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# Safety Assessment of *Scutellaria baicalensis*-Derived Ingredients as Used in Cosmetics

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Status: Draft Tentative Report for Panel Review  
Release Date: May 15, 2020  
Panel Date: June 8-9, 2020

The Expert Panel for Cosmetic Ingredient Safety members are: Chair, Wilma F. Bergfeld, M.D., F.A.C.P.; Donald V. Belsito, M.D.; Curtis D. Klaassen, Ph.D.; Daniel C. Liebler, Ph.D.; James G. Marks, Jr., M.D.; Lisa A. Peterson, Ph.D.; Ronald C. Shank, Ph.D.; Thomas J. Slaga, Ph.D.; and Paul W. Snyder, D.V.M., Ph.D. The Cosmetic Ingredient Review (CIR) Executive Director is Bart Heldreth, Ph.D. This report was prepared by Wilbur Johnson, Jr., M.S., Senior Scientific Analyst, CIR.

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**Memorandum**

To: Expert Panel for Cosmetic Ingredient Safety Members and Liaisons  
From: Wilbur Johnson, Jr.  
Senior Scientific Analyst, CIR  
Date: May 15, 2020  
Subject: Draft Tentative Report on *Scutellaria baicalensis*-Derived Ingredients

Enclosed is a draft tentative report on 4 *Scutellaria baicalensis*-derived ingredients (*scutel062020rep*). Report comments that were received from the Council prior to the September 2019 Expert Panel for Cosmetic Ingredient Safety (Panel) meeting (*scutel062020pcpc*) have been addressed. At the September 2019 Panel meeting, an Insufficient Data Announcement (IDA) with the following data requests on this ingredient group was issued:

Scutellaria Baicalensis Extract

Scutellaria Baicalensis Root Powder

Scutellaria Baicalensis Root Extract

Scutellaria Baicalensis Sprout Extract

- Genotoxicity (in vitro and mammalian); for ingredient extracts, methanol and aqueous extracts should be tested
- Phototoxicity

Scutellaria Baicalensis Root Extract and Scutellaria Baicalensis Root Powder

- An NOAEL for skin pigmentation and anti-inflammatory effects, including the suppression of delayed contact hypersensitivity, is needed

Scutellaria Baicalensis Extract

- Skin irritation and sensitization
- 28-day dermal toxicity; if dermal absorption occurs, additional data may be needed

Scutellaria Baicalensis Sprout Extract

- Method of Manufacture
- Composition
- Impurities
- Dermal absorption; if dermal absorption occurs, additional data may be needed
- Skin irritation and sensitization

To date, the following unpublished data have been received from the Council in response to the IDA, and are highlighted in the Draft Tentative Report text:

- 1) Method of manufacture of Scutellaria Baicalensis Root Extract (aqueous extract) (*scutel062020data2*)
- 2) in vitro genotoxicity data on a trade name mixture containing 33.33% Scutellaria Baicalensis Root Extract (aqueous extract) (*scutel062020data2*)
- 3) in vitro phototoxicity data on a trade name mixture containing 33.33% Scutellaria Baicalensis Root Extract (aqueous extract) (*scutel062020data2*)
- 4) HRIPT on a leave-on product containing 0.001% Scutellaria Baicalensis Root Extract (*scutel062020data1*)

Additionally, one case report on *Scutellaria Baicalensis* Extract and two case reports on *Scutellaria Baicalensis* Root Extract that were identified in the published literature recently, and are highlighted in the Draft Tentative Report text as well.

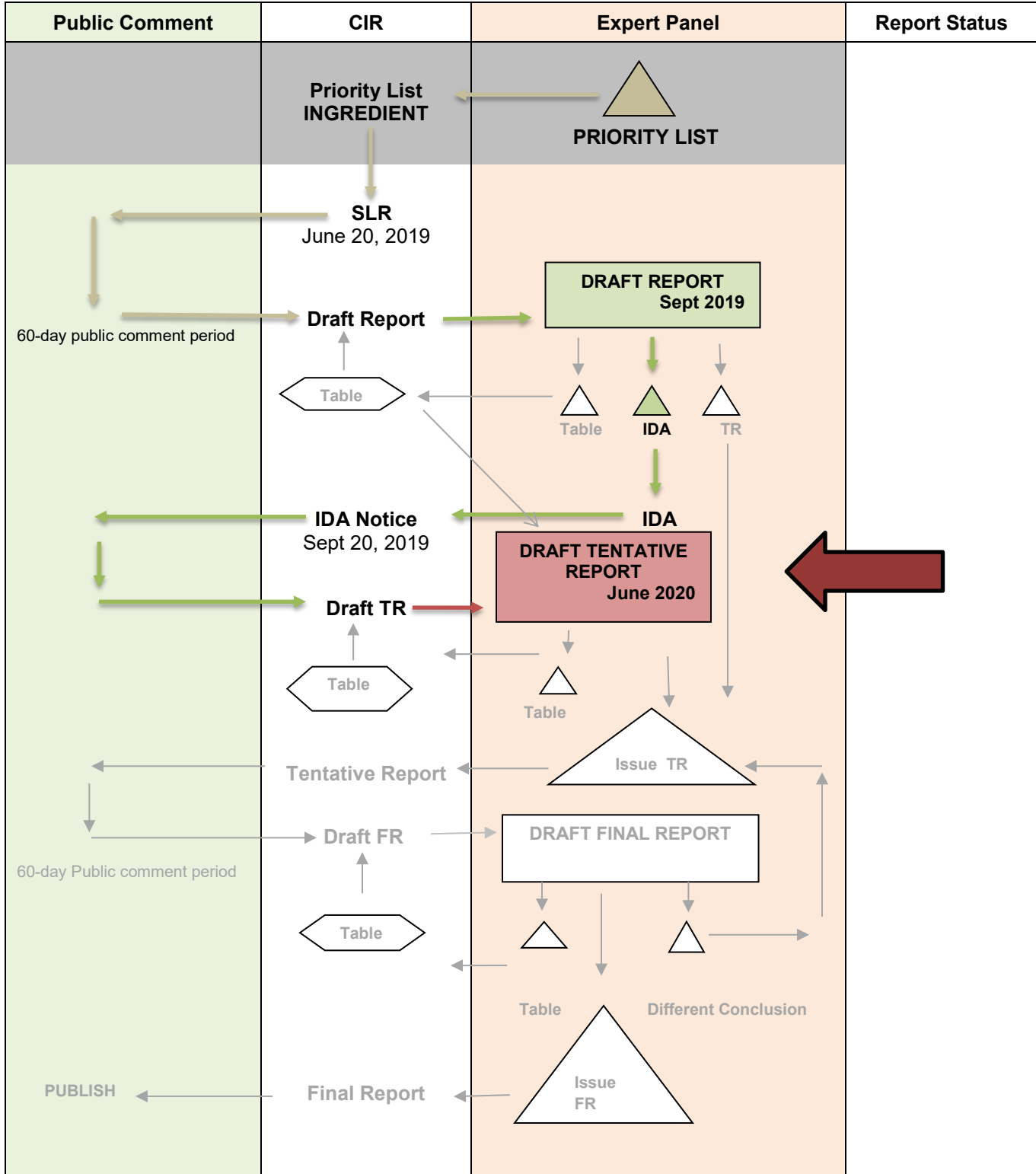
Also included in this package for your review are the report history (*scutel062020hist*), flow chart (*scutel062020flow*), literature search strategy (*scutel062020strat*), ingredient data profile (*scutel062020prof*), 2020 FDA VCRP data (*scutel062020FDA*), and minutes from the September 2019 Panel meeting (*scutel062020min*).

After reviewing these documents, if the available data are deemed sufficient to make a determination of safety, the Panel should issue a Tentative Report with a safe as used, safe with qualifications, or unsafe conclusion. If not, an insufficient data or split conclusion should be issued. Regarding the conclusion that will be determined, discussion items should be identified.

# SAFETY ASSESSMENT FLOW CHART

INGREDIENT/FAMILY Scutellaria baicalensis-derived Ingredients

MEETING June 2020



CIR History of:

***Scutellaria baicalensis*-derived Ingredients**

A Scientific Literature Review (SLR) on *Scutellaria baicalensis* -Derived Ingredients was issued on June 20, 2019. Comments and unpublished data were received from the Council before/after announcement of the SLR.

**Draft Report, Teams/Panel: September 16-17, 2019**

The draft report has been revised to include the following unpublished data that were received from the Council:

- (1) Use concentration data on all *Scutellaria baicalensis*-derived Ingredients
- (2) Use concentration data on *Scutellaria Baicalensis* Sprout Extract
- (3) Method of manufacture data on *Scutellaria Baicalensis* Root Extract (different extractants)
- (4) Chemical characterization data on *Scutellaria Baicalensis* Root Extract trade name materials
- (5) Impurities data on a *Scutellaria Baicalensis* Root Extract trade name material
- (6) Human skin irritation and sensitization data on *Scutellaria Baicalensis* Root Extract trade name materials

Comments on the safety assessment that were received from the Council have been addressed, and the report has been updated to include unpublished data (stated above) that were received from the Council.

An insufficient data announcement (IDA) with the following data requests on *Scutellaria baicalensis*-derived ingredients was issued:

*Scutellaria Baicalensis* Extract

*Scutellaria Baicalensis* Root Extract

*Scutellaria Baicalensis* Root Powder

*Scutellaria Baicalensis* Sprout Extract

- Genotoxicity (in vitro and mammalian); for ingredient extracts, methanol and aqueous extracts should be tested
- Phototoxicity

*Scutellaria Baicalensis* Root Extract and *Scutellaria Baicalensis* Root Powder

- An NOAEL for skin pigmentation and anti-inflammatory effects, including the suppression of delayed contact hypersensitivity, is needed

*Scutellaria Baicalensis* Extract

- Skin irritation and sensitization
- 28-day dermal toxicity; if dermal absorption occurs, additional data may be needed

*Scutellaria Baicalensis* Sprout Extract

- Method of Manufacture
- Composition
- Impurities
- Dermal absorption; if dermal absorption occurs, additional data may be needed
- Skin irritation and sensitization

**Draft Tentative Report, Teams/Panel: June 8-9, 2020**

The following data were received from the Personal Care Products Council in response to the IDA that was issued at the September 2019 Panel meeting: (1) Method of Manufacture of *Scutellaria Baicalensis* Root Extract (aqueous extract), (2) in vitro genotoxicity data on a trade name mixture containing 33.33% *Scutellaria Baicalensis* Root Extract (aqueous extract), (3) in vitro phototoxicity data on a trade name mixture containing 33.33% *Scutellaria Baicalensis* Root Extract (aqueous extract), and an HRIPT on a leave-on product containing 0.001% *Scutellaria Baicalensis* Root Extract.

The report has been revised to include the new data, and a draft discussion has been added. Also, comments that were received from the Council prior to the September 2019 Panel meeting have been incorporated.

