		2		2
Other skin care preparations		1	2	3
Total in each concentration range	**2**	**12**	**8**	
Grand total				**22**

The Expert Panel released a 'Notice of Insufficient Data Announcement' on December 17, 1996, outlining the data needed to assess the safety of Glucose Glutamate. The types of data required included:

1. Concentration of use data;
2. Chemistry data, including method of manufacture and impurities data;
3. UV absorption data; if absorption occurs in the UVA or UVB range, photosensitization data are needed;
4. Dermal absorption data; if dermal absorption occurs, 28-day dermal toxicity and developmental toxicity data are needed[2];
5. Skin irritation and sensitization data;
6. Two genotoxicity studies, one using a mammalian system; if positive, a 2-year dermal carcinogenicity assay performed according to National Toxicology Program (NTP) standards is needed.

No offer to supply the data was received. In accordance with Section 45 of the CIR Procedures, the Expert Panel will issue a Final Report—Insufficient Data. When the requested data are available, the Expert Panel will reconsider the Final Report in accordance with Section 46 of the CIR Procedures, Amendment of a Final Report.

CONCLUSION

The CIR Expert Panel concludes that the available data are insufficient to support the safety of Glucose Glutamate for use in cosmetic products.

REFERENCES

European Economic Community. 1995. *EEC Cosmetics Directive 76/768/EEC, as amended, Annexes I through VII.* Brussels: EEC.

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Wenninger, J. A., R. C. Canterbery, and G. N. McEwen, Jr., eds. 2000. *International cosmetic ingredient dictionary and handbook*, 8th ed., Vol 1., 572. Washington, DC: CTFA.

[2]Although the CIR Expert Panel has specified a "28-day dermal toxicity study," there is concern that specifying a type of study may inhibit those who want to gather data using other study designs. The types of data the Panel is seeking include the gross pathology and histopathology in skin and other major organ systems, along with certain other toxicity parameters, associated with repeated exposures. Doing a 28-day dermal toxicity study would generate the needed data. But there are other approaches. For example, the Expert Panel would consider a dermal reproductive and developmental toxicity study in which gross pathology and histopathology data are gathered on the F_0 generation to be sufficient to meet the "28-day dermal toxicity and dermal developmental/reproductive data" requested in item 4, if done at or above current concentrations of use of the ingredient.