**Scutellaria baicalensis-derived Ingredients Data Profile\* - June 8-9, 2020 - Wilbur Johnson, Jr.**

						Toxico-kinetics		Acute Tox			Repeated Dose Tox			DART		Genotox		Carci		Dermal Irritation			Dermal Sensitization			Ocular Irritation		Clinical Studies		
	Reported Use	GRAS	Method of Mfg	Constituents	Impurities	Dermal Penetration	ADME	Dermal	Oral	Inhalation	Dermal	Oral	Inhalation	Dermal	Oral	In Vitro	In Vivo	Dermal	Oral	In Vitro	Animal	Human	In Vitro	Animal	Human	Phototoxicity	In Vitro	Animal	Retrospective/Multicenter	Case Reports
Scutellaria Baicalensis Extract	X			X	X		X																							X
Scutellaria Baicalensis Root Extract	X		X	X	X		X								X	X				X	X		X	X	X					
Scutellaria Baicalensis Root Powder																														
Scutellaria Baicalensis Sprout Extract	X																													

\* "X" indicates that data were available in a category for the ingredient

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**Scutellaria Baicalensis-Derived Ingredients – 5/10/2019; 7/29/19; 2/3/20]**

Ingredient	CAS #	InfoBase	PubMed	TOXNET	FDA	EU	ECHA	IUCLID	SIDS	HPVIS	NICNAS	NTIS	NTP	WHO	FAO	ECE-TOC	Web
Scutellaria Baicalensis Root Extract	94279-99-9	Yes	6/3	92/3	No	Yes	No	No	No	No	No	No	No	No	No	No	
Scutellaria Baicalensis Extract	94279-99-9	Yes	191/14	293/11	No	Yes	REACH PreReg. – No Dossier	No	No	No	No	No	No	No	No	No	
Scutellaria Baicalensis Root Powder	94279-99-9	Yes	0	7/0	No	Yes	No	No	No	No	No	No	No	No	No	No	
Scutellaria Baicalensis Sprout Extract	94279-99-9	Yes	0	2/0	No	No	No	No	No	No	No	No	No	No	No	No	
<b>94279-99</b>		Yes	0	717/14	No	Yes	REACH PreReg. – No Dossier	No	No	No	No	No	No	No	No	No	

**LINKS**

InfoBase (self-reminder that this info has been accessed; not a public website) - <http://www.personalcarecouncil.org/science-safety/line-infobase>  
 SciFinder (usually a combined search for all ingredients in report; list # of this/# useful) - <https://scifinder.cas.org/scifinder>  
 PubMed (usually a combined search for all ingredients in report; list # of this/# useful) - <http://www.ncbi.nlm.nih.gov/pubmed>  
 Toxnet databases (usually a combined search for all ingredients in report; list # of this/# useful) – <https://toxnet.nlm.nih.gov/> (includes Toxline; HSDB; ChemIDPlus; DAR; IRIS; CCRIS; CPDB; GENE-TOX)

FDA databases – <http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/cfrsearch.cfm> (CFR); then,  
 list of all databases: <http://www.fda.gov/ForIndustry/FDABasicsforIndustry/ucm234631.htm>; then,  
<http://www.accessdata.fda.gov/scripts/fcn/fcnavigation.cfm?rpt=eafuslisting&displayall=true> (EAFUS);  
<http://www.fda.gov/food/ingredientspackaginglabeling/gras/default.htm> (GRAS);  
<http://www.fda.gov/food/ingredientspackaginglabeling/gras/scogs/ucm2006852.htm> (SCOGS database);  
<http://www.accessdata.fda.gov/scripts/fdccc/?set=IndirectAdditives> (indirect food additives list);  
<http://www.fda.gov/Drugs/InformationOnDrugs/default.htm> (drug approvals and database);  
<http://www.fda.gov/downloads/AboutFDA/CentersOffices/CDER/UCM135688.pdf> (OTC ingredient list);  
<http://www.accessdata.fda.gov/scripts/cder/iig/> (inactive ingredients approved for drugs)

EU (European Union); check CosIng (cosmetic ingredient database) for restrictions and SCCS (Scientific Committee for Consumer Safety) opinions -

<http://ec.europa.eu/growth/tools-databases/cosing/>

ECHA (European Chemicals Agency – REACH dossiers) – <http://echa.europa.eu/information-on-chemicals;jsessionid=A978100B4E4CC39C78C93A851EB3E3C7.live1>

IUCLID (International Uniform Chemical Information Database) - <https://iuclid6.echa.europa.eu/search>

OECD SIDS documents (Organisation for Economic Co-operation and Development Screening Info Data Sets)- <http://webnet.oecd.org/hpv/ui/Search.aspx>  
HPVIS (EPA High-Production Volume Info Systems) - <https://ofmext.epa.gov/hpvis/HPVISlogon>  
NICNAS (Australian National Industrial Chemical Notification and Assessment Scheme)- <https://www.nicnas.gov.au/>  
NTIS (National Technical Information Service) - <http://www.ntis.gov/>  
NTP (National Toxicology Program ) - <http://ntp.niehs.nih.gov/>  
WHO (World Health Organization) technical reports - [http://www.who.int/biologicals/technical\\_report\\_series/en/](http://www.who.int/biologicals/technical_report_series/en/)  
FAO (Food and Agriculture Organization of the United Nations) - <http://www.fao.org/food/food-safety-quality/scientific-advice/jecfa/jecfa-additives/en/> (FAO);  
FEMA (Flavor & Extract Manufacturers Association) - [http://www.femaflavor.org/search/apachesolr\\_search/](http://www.femaflavor.org/search/apachesolr_search/)  
Web – perform general search; may find technical data sheets, published reports, etc  
ECETOC (European Center for Ecotoxicology and Toxicology Database) - <http://www.ecetoc.org/>

#### Botanical Websites, if applicable

Dr. Duke's <https://phytochem.nal.usda.gov/phytochem/search>  
Taxonomy database - <http://www.ncbi.nlm.nih.gov/taxonomy>  
GRIN (U.S. National Plant Germplasm System) - <https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysimple.aspx>  
Sigma Aldrich plant profiler <http://www.sigmaaldrich.com/life-science/nutrition-research/learning-center/plant-profiler.html>

#### Fragrance Websites, if applicable

IFRA (International Fragrance Association) – <http://www.ifraorg.org/>  
RIFM (the Research Institute for Fragrance Materials) should be contacted



**SEPTEMBER 2019 PANEL MEETING – INITIAL REVIEW/DRAFT REPORT**

**Belsito Team –September 16, 2019**

DR. BELSITO: Shall we scuttle along to Scutellaria?

DR. LIEBLER: Yes. Before we get to Sulfites.

DR. BELSITO: Oh, my God. This is endless. Okay. Safety assessment. This is the first time we're looking at it, so feel free to comment away. There's a fragrance use, of course, which is not our purview. I guess the first question I had is, this is the first time we're reviewing a group where none of them have the same function. Is this an issue?

DR. SNYDER: I didn't catch that.

DR. BELSITO: Yeah. Read the sentence. PDF Page 9, the first full paragraph. It says, "However, these ingredients do not have any functions in common."

MS. FIUME: If I were to channel Bart, he doesn't necessarily feel that all the functions are truly representative of what the ingredients do. So, while sometimes it might provide useful information, it shouldn't be a reason to not include the ingredients together.

DR. BELSITO: Okay. I'm just saying, because we said before we'd do add-ons if they were no-brainers and they had similar functions. And here, we're starting with a group where we say none of them have similar functions. I'm just reading what I saw and asking the questions.

On PDF Page 9, under Physical and Chemical Properties, I think you have this completely backwards. The absorption peak between 200 and 250 is within the mid-wavelength of UVC, not UVB. And then absorption between 250 and 300, crossing both UVC and short-wavelength UVB. UVB is 290-320. UVC is less than 290. So, for every C, you've got to change it to B, and for every B, you've got to change it to C in that paragraph.

And then, for method of manufacture we need the extract and the sprout. And I didn't know if we needed the root powder since we have the root extract. If you read how the root extract is made, they make the powder first and then they water it down. So, I didn't really think we needed the manufacture for the powder.

DR. LIEBLER: So I think we need it for the extract.

DR. BELSITO: And the sprout.

DR. LIEBLER: Right. But for the extract, we need to know, what is it an extract of, roots, whole plant, stem, leaves?

DR. BELSITO: Right. Yeah, which we would get from the method of manufacture?

DR. LIEBLER: Right. So, if we had the method of manufacture, then that in turn could help us with safety data for some of the other ingredients.

DR. BELSITO: Right.

DR. LIEBLER: I had this insufficient for method of manufacture and composition for the whole extract.

DR. SNYDER: We have composition for the extract, the root extract and the root powder. We don't have anything on the sprout.

DR. BELSITO: Well, that was another question that I had on composition. I mean, they basically just gave you general categories. You were happy with the composition on the root extract and the root powder?

DR. LIEBLER: There was enough information for the root extract and the root powder. I think the thing I was unclear about for the extract, the scutellaria baicalensis, was whether or not that's distinct from the roots. In other words, does the extract contain roots?

DR. SNYDER: Since the extract was Table 2, it lists everything that's in there. Actually, there's more data than we have on the other one.

DR. LIEBLER: I'll take another look.

DR. SNYDER: Page 19.

DR. LIEBLER: Yeah. That's a listing of chemicals in it. I'm just trying to get the definition. Oh, it's the extract of the whole plant. Duh. Okay, there it is. That includes, therefore, roots.

DR. SNYDER: I thought we were good on everything except for the sprout. We don't have any data on the sprout.

DR. LIEBLER: Right.

DR. BELSITO: Okay. What did you think of the DART study on PDF 13, Paul?

DR. SNYDER: Well, there were two negative studies. And there was one, but the only effects were on maternal and there was no developmental effects. It was maternal so I had cleared that.

DR. BELSITO: Okay. What about the genotox? For genotox, I didn't understand. Results were positive for methanol and negative for aqueous. PDF 13, bottom of the page. It's the only one that's positive with two -- this was in the rec-assay. We had negative Ames and we had no mammalian genotoxicity. So, we only had two in vitros and no carcinogenicity.

MS. FIUME: And then, the second study, it was actually positive results seen in the aqueous and not the methanol.

DR. BELSITO: Right.

MS. FIUME: So, they were contradictory. Yeah.

DR. SNYDER: We go to Tom and there's those random positive ones, because the majority of them appears to be negative.

DR. BELSITO: No. We don't have a majority. We have a rec-assay and we have an Ames; and each had a positive result, one in methanol and one in aqueous.

DR. LIEBLER: Yeah. This is problematic. I'd like to hear what Tom thinks. But his point is frequently that sometimes you get conflicting results with botanicals.

DR. BELSITO: But we have no mammalian. We have no backups for this. We just have in vitro. And then we don't have a No-Adverse-Effect-Level for melanogenesis.

DR. KLAASSEN: Correct.

DR. LIEBLER: This is just in mouse melanoma cells, right?

DR. BELSITO: Yeah.

DR. LIEBLER: These are pretty high concentrations.

DR. BELSITO: I understand. But we have a report and we don't have a concentration at which nothing happens.

DR. LIEBLER: So, if you see an effect on melanogenesis in a cell culture system only, without any positive in vivo data, then you need a No-Effect-Level in vivo.

DR. BELSITO: You need some data.

DR. LIEBLER: In the previous report we did have cell data, but we also had in vivo data that was melanin-suppressing. But we didn't have a No-Effect-Level. Here, we don't have any in vivo data at all.

DR. BELSITO: I understand. But we have suggested evidence that this could occur.

DR. SNYDER: It inhibits melanogenesis, yeah.

DR. BELSITO: Without any data to suggest that it does not occur either in vivo or at concentrations that are used in cosmetics.

DR. LIEBLER: Okay.

DR. BELSITO: Then, for the antiallergenic effects -- here there were three concentrations used, Wilbur. It says 1, 10, and 100 micrograms per mL. The one, two, three, four, fifth line from the bottom of that paragraph it says, "following treatment with the extract (both concentrations)."

So, if there were three concentrations, did the 1 micron per mL not have an effect? Do we have a No-Effect-Level? Because there were three concentrations used and then they're counted as both concentrations.

MR. JOHNSON: I'll have to check that, but I think that that referred to the 10 and the 100. But I'll check that publication to see whether or not there was an affect and at what.

DR. BELSITO: Because if it has an anti-inflammatory effect, then we also need a NOAEL because cosmetics should not have biological functioning. Right? Or it becomes an OTC anti-inflammatory or prescription anti-inflammatory.

DR. SNYDER: Right. Not under our purview.

DR. BELSITO: Right. So, we need more information on melanogenesis.

DR. SNYDER: Which one was that that's supposed to function as an -- root extract?

DR. BELSITO: The baicalensis extract. Ethanol extract, plant part not stated. Then we also have suppression of DNCB-induced contact dermatitis, aqueous extract of the root. They stated the results indicated a topical application, suppressed DNCB-induced contact dermatitis. This was 0.1 percent aqueous extract.

DR. SNYDER: No, we didn't get the data needs.

DR. BELSITO: So we need a no-observed-effect-level for melanogenesis, IgE, or our anti-inflammatory suppression of contact allergy. In terms of sensitization for the root extract --

DR. SNYDER: We have that.

DR. BELSITO: Well, yeah. Theoretically, you're supposed to have 20 test animals, they only had 10 in the Buehler, but it was negative.

And the human HRIPT on the root extract, theoretically, you're supposed to have 100 subjects in the same panel, but they had 49 and 54. So I thought, overall, even though the studies didn't meet the usual defined criteria in terms of ends, they were okay when put together for the root extract.

DR. SNYDER: Okay.

DR. BELSITO: So, I thought insufficient for the root extract and powder. We need more data on the no-observed-effect-level for pigment effects and anti-inflammatory effects. For the extract, we need sensitization and irritation and a 28-day dermal. And if absorbed, other studies. And for the sprout, we need everything.

MR. JOHNSON: Could you go over that again?

DR. BELSITO: For the root extract and powder, we need a no-observed-adverse-effect-level for pigmentation, anti-inflammatory effects including suppression of contact dermatitis. For the extract of the whole plant we need sensitization and irritation and a 28-day dermal. If absorbed, additional studies may be needed. For the sprout, we need manufacturing, impurities, sensitization, composition, irritation, dermal absorption.

MR. JOHNSON: Manufacture, impurities.

DR. BELSITO: Impurities, dermal absorption. If absorbed, other studies may be needed. Sensitization and irritation.

MS. FIUME: Do you need a method of manufacture for the whole plant extract?

DR. BELSITO: I didn't put that down.

DR. SNYDER: Dan had it at first, but I think it went away, right? You mentioned that at first?

DR. LIEBLER: Well, it's just defined in Table 1 as the entire plant extract, all parts of the plant. Because my question was, what parts of the plant is it?

DR. BELSITO: So, you need composition for extract?

DR. LIEBLER: We've got composition for the extract. We're okay on that.

DR. BELSITO: Okay. You got that, Wilbur?

MR. JOHNSON: Let me read it back. For the whole plant extract, skin irritation and sensitization data and 28-day dermal toxicity data. If absorption occurs, then additional data may be needed. For the sprout extract, method of manufacture, impurities, dermal absorption. If absorbed, additional studies may be needed. Skin sensitization and skin irritation.

DR. BELSITO: Right.

DR. LIEBLER: Did we need more mutagenesis? We needed an in vivo mutagenesis?

DR. BELSITO: Well, if absorbed.

MS. FIUME: Oh, were you going to wait to see what Tom says tomorrow?

DR. BELSITO: Yeah, we're going to wait to see what Tom says about mutagenesis.

DR. LIEBLER: Okay.

DR. BELSITO: And then for the extract and powder we needed the no-observed-adverse-effect-levels for pigmentation, anti-inflammatory effects, and suppression of delayed type hypersensitivity. Then Tom comments on the mutagenicity studies.

MR. JOHNSON: Dr. Belsito, are there any concerns about teratogenicity? Because we had positive results in the teratogenicity study.

DR. KLAASSEN: But they were kind of repaired with time. It was more of a delay, I think. I didn't think it was necessary, if I recall correctly.

MR. JOHNSON: You said there's no concern, and what's the reasoning?

DR. KLAASSEN: Well, it wasn't a true teratogenic effect. It was kind of a delay in development.

DR. SNYDER: No. No, no. There were maternal effects but only at high doses, 32 milligrams per kilogram with two negative studies. That's fine. Opps. I'm on the wrong report. Sorry.

MR. JOHNSON: I guess what I was talking about the statistical significant dose-dependent increase in the incidence of skeletal variations.

DR. KLAASSEN: Right. But then I thought, if you read a little further, at a little later date they're back to control. So, it's kind of a delayed. And that's usually not considered a --

DR. SNYDER: Skeletal variations.

MR. JOHNSON: Okay.

DR. SNYDER: Yeah, if they would lose weight or anything -- it's not a . It's not a very good one.

DR. BELSITO: Yeah. It says the author stated that the results of the study suggested the appearance of lumbar ribs induced by the test material is a transient fetal variation rather than teratogenicity or maternal toxicity.

DR. KLAASSEN: And I agree.

DR. SNYDER: Yeah. I do.

### Marks Team – September 16, 2019

DR. MARKS: Okay. Are we ready? Everybody's back. Okay. Let's move on now to *Scutellaria B. Baicalensis* perhaps is the way you say that. Mint. There we go. On the next memo, Wilbur, would you put mint? At any rate, this is the first review of these four ingredients. As you mentioned, they're herbs or mint. Ron and Tom, first, the four ingredients okay? The extract, the root extract, root powder, sprout extract?

DR. SLAGA: Yes.

DR. SHANK: Yes.

DR. MARKS: Yeah. I don't think -- we can't eliminate them. We have no good reason. What needs do we have for them? First of all, they're herbs. Are they GRAS food? I assume, but, Tom, you're going to comment.

DR. SLAGA: I thought there was plenty of data, and I'd say safe.

DR. MARKS: We certainly have data for the extract and the root extract.

DR. BERGFELD: What about the sprout?

DR. MARKS: Well, we're going to get to the -- yeah, there's nothing. Ron, what do you think?

DR. SLAGA: The sprout comes from the root, the seed.

DR. SHANK: We have data on the root extract, but I don't know if you can read across to all of the other forms. The root extract inhibited melanin production in cultured melanoma cells, so we might need data on depigmentation in animals. It's also used in sun lotions, so we may need phototox data. You could try to do UV absorption, but these are such mixtures I'm not too sure how those data would be interpreted.

The root extract in a developmental toxicity study produced lumbar ribs in rats. And I need to ask Dr. Snyder what does that really mean. I've never encountered that before.

So I did have some needs. We have a little toxicology data on, quote, extract. Is that whole plant extract? And we don't have data on the sprout extract, but these are used at much lower concentrations than the root extract. So maybe if we can read across, we could cover them. And what else?

DR. MARKS: I'll address the irritation and sensitization. I thought it was fine. It was okay for the root extract at 100 percent and in animal at 10 percent. And the use concentration was 0.5, so it's way, way above the use concentration.

DR. SHANK: Right.

DR. MARKS: I felt the root extract we could read over to the extract itself, perhaps. And then the other, the extract itself, again, as you mentioned, there's low concentration, 0.3 percent in the extract, and 0.0005 percent in the sprout. So I thought the concentrations of use were so low that at least irritation and sensitization would not be an issue.

So it's mint. Does that have any bearing in terms of the systemic toxicity? I guess you'd say is this a GRAS? Is it food? And if so, does it eliminate some of those systemic needs, other than, as you said, the issue of could the root extract cause depigmentation? Do we need phototox data. And then the developmental issue, Ron? And I might ask you tomorrow -- although we're seconding it -- to comment on those three needs.

DR. SHANK: This is mint? I thought this was Chinese skullcap.

DR. MARKS: I'm going on.

DR. SHANK: Pardon me?

MR. GERMILLION: It says it's in the mint family on page 9 of the report, but it's Chinese skullcap and Baikal skunk. So the mint family is what it says.

DR. SHANK: Okay.

DR. MARKS: What is the -- what is China skullcap?

DR. SHANK: Herbal medicine used for everything.

DR. MARKS: Yeah. So it's really a medicine rather than a food. Then it wouldn't be GRAS.

DR. SHANK: That's my understanding.

MR. ANSELL: Yeah. But GRAS is not a driver as to whether or not it's ingested as part of the human diet.

DR. MARKS: Yeah.

MR. GERMILLION: And things can be GRAS. Companies can self-determine that a substance is GRAS that they're using. I'm not really sure. Sometimes FDA is asked to give a voluntary opinion on whether they'd like more data. But I'm a little confused about the references to GRAS and what the significance of that is.

MS. SADRIEH: There's no significance. GRAS doesn't apply to cosmetics.

MR. GERMILLION: Yeah. I guess what my point was is just things are GRAS. FDA hasn't contested that interpretation, but it doesn't necessarily mean that there's really any kind of meaningful safety assessment.

MR. ANSELL: Well, that's a point of some discussion. But it's really not relevant to the criteria within the context of the CIR review. What we're saying is that if it's been part of the human diet for a substantial period of time, that that is responsive to the question of systemic toxicity, and that we should be focusing on topical effects and concentrations. The GRAS discussion is a very specific regulatory scheme within the U.S. And it not being GRAS does not suggest it's not an item of food.

The GRAS finding, however, I would argue is a substantial finding. It's generally recognized by experts. It is a regulatory scheme, and FDA does have to formally not object. So it doesn't suggest -- we could argue whether the current affirmation versus notification is effective. But what we're interested here is that it's been part of the diet.

DR. MARKS: We've had extensive conversations in our team about what GRAS is and what it means. So I guess tomorrow we'll most likely be seconding a motion for an insufficient data announcement, perhaps, getting the needs for the root extract concerning it's inhibition of melanin. Is there depigmentation? Perhaps phototox data. And then we'll question the developmental issue, too. Does that sound reasonable?

DR. SHANK: Yes. Are the sensitization data enough? There's an animal study when they use the dry powder. Is that reasonable? How do you do that? And then the human study, there's very little detail. So I was wondering if that's enough data to say we can read across for everything else. It's page 16 in the report. In the animal data, they used a dry powder. I don't know how you do that.

DR. MARKS: Basically, you just apply it on there. And I thought it was okay.

DR. SHANK: Okay. And then the human data, 49 subjects and then another one 54 subjects. And 32 --

DR. MARKS: And that was at 10 percent. And, again, which is much higher than the use concentration.

DR. SHANK: But there are no data.

DR. MARKS: You mean in terms of the actual testing. Yeah. I guess I assume that when they do an HRIPT that it's done in the usual manner; HRIPT, or it wouldn't be identified as such. Did you get any sense that it was other than the usual methodology?

MR. JOHNSON: I think it's the usual.

DR. MARKS: So I accept it at face value.

DR. SHANK: Okay.

DR. MARKS: Since HRIPT is a standardized testing methodology.

MR. JOHNSON: Because in that submission, data relating to the test protocol were not included. So that's just an assumption about the protocol.

DR. MARKS: And actually, I thought the 100 percent powder was pretty impressive, actually.

DR. SHANK: How do you do such a test? Do you have to put it on a gauze pad and then just tape it to the animal's skin?

DR. MARKS: Presumably, yes.

DR. SHANK: You wouldn't make a paste out of it or something? Never mind.

DR. MARKS: They say a spray dried extract.

DR. SHANK: Applied as a powder.

DR. MARKS: I know when I sometimes don't have the actual patch testing allergens, in either petrolatum or water, I will take the whole -- if it's a plant part, I'll actually take the plant part and apply it directly to the skin and get sensitization.

DR. SHANK: Really.

DR. MARKS: Yes.

DR. SHANK: Thank you.

DR. MARKS: You're welcome.

MR. JOHNSON: One question, Dr. Marks. The data need, the depigmentation data, specifically, what type of testing is being requested in the IDA?

DR. SHANK: I would use pigment in animal, a guinea pig that has pigment in skin, and then apply it to the skin. Again, these are, I think, standardized tests.

DR. MARKS: That's what's been used in the past.

DR. BERGFELD: Are you allowed to use animal testing now?

DR. SHANK: In the United States, yes.

DR. MARKS: And presumably, this may actually -- data may exist, we just didn't find it. What page is that?

DR. SHANK: Let's see.

MS. FIUME: 14.

DR. BERGFELD: It had some very interesting characteristics. It supposedly lighten skin. It dampened inflammation. I don't think you can read across to sprout.

DR. SHANK: I agree.

DR. MARKS: Okay. So I don't think our -- let's go back. So again, insufficient data announcement is what we would propose. And we need more information concerning the depigmentation for the root extract and potentially the other three ingredients. We need phototox data and developmental data. Did I clarify that, Ron?

DR. SHANK: We have developmental tox, but I don't know how to interpret it. It's a rat study, and they found in the embryos lumbar ribs. Rats don't have lumbar ribs. And there seemed to be a transient response. So something's going on, but I don't know how to interpret it. So maybe Dr. Snyder can help us out on that.

DR. MARKS: And that was which page for that?

DR. SHANK: Let's see. Page 13, in the middle.

DR. MARKS: Okay. Any other comments? So presumably, we'll have an insufficient data announcement tomorrow.

MR. JOHNSON: Dr. Marks and other members of the team, you'll notice throughout the report text that sometimes you will see a *scutellaria baicalensis* root extract, meaning that we're not sure what was actually tested is the INCI name ingredient. And in particular, that's true with respect to the genotoxicity studies. So with that in mind, would there be any need for any additional genotoxicity data?

DR. SLAGA: Since it is the first time, we could ask for it and see if we get it.

DR. BERGFELD: Are you going to do it on the root and the sprout since you're asking?

DR. SLAGA: Yeah. Just ask for both, the sprout and root.

MR. JOHNSON: Now, the phototoxicity data --

DR. MARKS: Let's go back to that. So Tom, you think we should ask for mutagenicity?

DR. SLAGA: Well, if we're asking for other things.

DR. MARKS: If we don't get it, are we going to say it's insufficient?

DR. SLAGA: No, it's not really needed.

DR. MARKS: Well, if we don't need it then we shouldn't ask for it. Because I don't want to put out ask for things and then we go back and say, well, we really didn't need it. And that's what I question, Tom, when you said initially you didn't have a need for it.

DR. SLAGA: I didn't initially have any needs.

DR. MARKS: Okay. So I know you were talking about whether it's the INCI ingredient or not, and we have that with other botanicals. When they're testing, we're not sure whether it's truly a cosmetic formulation or another formulation of it. And that's the uncertainty, I think, when we're dealing with these botanicals. Monice, you had a comment. So I'm going to say, Wilbur, we don't need that --

MR. JOHNSON: Okay.

DR. MARKS: -- based on Tom's comment.

MS. FIUME: So I actually have two questions, but the first is with the genotox. So for the purposes of the discussion, then, it says that a methanol extract had positive results, but the aqueous extract had negative results. So for the purposes of the discussion, can you provide some language?

DR. SLAGA: That can be discussed in the discussion. In this case, the aqueous is the most important, right?

MS. FIUME: Do we have what the extract is for the ingredient because there's ethanol extract, butylene glycol, but it doesn't say if it's --? Okay. So then the specific language, Dr. Slaga, what should be said about it?

DR. SLAGA: I can't explain the methanol, to be honest, but the fact that it was more soluble in water I thought gave more realistic response.

DR. SHANK: In a lot of the toxicology data, the adverse response was very much dependent on which solvent was used to make the extract. That would suggest probably that the flavonoids are the toxic agents here because you can separate them based on which solvent you use. What's used in cosmetics I'm not sure.

MS. FIUME: Since an IDA is going out, do you want additional method of -- would that help clarify?

DR. SHANK: I'm not sure it would clarify because -- unless there's just one extract used, say water, yes, that would clarify it. But if there's several different methods, no, it won't clarify it.

MS. FIUME: Thank you. My second --

DR. SHANK: Let me see what's here on methods.

MR. JOHNSON: PDF page 10.

DR. SHANK: So it looks like you could use ethanol, butylene glycol, water.

MS. FIUME: Thank you. And then, I guess, my other question --

DR. MARKS: Well, have we settled it? We don't need these, Tom?

DR. SLAGA: You could ask for data to clarify the methanol aqueous. I read that, but at the same time, these things have a long history of use. And there's really no alert for cancer genotoxicity as being a problem. And without -- you can have the genotox, but if you have no irritation, the odds that you would get cancer are very slim.

MR. JOHNSON: So Dr. Slaga, you want to know whether or not methanol is in fact used in the production of either of those extracts?

DR. SLAGA: Right.

DR. SHANK: Well, genotox in one study -- the methanol extract was positive and the water negative and in the Ames assay the opposite. So it's very hard to interpret that.

DR. MARKS: So then the question is how can we clarify it. Do we use the reasoning you just said, Tom, in the discussion that a long use of this and no alerts?

DR. SLAGA: Well, that's one study. We could ask for repeat studies, both in bacteria and mammalian mutagenesis just for a complete on both the methanol and aqueous. But other solvents were used, and they weren't tested.

DR. SHANK: A toxicological response is very much dependent on what solvent is used to extract the plant.

DR. MARKS: So it sounds like -- I'm not sure how we can clarify it. I guess that's my question. If we call it insufficient because of -- do you want to say mutagenicity or carcinogenicity?

DR. SLAGA: No. We just need to clarify the genotoxicity with repeat studies, additional studies on both aqueous and methanol extract; both in bacteria, the Ames in this case, which was used, and mammalian system.

MR. JOHNSON: This is just for the root extract?

DR. SLAGA: Huh?

MR. JOHNSON: Just for the root extract ingredient, or what about the other extract?

DR. SHANK: I don't think you can read across from the root to the leaf and stem and sprout. Unless we have the data showing that the composition is pretty much the same regardless of the source.

DR. SLAGA: We could ask for it all right now.

MR. JOHNSON: On all?

DR. SLAGA: Yeah.

MR. JOHNSON: Even the root powder?

DR. SLAGA: Yeah.

MR. JOHNSON: Okay.

DR. MARKS: What page was that, Wilbur, in the document?

DR. SLAGA: Was it 10?

DR. MARKS: Ten. And then how about the phototox data? Which page was that, Ron Shank?

DR. SHANK: Let me see. Well. Hmm.

MS. FIUME: Is it page 14 you're talking about, the melanogenesis study?

DR. SHANK: Yes. Thank you.

DR. MARKS: Okay. Good. So it seems pretty clear tomorrow we're going to have an insufficient data announcement. And at least our team would like clarification of depigmentation of the root extract and also the sprout, suggest using a depigmented animal model. We'll clarify that tomorrow.

Some phototox data based also on that melanogenesis section, developmental clarification. The question is these ribs that you're talking about, Ron, we'll get Paul's input on that. And I'll probably ask you to clarify your concerns, Ron. And then, clarify the genotoxicity studies with the methanol and water extracts. And we can't read across for all the ingredients. And, Tom, I may ask you to comment on that.

DR. SLAGA: We want additional studies to clarify that. We want to have the weight of evidence going one way or the other. With the Ames assay, it's very difficult to tell after one study. It's usually repeated a number of times to see how it kind of unfolds.

DR. MARKS: And Tom, I'll probably ask you to comment on that tomorrow. Okay. Any other questions?

MR. JOHNSON: Yes, Dr. Marks. The phototoxicity data request is on which ingredient?

DR. SHANK: The root extract for sure.

MR. JOHNSON: The root extract, the sprout extract?

DR. BERGFELD: I think your sprout is needing everything, composition especially, concentrations of use --

DR. SHANK: Yeah. We don't know anything about the sprout.

DR. BERGFELD: -- special studies.

DR. SHANK: It is used, isn't it?

DR. MARKS: The extract, the concentration, I believe, is 0.03 percent. It has 102 uses.

MS. FIUME: And the whole plant extract, also, has use.

MR. JOHNSON: Yeah.

DR. SHANK: Yeah. We don't have any tox data or sensitization data on whole plant extract or sprout extract. Now, root powder is just dried root extract? That's how I read it.

DR. MARKS: Yes. I wondered whether the sensitization and the irritation data were necessary for the extract at 0.03 percent use concentration. And then for the sprout extract, the use concentration leave on was 0.0005 percent. So one might use the same reasoning on the sprout extract that so little of it's used, are we concerned about the other toxicologic endpoints. But we can ask for them.

At 0.0005 -- I assume that concentration is correct. It's really low. So that's why I didn't particularly identify those since we had the root extract as a non-sensitizer. I didn't feel compelled with the others. I felt we could read-across the root powder. And then the extract itself and the sprout extract I felt were low concentrations would be okay from a sensitization point of view. That was my reasoning.

DR. SHANK: That sounds good.



DR. MARKS: Okay. Well, we have it looks like four data needs for tomorrow. We'll suggest the issue with depigmentation, the phototox, maybe developmental. We'll get clarification of that tomorrow concerning those ribs that you were talking about, Ron. And then also clarify/additional studies on genotoxicity. Does that sound good, Tom?

DR. SLAGA: Yeah.

DR. MARKS: Sound good, Ron?

DR. SHANK: Yes.

DR. MARKS: Okay. And we'll see what the Belsito team suggests also, but I have a feeling it's going to be an IDA, Wilbur, no matter what. Okay

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DR. BELSITO: So this is the first time we're looking at the Chinese skullcap-derived ingredients. And based upon the data that was provided to us, first of all there was a report of it being used as a fragrance, which we would like acknowledged it is not our purview. We did discuss the fact that all of these seem to have a different function and whether that was an issue, but we did not think so.

Overall we felt that it was insufficient for the root extract and the powder, we needed more data on constituents. We also needed a NOAEL for the pigment effects and the anti-inflammatory effects of these materials.

DR. BERGFELD: Is there a second or a comment?

DR. MARKS: Yes, we second the insufficient data announcement. We had a few other concerns. One was phototox data on all the ingredients. And then Ron Shank had a concern and wanted Paul's comments about developmental effects. Where in one system -- you want to elaborate on that, Ron, the issue of the ribs?

DR. SHANK: I just would like to ask Dr. Snyder, what is the significant in a rat study where you see lumbar ribs.

DR. SNYDER: The general consensus is that if you see skeletal variations in a study where there are maternal effects or any even slight effects, that they're not considered significant, unless you see other malformation or something. But them as a standalone doesn't give you very much evidence of teratogenicity.

DR. SHANK: Okay, thank you.

DR. KLAASSEN: In fact, often those kind of repair themselves with time. It's basically kind of a slowing down of the maturation. And in fact in the study they did look at the ribs at a later time and they did catch up. So, that's not considered a teratogenic effect.

DR. SHANK: Okay, right. This is the first time I've come across lumbar ribs, so I had to ask.

DR. SNYDER: Yeah, I sent the staff the review paper on the anogenital distant things and the skeletal variations and how to interpret those. I sent that to the staff as a reference for them to have.

DR. BERGFELD: Thank you.

DR. BELSITO: And, we had a question over to Tom about the mutagenicity studies. We have no mammalian genotox, but in a rec-assay the methanol extract was positive, and the aqueous extract was negative. And then in an Ames test it was flipped; the methanol extract was negative, and the aqueous extract was positive. How do we interpret that, and do we need a mammalian genotoxicity?

DR. SLAGA: That was one of the data needs that we would like to see that repeated. When you only have one trial like that, where one's positive and one's negative, it would be nice to have several other -- a repeat of that, plus another assay, be it a mammalian system, so that you could develop a weight of evidence one way or the other.

So, that was one of our discussions that we thought that it's better not to leave it that way. More data since we're asking for others, it would be good to have that.

DR. LIEBLER: So are you suggesting repeats on the in vitro -- analyses for an in vivo?

DR. SLAGA: Yeah, repeats on the in vitro, plus additional assays or two. You know, it'd be nice to have a mammalian system.

DR. LIEBLER: Right, okay

DR. SLAGA: Yeah.

DR. LIEBLER: Yeah.

DR. BELSITO: And so, this is the one on the sprout also that we -- so on the root powder and extract we need more data on constituents and a NOAEL for pigment, infection and anti-inflammatory. For the extract we need sensitization, irritation, 28-day dermal, and if effects, additional. And for the sprout we need method of manufacturing, impurities, sensitization, irritation and a 28-day dermal and if absorbed, other data may be necessary. And then, the comments we just had on mutagenesis.

DR. BERGFELD: I'd like to ask a question regarding is this a food? I mean, if it's in the mint family -- it's not only medicinal as the Chinese use it, but it's possible it's used in our country as a food substance, and herb.

DR. BELSITO: I couldn't find anything where it was used as a food.

DR. HELDRETH: Not that we're aware of.

DR. SLAGA: It's a mint.

DR. BELSITO: Yeah, but mint is *Mentha piperita* or something like that.

DR. BERGFELD: Well, anyhow, it is a consideration if we could find anything on food.

DR. BELSITO: It's a different species or genus for sure.

DR. BERGFELD: All right, well we've had a second -- an amended second, I gather, because we've had some added needs put in. So, any other comments?

And seeing none, I'll call the question. All those in favor with an insufficient report? Yes, thank you, unanimous. And, the insufficiencies have been outlined, and you all have them? Okay, fine.

## **Safety Assessment of *Scutellaria baicalensis*-Derived Ingredients as Used in Cosmetics**

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The Expert Panel for Cosmetic Ingredient Safety members are: Chair, Wilma F. Bergfeld, M.D., F.A.C.P.; Donald V. Belsito, M.D.; Curtis D. Klaassen, Ph.D.; Daniel C. Liebler, Ph.D.; James G. Marks, Jr., M.D.; Lisa A. Peterson, Ph.D.; Ronald C. Shank, Ph.D.; Thomas J. Slaga, Ph.D.; and Paul W. Snyder, D.V.M., Ph.D. The Cosmetic Ingredient Review (CIR) Executive Director is Bart Heldreth, Ph.D. This report was prepared by Wilbur Johnson, Jr., M.S., Senior Scientific Analyst, CIR.

**ABSTRACT:** The Expert Panel for Cosmetic Ingredient Safety (Panel) reviewed the safety of 4 *Scutellaria baicalensis*-derived ingredients in cosmetic products; these ingredients are reported to have the following functions in cosmetics: antimicrobial agent, skin conditioning agent, abrasives, fragrance ingredients, skin protectants, and antioxidants. The Panel reviewed relevant data relating to the safety of these ingredients in cosmetic formulations, and concluded that ... [to be determined]

## **INTRODUCTION**

The safety of the following 4 *Scutellaria baicalensis*-derived ingredients, as used in cosmetics, is reviewed in this safety assessment.

Scutellaria Baicalensis Extract  
Scutellaria Baicalensis Root Extract

Scutellaria Baicalensis Root Powder  
Scutellaria Baicalensis Sprout Extract

According to the web-based *International Cosmetic Ingredient Dictionary and Handbook* (wINCI; *Dictionary*), these ingredients, collectively, are of the same genus and species and have the following reported functions in cosmetics: antimicrobial agent, skin conditioning agent, abrasives, fragrance ingredients, skin protectants, and antioxidants (See Table 1).<sup>1</sup> However, these ingredients do not have any functions in common.

Botanicals, such as *Scutellaria baicalensis*-derived ingredients, may contain hundreds of constituents, some of which may have the potential to cause toxic effects. In this assessment, the Panel is reviewing the potential toxicity of each of the botanical ingredients as a whole, complex mixture. The Panel is not reviewing the potential toxicity of the individual constituents.

This safety assessment includes relevant published and unpublished data for each endpoint that is evaluated. Published data are identified by conducting an exhaustive search of the world's literature. A list of the typical search engines and websites used, sources explored, and endpoints that the Panel evaluates, is available on the Cosmetic Ingredient Review (CIR) website (<https://www.cir-safety.org/supplementaldoc/preliminary-search-engines-and-websites>; <https://www.cir-safety.org/supplementaldoc/cir-report-format-outline>). Unpublished data are provided by the cosmetics industry, as well as by other interested parties.

In many of the published studies, it is not known how the substance being tested compares to the cosmetic ingredient. Therefore, if it is not known whether the substance being discussed is a cosmetic ingredient, the test substance will be identified by genus and species (e.g., "a *Scutellaria baicalensis* extract"). If it is known that the substance is a cosmetic ingredient, INCI nomenclature (e.g., "Scutellaria Baicalensis Extract") will be used; italics are not used in INCI names.

## **CHEMISTRY**

### **Definition**

The definitions and functions in cosmetics of the 4 *Scutellaria baicalensis*-derived ingredients reviewed in this safety assessment are presented in Table 1.<sup>1</sup> All of these ingredients are derived from the same genus and species, and from either the root or the sprout plant parts. The root is defined as an organ of the plant that absorbs and transports water and nutrients, lacks leaves and nodules, and is usually underground.<sup>1</sup> The sprout is defined as a seedling, germinating seed, and any new growth of a plant from a stem such as a new branch or a bud.

### **Plant Identification**

*Scutellaria baicalensis* Georgi is an herb of the Lamiaceae family (i.e., mint family) and Scutellarioideae subfamily.<sup>2,3</sup> Baikal skullcap and Chinese skullcap are common names for this herb, which is native to the Asia-Temperate geographical region that includes Siberia, Mongolia, Russian (far east), China, and Korea. *Scutellaria radix* is defined as the root of *Scutellaria baicalensis* Georgi.<sup>4</sup>

### **Physical and Chemicals Properties**

#### **Scutellaria Baicalensis Root Extract**

In an ultraviolet (UV) spectral analysis of a *Scutellaria baicalensis* root extract (aqueous ethanol extract), an absorption peak between 200 and 250 nm (within the short-wavelength UV (UVC)) and an absorption peak between 250 and 300 nm (crossing both mid-wavelength UV (UVB) and UVC)) were observed.<sup>4</sup>

### **Method of Manufacture**

#### **Scutellaria Baicalensis Root Extract**

Data on the methods of manufacture of Scutellaria Baicalensis Root Extract (using different extractants) were provided via the Personal Care Products Council (Council).<sup>5,6</sup> According to one method, the dried raw material (*Scutellaria baicalensis* root) is extracted with 90 vol% ethanolic solution.<sup>5</sup> Extraction is followed by filtration, concentration of the filtrate (and then concentration adjustment with 50 vol% ethanolic solution). The next steps include sedimentation, filtration, and then packaging. Another method uses a lower concentration of the extractant.<sup>5</sup> The first step in this production process is extraction of the dried raw material with 30 vol% ethanolic solution.<sup>5</sup> Extraction is followed by filtration and

concentration of the filtrate. Squalene is then added, and this step is followed by sedimentation, filtration, and then packaging. A third production method involves extraction of the dried raw material with 50 vol% 1,3-butylene glycolic solution.<sup>5</sup> Extraction is followed by filtration and then sedimentation. This step is followed by additional filtration and then packaging. The production of *Scutellaria Baicalensis* Root Extract via aqueous extraction of *Scutellaria baicalensis* has also been described. The botanical raw material (*Scutellaria baicalensis* root) is cut and cleaned. This is followed by water extraction, a concentration phase, and then spray drying.<sup>6</sup>

A method of preparation of a *Scutellaria baicalensis* root extract (aqueous extract) from a published study is summarized as follows.<sup>7</sup> Briefly, the dried roots of *Scutellaria baicalensis* are ground into powder (60-mesh) and 250 g are extracted twice with 10 volumes of boiling purified water for 1 h. The supernatants are then combined, filtered, and lyophilized. The extract (powder) is then stored at 4 °C until use.

In a method of preparation from another study, *Scutellaria baicalensis* roots were chopped into pieces, immersed in distilled water for 1 h, and then extracted under thermal reflux for 1 h, twice.<sup>8</sup> The extract was filtrated using analytical filter paper and evaporated to dryness using a rotary evaporator at 60 °C under reduced pressure. The dried residue was dissolved in distilled water to yield a final concentration of 0.3 g/L.

## Composition

### *Scutellaria Baicalensis* Extract

Phytochemical analyses have detected and quantified the flavonoids baicalin, baicalein, scutellarin, wogonin, and the human neurohormones, melatonin and serotonin, in leaf and stem tissues from *Scutellaria baicalensis*.<sup>9</sup> The extraction of dried slices of *Scutellaria baicalensis* with ethanol has yielded a number of chemical constituents, including various glucuronides and flavones (See Table 2).<sup>10</sup>

### *Scutellaria Baicalensis* Root Extract

The content of major flavonoids in a *Scutellaria baicalensis* root extract (250 g, aqueous extract) has been determined to be: baicalin (406 mg/g extract), wogonoside (155 mg/g extract), 7-O- $\beta$ -D-glucuronide (53.8 mg/g extract), baicalein (31.7 mg/g extract), wogonin (30.5 mg/g extract), and oroxylin A (7.24 mg/g extract).<sup>7</sup> The total content of these 6 main flavonoids accounted for 68.5% of the extract.

A *Scutellaria Baicalensis* Root Extract trade name mixture (30% ethanol extract) is reported to contain flavonoid compounds.<sup>5</sup> Another *Scutellaria Baicalensis* Root Extract trade name mixture (90% ethanol and butylene glycol extract) contains tannin and flavonoid compounds.

### *Scutellaria Baicalensis* Root Powder

A *Scutellaria baicalensis* root (dried root) contains a variety of flavones, phenylethanoids, amino acids, sterols, and essential oils.<sup>7</sup> The major flavonoid glycosides of this material include baicalin, wogonoside, oroxylin A 7-O- $\beta$ -D-glucuronide, and their aglycones baicalein, wogonin and oroxylin A.<sup>7,11</sup> Baicalin is the most abundant flavonoid constituent of this *Scutellaria baicalensis* root. Minor flavonoids that have been identified in this *Scutellaria baicalensis* root include: viscidulin III-2-O- $\beta$ -D-glucoside; 5,7,2,5-tetrahydroxyflavone; (-)-eriodictyol; rivularin; chrysin 8-C- $\beta$ -D-glucopyranoside; and 5,2'-dihydroxy-6,7,8,3'-tetramethoxyflavone.<sup>12</sup>

## Impurities

### *Scutellaria Baicalensis* Extract

The results of a high-performance thin-layer chromatographic analysis of a *Scutellaria baicalensis* extract have indicated the absence of *Teucrium chamaedrys* (Gemander), which has been reported as an adulterant of *Scutellaria lateriflora* (American skullcap) herbal preparations.<sup>13</sup> *Teucrium chamaedrys* is a species of ornamental plant native to Mediterranean region of Europe and North Africa, and to the Middle East as far east as Iran.

### *Scutellaria Baicalensis* Root Extract

A *Scutellaria Baicalensis* Root Extract trade name mixture (ethanol and butylene glycol extract) is reported to contain no more than 20 ppm heavy metals and no more than 2 ppm arsenic.<sup>5</sup>

## USE

### Cosmetic

The safety of *Scutellaria baicalensis*-derived ingredients is evaluated based on data received from the United States Food and Drug Administration (US FDA) and the cosmetics industry on the expected use of these ingredients in cosmetics. Use frequencies of individual ingredients in cosmetics are collected from manufacturers and reported by cosmetic product category in FDA's Voluntary Cosmetic Registration Program (VCRP) database.<sup>14</sup> Use concentration data are submitted by the cosmetics industry in response to surveys, conducted by the Council, of maximum reported use concentrations by product category.<sup>15,16</sup>

According to 2020 VCRP data, *Scutellaria Baicalensis* Root Extract is reported to be used in 514 cosmetic products (419 leave-on products, 95 rinse-off products).<sup>14</sup> Of the *Scutellaria baicalensis*-derived ingredients reviewed in this safety assessment, this is the greatest reported use frequency. The results of concentration of use surveys conducted by the Council in 2018 and 2019 indicate that *Scutellaria Baicalensis* Root Extract is used at maximum use concentrations up to 0.5% in leave-on products (moisturizing products).<sup>15,16</sup> This is the highest use concentrations in leave-on products that is being reported for the *Scutellaria baicalensis*-derived ingredients reviewed in this safety assessment. According to VCRP and Council survey data, *Scutellaria Baicalensis* Root Powder is not currently in use in cosmetic products. Further use data are presented in Table 3.

Cosmetic products containing *Scutellaria baicalensis*-derived ingredients may be applied to the skin or, incidentally, may come in contact with the eyes (e.g., *Scutellaria Baicalensis* Root Extract at concentrations up to 0.07% in eye shadows). *Scutellaria Baicalensis* Root Extract and *Scutellaria Baicalensis* Sprout Extract are used in products that come in contact with mucous membranes during product use (maximum ingredient use concentrations of 0.0045% (lipstick) and 0.0002% (bath soaps and detergents), respectively). Additionally, *Scutellaria Baicalensis* Root Extract could be incidentally ingested (maximum use concentrations up to 0.0045% (lipstick)). Products containing *Scutellaria baicalensis*-derived ingredients may be applied as frequently as several times per day and may come in contact with the skin for variable periods following application. Daily or occasional use may extend over many years.

The *Scutellaria baicalensis*-derived ingredients reviewed in this safety assessment are not restricted from use in any way under the rules governing cosmetic products in the European Union.<sup>17</sup>

### **Non-Cosmetic**

#### *Scutellaria Baicalensis* Root Extract and *Scutellaria Baicalensis* Root Powder

*Scutellaria Radix*, known as Huangqin in Chinese, is the dried root of *Scutellaria baicalensis* Georgi. It is a well-known traditional herbal medicine that is used to treat inflammation, cardiovascular diseases, and respiratory and gastrointestinal infections.<sup>7</sup> *Scutellaria baicalensis* Georgi is one of the 50 fundamental herbs of traditional Chinese medicine, and pharmacological effects of *Scutellaria baicalensis* have been described.<sup>7,12,18</sup>

## **TOXICOKINETIC STUDIES**

### **Absorption, Distribution, Metabolism, and Excretion**

#### **Animal**

##### **Oral**

#### *Scutellaria Baicalensis* Extract

The toxicokinetics of *Scutellaria baicalensis* extract (ethanol extract) was studied using groups of Sprague-Dawley rats.<sup>19</sup> *Scutellaria baicalensis* herb (plant part not stated) was extracted in this study. In an oral absorption experiment, a *Scutellaria baicalensis* extract (single dose of 2.5 mL/kg) was administered (method not stated) to 6 Sprague-Dawley rats, after which blood samples were collected. The blood concentration of baicalin (a flavone component of the extract) quickly reached its peak, suggesting that it was absorbed rapidly and eliminated slowly. In the distribution experiment, the extract (2.5 mL/kg) was administered orally to 30 Sprague-Dawley rats. The animals were killed and tissue samples from the following organs were collected at various intervals (15, 30, 60, 120, 360, and 600 min): heart, liver, lung, kidney, stomach, spleen, brain, and intestines. Baicalin was detected in all of the tissues that were collected. The amount of baicalin that was found in the brain indicated that this flavone could pass the blood-brain barrier. Baicalein (another flavone component) was also detected in the liver, heart, lung, kidney, stomach, and intestine. Another experiment that was performed involved 6 rats that were dosed orally (method not stated) with the extract (2.5 mL/kg). Urine and feces were collected at different time points (0 - 4 h, 4 - 8 h, 8 - 12 h, 12 - 24 h post-dosing). Baicalin and baicalein were detected in the urine and feces after dosing. The urinary cumulative excretion of baicalin was 0.12% and the fecal cumulative excretion of baicalin was 0.48% of the dose up to 24 h post-administration. The urinary cumulative excretion of baicalein was 0.05% and the fecal cumulative excretion of baicalein was 0.04% of the dose up to 24 h post-administration.

#### *Scutellaria Baicalensis* Root Extract

Metabolism and excretion of an orally (gavage)-administered *Scutellaria baicalensis* root extract (aqueous extract) were evaluated using groups of male Sprague-Dawley rats.<sup>8</sup> The first experiment involved 2 groups of 6 fasted rats (test and control groups). The aqueous extract (dissolved in distilled water prior to dosing) was administered by gavage at a dose of 4.5 g/kg bw. Control animals received distilled water (5 mL). Urine and feces samples were collected at 12 h post-dosing. In the second experiment, another group of 6 fasted rats was dosed by gavage with the test substance, and bile samples were collected from the cannulated bile duct within 12 h. Four parent components (from *Scutellaria baicalensis* root) and a total of 15 metabolites (sulfate and glucuronide conjugates, and hydroxylated, methylated, acetylated, and deoxygenated products) were detected, with most present in the urine. The metabolites identified are presented in Table 4.

A *Scutellaria baicalensis* root extract (suspended in an aqueous 0.5% carboxymethyl cellulose sodium salt solution, to a concentration of 100 mg/mL) was administered orally (method not stated) to fasted male Sprague-Dawley rats (number not

stated) at a dose of 800 mg/kg (equivalent to baicalin (324.80 mg/kg), wogonoside (124.00 mg/kg), oroxylin A 7-O- $\beta$ -D-glucuronide (43.04 mg/kg), baicalein (25.36 mg/kg), wogonin (24.40 mg/kg), and oroxylin A (5.79 mg/kg)).<sup>7</sup> Blood samples (250  $\mu$ l) were obtained from the jugular veins and collected at the following times after dosing: 0.083, 0.167, 0.25, 0.33, 0.5, 1, 2, 4, 6, 8, 12, 18, 24, 36, and 48 h. The peak plasma concentration ( $C_{max}$ ) and the time reaching  $C_{max}$  ( $T_{max}$ ) were obtained directly from the experimental data. The three tested flavonoid glucuronides (baicalin, wogonoside, and oroxylin A 7-O- $\beta$ -D-glucuronide) and their aglycones (baicalein, wogonin and oroxylin A) exhibited rapid absorption ( $T_{max} < 12$  min) and exhibited a multiple-peak phenomenon. Focusing on the dose in the extract, because the dose of baicalein is much higher than that of oroxylin A, one would expect that the systemic exposure of baicalein would have been greater, but it was comparable to that of oroxylin A. Therefore, the potential for systemic exposure per unit time would be greater for oroxylin A (when compared to baicalein). Because the doses of baicalein and wogonin in the extract are comparable, the expectation is that the systemic exposure would have been comparable, but the systemic exposure of baicalein was much less than that of wogonin. Therefore, the potential for systemic exposure per unit time would be greater for wogonin (when compared to baicalein). These data indicate that the systemic absorption, over time, of baicalein would be less when compared to the other 2 constituents.

## **Human**

### **Oral**

#### **Scutellaria Baicalensis Root Powder**

A study was performed to investigate the urinary pharmacokinetics of flavone constituents of a *Scutellaria baicalensis* root powder (contains baicalin, baicalein, wogonoside and wogonin flavones).<sup>20</sup> Quantitation (using high performance liquid chromatography) of the commercial powder indicated that baicalin and wogonoside were the major flavone constituents, and that their aglycones, baicalein and wogonin, were less abundant. The powder (5.2 g) and 200 mL water were administered orally to 10 subjects after an overnight fast. Urine samples were collected before and after dosing. The glucuronides and sulfates of baicalein and wogonin in urine were hydrolyzed with  $\beta$ -glucuronidase and sulfatase, respectively. Study results indicated that the mean cumulated renal excretion of baicalein glucuronides and sulfates were  $43.1 \pm 4.5$   $\mu$ mol (2.9% of dose) and  $64.8 \pm 6.3$   $\mu$ mol (4.3% of dose), respectively. Wogonin glucuronides and sulfates were  $21.6 \pm 2.0$   $\mu$ mol (5.9% of dose) and  $20.7 \pm 1.7$   $\mu$ mol (5.7% of dose), respectively. The renal excretion of conjugated metabolites of wogonin (11.6% of dose; number of  $\mu$ mol not stated) were higher than that of baicalein (7.2% of dose; number of  $\mu$ mol not stated). The baicalein sulfates predominated when compared to the corresponding glucuronides; whereas, the presence of wogonin sulfates was comparable to the corresponding glucuronides.

## **TOXICOLOGICAL STUDIES**

General toxicity studies of *Scutellaria baicalensis*-derived ingredients reviewed in this safety assessment were neither found in the published literature, nor were these data submitted.

## **DEVELOPMENTAL AND REPRODUCTIVE TOXICITY STUDIES**

#### **Scutellaria Baicalensis Root Extract**

The teratogenicity of a *Scutellaria baicalensis* root extract (aqueous extract) was evaluated using groups of 30 pregnant, Sprague-Dawley female rats.<sup>21</sup> The test substance was administered by gavage to 3 groups, at doses of 0.25, 12.49, and 24.98 g/kg/day, on gestation days 7 to 17 (11 days). Control rats were administered distilled water. Two-thirds of pregnant females in each group were killed on day 20 of gestation, and their fetuses were examined. The remaining dams were allowed to litter naturally, and postnatal development of the offspring was evaluated. A statistically significant ( $p < 0.05$ ), dose-dependent increase in the incidence of skeletal variations (presence of lumbar ribs) was observed. A dose-dependent increase in the frequency of dilatation of the ureter was also reported. However, the incidence of this abnormality was comparable between the 12.49 and 24.98 g/kg/day dose groups. Dilatation was observed along the entire length of the ureter, not in localized segments. Various minor abnormalities were also observed in the 24.98 g/kg/day dose group, and hydrocephaly was observed in one of the control litters. There were no statistically significant differences in the following between control and treated groups: maternal body weight, intake of diet and water, efficiency of diet, hematologic values, resorbed and dead fetuses, corpora lutea, separation of eyelids, emergence of abdominal hair and incisors, traction test values, sex organ function in fetuses, and the growth of fetuses.

A *Scutellaria baicalensis* root extract (aqueous extract) was administered by gavage to 20 pregnant Sprague-Dawley rats.<sup>22</sup> The extract, in saline (15 g in 750 mL), was administered slowly (186 mg/kg bw) daily, from day 7 to day 17 of gestation. The authors noted that the administered dose was equivalent to 25 g/kg of *Scutellaria baicalensis* root (starting material), representing a 100-fold increase over the typical human intake level. The control group (20 pregnant rats) was administered equal volumes of saline. Ten maternal animals in each group were killed on gestation day 20, and the fetuses were delivered by cesarean section. The following were then determined: number of dead fetuses, live fetuses, resorption sites, and corpora lutea; fetal sex; and fetal body weights. Skeletal examinations of fetuses were also performed after the animals were killed on day 20. Skeletons of offspring obtained by natural delivery were evaluated at postnatal day 50 by

necropsy. The remaining animals were allowed to naturally deliver their offspring, and all of the weanlings were maintained to postnatal day 50 for the reversibility study. In fetuses obtained by cesarean section on gestational day 20, the incidence of fetal lumbar rib was increased in the treated group ( $11.54 \pm 0.15\%$ ) when compared to the vehicle control group. However, in the groups obtained by natural delivery, the fetal lumbar rib incidence of the treated group ( $0.81 \pm 0.01\%$ ) was decreased on postnatal day 50 when compared to the fetuses that were delivered by cesarean section on day 20. This means that the lumbar rib had been recovered by postnatal day 50. The weights of fetuses in the treated group tended to be less when compared to those in the control group. Alkaline phosphatase in treated dams was increased on gestation day 20, but was decreased on postnatal day 50. There were no significant differences between the control and treated group with respect to the following: maternal body weight, or embryological, histopathological, hematological, or serum biochemical changes. The authors stated that the results of this study suggest that the appearance of lumbar rib induced by the test material is a transient fetal variation rather than teratogenicity or maternal toxicity.

The effect of a *Scutellaria baicalensis* root extract (aqueous extract) on embryonic development was studied using groups of 18 pregnant ICR mice that received oral (gavage) doses of 2, 8, or 32 g/kg/day.<sup>23</sup> The doses (dose volume = 0.5 mL/30 g bw) were administered from gestation day 6 to 15. The control group (18 pregnant mice) was administered water. The animals were killed on gestation day 18, and the following parameters were evaluated: live and dead fetuses, resorptions, external and skeletal malformed fetuses, maternal body weights, and maternal liver, kidney, and heart weights. When compared to the negative control group, no statistically significant differences in fetal parameters were observed. Maternal absolute liver and kidney weights in the 32 g/kg/day group were significantly higher ( $p < 0.05$ ) when compared to the control group. Additionally, increases in relative liver and kidney weight values in this group were statistically significant ( $p < 0.05$ ). The authors concluded that the oral administration of this extract at or below a dose of 32 g/kg/day during organogenesis did not cause statistically significant fetal external or skeletal malformations. However, dosing with 32 g/kg/day presented potential maternal toxicity.

## **GENOTOXICITY STUDIES**

### **In Vitro**

#### **Scutellaria Baicalensis Root Extract**

The genotoxicity of a trade name mixture containing 33.33% *Scutellaria Baicalensis* Root Extract (aqueous extract) was evaluated in the Ames test using the following *Salmonella typhimurium* strains with and without metabolic activation: TA97a, TA98, TA100, TA102, and TA1535.<sup>6</sup> The tradename mixture was evaluated at doses up to 5 µl/dish, and testing was performed in accordance with Organization for Economic Co-Operation and Development (OECD) Test Guideline (TG) 471. The test procedure included a negative/solvent control (not stated). The trade name mixture did not cause significant cytotoxicity and was non-genotoxic over the range of doses tested in all bacterial strains.

The Ames test was also used to evaluate the genotoxicity of *Scutellaria baicalensis* root extracts (methanol extract and aqueous extract), using *S. typhimurium* strains TA98 and TA100, with and without metabolic activation.<sup>24</sup> The bacterial suspension + extract (0.1 mL) was incubated for 2 days, and the revertant colonies formed were scored. AF-2 and benzo[a]pyrene served as positive controls. Results for the aqueous extract were positive in strain TA100 with, but not without, metabolic activation. All strain TA98 results for the aqueous extract were negative. Results were also negative for the methanol extract, with or without metabolic activation, in both strains.

The genotoxicity of *Scutellaria baicalensis* root extracts (methanol extract and aqueous extract) was evaluated in the *Bacillus subtilis* rec-assay using strains H17 Rec<sup>+</sup> and M45 Rec<sup>-</sup> without metabolic activation.<sup>24</sup> A filter-paper disk containing the extract (100 mg/mL; 60 µl) and a bacterial strain was incubated overnight. The diameter of inhibition zones formed around the disk was measured, and Rec<sup>+</sup> and Rec<sup>-</sup> spore plates were compared. Mitomycin C and furylfuramide (AF-2) served as positive controls. Results were positive for the methanol extract and negative for the aqueous extract.

### **In Vivo**

Data on the in vivo genotoxicity of *Scutellaria baicalensis*-derived ingredients reviewed in this safety assessment were neither found in the published literature, nor were these data submitted.

## **CARCINOGENICITY STUDIES**

Data on the carcinogenicity of *Scutellaria baicalensis*-derived ingredients reviewed in this safety assessment were neither found in the published literature, nor were these data submitted.

## **OTHER RELEVANT STUDIES**

### **Effect on Melanogenesis**

#### **Scutellaria Baicalensis Root Extract**

The effect of a *Scutellaria baicalensis* root extract (powder, ethanol extract) on melanogenesis was studied using B16F10 mouse melanoma cells.<sup>25</sup> B16F10 cells were cultured for 24 h with a *Scutellaria baicalensis* root extract at



concentrations of 7, 35, and 70  $\mu\text{g/mL}$ . Linoleic acid (100  $\mu\text{M}$ ) served as the positive control. Incubation with a *Scutellaria baicalensis* root extract for 24 h resulted in a statistically significant ( $p < 0.01$ ) decrease in melanin levels in a dose-dependent manner as the dose was increased from 35  $\mu\text{g/mL}$  to 70  $\mu\text{g/mL}$ . At a concentration of 70  $\mu\text{g/mL}$ , the extract inhibited melanin formation more effectively than did the positive control (100  $\mu\text{M}$  linoleic acid). It should be noted that results also indicated that 2 flavone components of *Scutellaria baicalensis* root (wogonin and wogonoside) consistently inhibited melanogenesis in both B16F10 melanoma cells and melanocytes. In order to determine the most efficient extraction of *Scutellaria baicalensis* root, the inhibition of melanogenesis by each extract generated from the following 4 organic solvents was evaluated: n-hexane, ethyl acetate, methanol, and water. The solvents n-hexane, ethyl acetate, methanol and water resulted in 83.2, 109.2, 177.6, and 84.4 mg of the crude extract (a *Scutellaria baicalensis* root extract) from the ratio of powder/solvent (20.3 g/100 mL, 10.1 g/50 mL, 1.0 g/5 mL, and 1.0 g/30 mL), respectively. Melanin content was assessed after treatment of B16F10 cells with each extract for 24 h. The methanol extract caused a statistically significant ( $p < 0.05$ ) decrease in melanin content, whereas no decrease was observed after treatment with the other three extracts. The extract eluted by ethyl acetate tended to increase melanin content and produced toxicity. These results suggest that *Scutellaria baicalensis* root extract (methanol extract) is capable of inhibiting melanogenesis (strong inhibitory effect, without cytotoxicity), and its active components can be efficiently extracted. The authors stated that the difference in results depending on the extractant used is that certain flavonoids in a *Scutellaria baicalensis* root extract (present in one extract versus the other) were responsible for the inhibition of melanogenesis.

### Antiallergic Effects

#### *Scutellaria Baicalensis* Extract

Antiallergic effects of a *Scutellaria baicalensis* extract (ethanol extract, plant part not stated) were evaluated using the following groups of 6 Sprague–Dawley rats: rats sensitized with anti-dinitrophenyl (anti-DNP) immunoglobulin E (IgE); rats sensitized with anti-DNP IgE and treated with a *Scutellaria baicalensis* extract; normal control group; and negative control group.<sup>26</sup> The rats received intradermal injections of anti-DNP IgE at each of three dorsal skin sites. At 48 h post-injection, each rat received an intravenous injection of DNP-HSA in saline containing 4% Evans blue. A *Scutellaria baicalensis* extract (28 mg/100 g body weight) was administered orally prior to this injection. The rats were then killed, dorsal skin was removed, and the pigment area was measured. Additionally, rat peritoneal mast cells (RPMCs) were cultured and purified to investigate histamine release. RPMC's were incubated for 10 min with a *Scutellaria baicalensis* extract at concentrations of 1, 10, and 100  $\mu\text{g/mL}$ . Histamine release was evoked by adding compound 48/80. Also, in vitro, human mast cells (HMC-1) were pretreated with a *Scutellaria baicalensis* extract (1, 10, and 100  $\mu\text{g/mL}$ ) for 1 h before stimulation with phorbol 12-myristate 13-acetate (PMA) plus A23187 (a calcium ionophore). The effects on pro-inflammatory cytokine expression and mitogen activated protein (MAP) kinase expression were investigated using tumor necrosis factor-alpha (TNF- $\alpha$ ) and interleukin-8 (IL-8) assays, and Western blotting analysis of HMC-1 cells. Treatment with a *Scutellaria baicalensis* extract inhibited the passive cutaneous anaphylaxis reaction, when compared to the control group. Following treatment of RPMCs with a *Scutellaria baicalensis* extract (all 3 concentrations), histamine release decreased significantly. In HMC-1 cells, a *Scutellaria baicalensis* extract restored IL-8 and TNF- $\alpha$  expression and inhibited MAP kinase expression in compound 48/80-induced HMC-1 cells. The authors noted that these data suggest that a *Scutellaria baicalensis* extract may prove to be a useful anti-inflammatory agent through its downregulation of the expression of various inflammatory mediators.

#### *Scutellaria Baicalensis* Root Extract

The antiallergic effect of a topically applied *Scutellaria baicalensis* root extract (aqueous extract) in suppressing 2,4-dinitrochlorobenzene (DNCB)-induced allergic contact dermatitis was studied.<sup>27</sup> This *Scutellaria baicalensis* root extract (aqueous extract) was defined as a spray dried extract with the following components: baicalin (6.45%), wogonoside (3.37%), baicalein (2.07%), and wogonin (0.48%). *Scutellaria baicalensis* root extract (aqueous extract) was evaluated using the following 6 groups (5 mice per group) of female BALB/c mice: negative control group (cream base alone); positive group (dinitrochlorobenzene (DNCB) + cream base); dexamethasone group (DNCB + 0.1% dexamethasone cream); 0.1% *Scutellaria baicalensis* root extract (aqueous extract) group (DNCB + 0.1% *Scutellaria baicalensis* root extract (aqueous extract) cream); and 0.5% *Scutellaria baicalensis* root extract (aqueous extract) (DNCB + 0.5% *Scutellaria baicalensis* root extract (aqueous extract) cream). Each gram of cream contained (w/w) 1 mg of dexamethasone and a *Scutellaria baicalensis* root extract (aqueous extract) (1 and 5 mg) in an emollient cream base consisting of the following components: propylene glycol, stearyl alcohol, acetyl alcohol, sorbitan monostearate, polysorbate 60, mineral oil and purified water. The mice received topical applications (on dorsal skin) of ~20 mg dexamethasone cream, a *Scutellaria baicalensis* root extract (aqueous extract) cream, or emollient cream base alone daily on days 1 to 14. Allergic sensitization was induced according to the following procedure: A 1-cm<sup>2</sup> gauze patch containing 0.1 mL of 1% DNCB in acetone/olive oil (3:1) was applied for 4 h (on days 1 and 4) to the back. After a 4-day non-treatment period, the mice were challenged (dorsal skin) with a patch containing 0.2% DNCB on days 8 and 11. On day 14, the mice were killed and blood samples were collected. Dorsal skin samples from each mouse were subjected to histopathological and biochemical examination.

Topical application of a *Scutellaria baicalensis* root extract (aqueous extract) attenuated the epidermal thickness and mast cell infiltration into the skin in DNCB-induced contact dermatitis. Additionally, a *Scutellaria baicalensis* root extract (aqueous extract) suppressed DNCB-induced production of serum IgE as well as IL-4, IFN- $\gamma$ , and TNF- $\alpha$  in the skin. Topical

application of a *Scutellaria baicalensis* root extract (aqueous extract) also ameliorated the significant decrease in dermal glutathione and superoxide dismutase levels. The researchers stated that these results indicated that the topical application of *Scutellaria baicalensis* suppressed DNCB-induced contact dermatitis.

### Cytotoxicity

#### Scutellaria Baicalensis Root Extract

A *Scutellaria baicalensis* root extract (aqueous extract) was tested in apoptosis experiments involving the following cell types from 26 children with acute lymphoblastic leukemia: the NALM-6 cell line (human peripheral blood leukemia pre-B cells), peripheral blood leukocytes, and bone marrow cells.<sup>28</sup> The 3 cell types were incubated for 48 h with a *Scutellaria baicalensis* root extract (aqueous extract) at concentrations up to 200 µg/mL/  $2 \times 10^6$  cells. Peripheral blood (from 16 healthy children) tested with the same concentrations served as the control. The percentage of living peripheral blood leukocytes and bone marrow cells after 24 h of incubation oscillated around 90% (test and control cells). However, on day 2, the number of living bone marrow cells from patients with acute lymphoblastic leukemia decreased to only 65%. A *Scutellaria baicalensis* root extract (aqueous extract) enhanced the apoptosis of peripheral blood leukocytes in bone marrow cells of leukemic children. The percentage of peripheral blood leukocytes that underwent apoptosis increased from 11% in the control to 17% and 24% for the doses of 100 µg/mL and 200 µg/mL, respectively. At a dose of 200 µg/mL, apoptosis in bone marrow cells and peripheral blood leukocytes from patients with acute lymphoblastic leukemia was statistically significantly increased ( $p < 0.05$ ), when compared to peripheral blood leukocytes from healthy controls. A *Scutellaria baicalensis* root extract (aqueous extract) did not induce apoptosis of control peripheral blood leukocytes. Pro-apoptotic activity of a *Scutellaria baicalensis* root extract (aqueous extract) in the NALM-6 cell line was also reported (details relating to results not included). The authors noted that the observation of a *Scutellaria baicalensis* root extract (aqueous extract)-induced apoptosis in peripheral blood leukocytes from leukemia patients, but not from healthy controls, may be related to the tumor necrosis factor-related apoptosis-inducing ligand (TRAIL). They stated that TRAIL induces apoptosis in various cancer cells in vitro and in vivo, with little or no toxicity in normal cells.

The cytotoxicity of a *Scutellaria baicalensis* root extract (aqueous ethanol extract) was evaluated using human keratinocytes (HaCaT) that were cultured with the extract for 24 h.<sup>4</sup> The extract tested was nontoxic at concentrations up to 30 µg/mL. However, statistically significant ( $p < 0.05$ ) cytotoxicity was observed at concentrations of 100 µg/mL and 1000 µg/mL.

### Estrogenic Activity

#### Scutellaria Baicalensis Root Extract

A *Scutellaria baicalensis* root extract (ethanol extract) was assayed for estrogenic activity in vitro using a recombinant yeast system with both a human estrogen receptor expression plasmid and a reporter plasmid.<sup>29</sup> The extract (in dimethyl sulfoxide) was added to the culture, reaching final concentrations between 0.1 and 1000 µg/mL, and incubated for 2 h.  $\beta$ -Galactosidase activity, which is dependent on binding of the ligand to the estrogen receptor, was then assayed. The activity of  $\beta$ -galactosidase resulted in a color reaction, which was measured absorbance at 420 nm. 17 $\beta$ -Estradiol served as the positive control. EC<sub>50</sub> (concentration of test material at half-maximum  $\beta$ -galactosidase activity) values were determined. The estrogenic relative potency (RP) of the test material was computed by dividing the EC<sub>50</sub> of 17 $\beta$ -estradiol by the EC<sub>50</sub> of the test material, and then multiplying this value by 100. The EC<sub>50</sub> for 17 $\beta$ -estradiol was  $0.205 \pm 0.025$  ng/mL (RP = 100). The EC<sub>50</sub> for this *Scutellaria baicalensis* root extract was 262.3 µg/mL (RP =  $8.77 \times 10^{-5}$ ). This *Scutellaria baicalensis* root extract was classified as negative for estrogenic activity.

## DERMAL IRRITATION AND SENSITIZATION STUDIES

### Irritation

#### Animal

#### Scutellaria Baicalensis Root Extract

The skin irritation/corrosion potential of a *Scutellaria baicalensis* root extract (aqueous extract) was evaluated in accordance with OECD TG 404, using 6 New Zealand white rabbits.<sup>30</sup> The dried powder (spray dried extract) test article comprised in part: baicalin (6.45%), wogonoside (3.37%), baicalein (2.07%), and wogonin (0.48%). Distilled water (negative control) was also applied to the 6 rabbits. Reactions were scored using the Draize scale, and the primary irritation index (PII) was calculated using the mean score at 24, 48, and 72 h. There were no significant body weight changes, clinical signs, or mortality following topical application of the test substance. Slight erythema with edema (score of 1) was observed in 1 of 6 rabbits at 1 h after patch removal. By 24 h post-application, the reactions had resolved. The extract was classified as a non-irritant (PII = 0). The distilled water control also produced negative results.

## **Human**

### **Scutellaria Baicalensis Root Extract**

Results from a human patch test on a 10% Scutellaria Baicalensis Root Extract trade name mixture (butylene glycol extract; dose not stated) involving 12 subjects were negative for skin irritation.<sup>5</sup> Details relating to the test protocol and results were not included.

## **Sensitization**

### **Animal**

#### **Scutellaria Baicalensis Root Extract**

The skin sensitization potential of a *Scutellaria baicalensis* root extract (aqueous extract) was evaluated in accordance with OECD TG 404 (Buehler method) using the following groups of Hartley guinea pigs: 10 test animals, 20 negative control animals, and 10 positive control animals.<sup>30</sup> The dried powder (spray dried extract), applied to the skin using an occlusive patch, was defined as a *Scutellaria baicalensis* root extract (aqueous extract) with the following components: baicalin (6.45%), wogonoside (3.37%), baicalein (2.07%), and wogonin (0.48%). DNCB (1%) and distilled water served as positive and negative controls, respectively. Skin reactions were scored at 24 h and 48 h after patch removal according to the Magnusson and Kligman grading scale. Results were expressed as mean  $\pm$  standard error of the mean. There were no significant body weight changes, clinical signs, or mortality following topical application of the test substance. Treatment with the test substance was not associated with any changes on the skin surface, including erythema and edema at 24 and 48 h following patch removal. The test material was classified as a non-sensitizer (Buehler score = 0). Skin sensitization was observed in the positive control group. The average skin response scores in the DNCB-treated group were 0.6 and 0.4 at 24 and 48 h, respectively. Reactions were not observed in the distilled water, negative control group.

### **Human**

#### **Scutellaria Baicalensis Root Extract**

The skin sensitization potential of an undiluted leave-on product containing 0.001% Scutellaria Baicalensis Root Extract was evaluated in a human repeated insult patch test (HRIPT) involving 220 subjects.<sup>31</sup> The product (0.2 g, under semi-occlusive patch) was applied undiluted to the skin for 24 h. The location and area (cm<sup>2</sup>) of the application site were not stated. Nine induction patch applications were made during a 3-week induction period, followed by a 2-week non-treatment period. A challenge patch was then applied to a new test site (location not stated), and reactions were scored at 24, 48, 72, and 96 h according to the International Contact Dermatitis Research Group (ICDRG) reading scale: 0 (no visible reaction) to 4 (severe reaction with erythema, induration, vesicles, and pustules (may be weeping)). A low-level reaction was associated with a score of 0 or 1, and a high-level reaction was associated with a scores of 2 and above. Three subjects had a low-level reaction during induction. A low-level reaction was also observed in 1 subject during the challenge phase. Whether or not the subject with the low-level reaction during challenge was among the 3 with a low-level induction reaction was not stated. None of the subjects had a high-level reaction. The product did not induce an allergic response, and the authors commented that the product did not induce dermal sensitization in any of the subjects tested.

Results from an HRIPT on a 10% Scutellaria Baicalensis Root Extract trade name mixture (butylene glycol extract; dose per cm<sup>2</sup> not stated) involving 49 subjects were negative for skin sensitization.<sup>5</sup> Details relating to the test protocol and results were not included. In another HRIPT involving 54 subjects patch tested with an undiluted Scutellaria Baicalensis Root Extract trade name mixture (30% ethanol extract; dose per cm<sup>2</sup> not stated), test results were also negative for skin sensitization. Details relating to the test protocol and results were not included.

## **Phototoxicity**

### **In Vitro**

#### **Scutellaria Baicalensis Root Extract**

The phototoxicity of a trade name mixture containing 33.33% Scutellaria Baicalensis Root Extract (aqueous extract) was evaluated in the 3T3 neutral red uptake in vitro phototoxicity assay (equivalent to OECD Guideline for Testing Chemicals – In Vitro 3T3 NRU phototoxicity test) using Balb/c 3T3 cells at a density of  $1 \times 10^4$  cells per well.<sup>6</sup> The maximum test concentration of the trade name mixture was 1000  $\mu$ g/ml. Untreated cells served as the negative control, and the positive control was chlorpromazine. An appropriate continuous dose-response curve (model, x-axis = cell concentration and y-axis = cell viability) was used. This model was consistent with the European Union instructions (EU 67/548/EEC Appendix VB.41 “3T3 Neutral Red Uptake (NRU) in Vitro Phototoxicity Test Methods). A photo-irritation factor (PIF) was calculated. A PIF of 1 was calculated for the trade name mixture, and was interpreted as a prediction of no phototoxicity.

## **OCULAR IRRITATION STUDIES**

Data on the ocular irritation potential of *Scutellaria baicalensis*-derived ingredients reviewed in this safety assessment were neither found in the published literature, nor were these data submitted.

## CLINICAL STUDIES

### Case Report

#### Scutellaria Baicalensis Extract

A normal female developed facial eczema after using a resveratrol skin cream containing Scutellaria Baicalensis Extract (concentration not stated) for several weeks.<sup>32</sup> Repeated open application testing of the product twice daily on the antecubital flexures yielded a positive reaction within 2 days. Patch testing of the undiluted cream yielded a 1+ reaction on days 1 and 2. In other patch tests 0.5% aqueous Scutellaria Baicalensis Extract yielded a 1+ reaction on days 2 and 3, and weaker 1+ reactions to resveratrol (1% in petrolatum) on days 2 and 3 were also observed. Positive reactions were not observed when 15 control patients were patch tested with Scutellaria Baicalensis Extract or resveratrol. The case authors concluded that the patient was sensitized to Scutellaria Baicalensis Extract, with possible co-sensitization to resveratrol.

Another case report involves a male lupus patient with facial eczema who had applied a sunscreen containing Scutellaria Baicalensis Extract several times per day while on a 10-day vacation and afterwards.<sup>33</sup> The eczema occurred only after he returned home and he noted that the more the sunscreen was applied, the eczema became progressively worse. The results of a photopatch test on the sunscreen product were positive at the irradiated site (+ reaction) and non-irradiated site (+++) on day 2. Subsequent photopatch tests on ingredients of the sunscreen product yielded a positive reaction on only one of the ingredients, Scutellaria Baicalensis Extract. This ingredient was tested at a concentration of 0.2% in 50/50 water/alcohol, and a ++ reaction was observed at the non-irradiated site on day 2. A reaction at the irradiated site was not observed.

#### Scutellaria Baicalensis Root Extract

A female non-atopic patient had a 2-year history of pruritic, erythematous scaly plaques involving both eyelids and periorbital skin.<sup>34</sup> The patient was patch tested, according to European Society of Cosmetic Dermatitis guidelines, with a sunscreen containing Scutellaria Baicalensis Root Extract that was being used. Reactions were scored on days 2, 4, and 7. Positive reactions to the sunscreen (-/+ /++) and 0.2% 50/50 Scutellaria Baicalensis Root Extract (?+ /++) were reported.

In a second case report, a female patient with a history of mild atopic dermatitis (antecubital flexures and face) presented with facial eczema that she had experienced for 1 year.<sup>35</sup> She had slowly developed recalcitrant facial eczema, and, during the 1-year period, a retinoic acid-containing cream and sunscreens had been applied to treat both the acne and solar brown spots. Both patch test and photopatch test results for one of the sunscreens (contained Scutellaria Baicalensis Root Extract) used were positive on day 2 (+ reaction) and day 3 (++) reaction). The reaction to the sunscreen was not photoaggravated, and was identical at ultraviolet (UV)-exposed and non-exposed sites. Furthermore, reaction to the sunscreen was confirmed by a positive repeated open application test result after 2 days of application. Patch and photopatch tests on ingredients of the sunscreen were also performed. In both tests, a positive reaction to Scutellaria Baicalensis Root Extract (0.2% aqueous/ethanol) was reported on day 2 (+ reaction) and day 3 (++) reaction), with no photoaggravation. The patch testing of 10 control subjects with Scutellaria Baicalensis Root Extract (0.2% aqueous/ethanol) yielded negative results.

### SUMMARY

The safety of the following 4 *Scutellaria baicalensis*-derived ingredients, as used in cosmetics, is reviewed in this safety assessment: Scutellaria Baicalensis Extract, Scutellaria Baicalensis Root Extract, Scutellaria Baicalensis Root Powder, and Scutellaria Baicalensis Sprout Extract. These ingredients, collectively, have the following functions in cosmetics, although none of the ingredients has the same reported functions: antimicrobial agent, skin conditioning agent, abrasive, fragrance ingredient, skin protectant, and antioxidant.

Method of manufacture data on Scutellaria Baicalensis Root Extract (root extracted with ethanol, butylene glycol extract, or water) were received from the Council. The extractants used in 2 methods of manufacture are 90% ethanol (one method) and 30% ethanol (another method). In both methods, the starting material is dried raw material (root) that is extracted, subsequently concentrated, and then filtered prior to packaging. The only real difference between these 2 methods is the addition of squalene after the concentration step in the method involving extraction with 30% ethanol. The same methodology is used when butylene glycol (50% 1,3-butylene glycolic solution) is the extractant; squalene is not added. Regarding the method of manufacture of Scutellaria Baicalensis Root Extract (aqueous extract), the starting botanical raw material (root) is extracted and then concentrated and spray-dried.

A Scutellaria Baicalensis Root Extract trade name mixture (30% ethanol extract) contains flavonoid compounds. Another Scutellaria Baicalensis Root Extract trade name mixture (90% ethanol and butylene glycol extracts) contains tannin and flavonoid compounds. A Scutellaria Baicalensis Root Extract trade name mixture (90% ethanol and butylene glycol extracts) is reported to contain not more than 20 ppm heavy metals and not more than 2 ppm arsenic. Phytochemical analyses have detected and quantified the flavonoids baicalin, baicalein, scutellarin, wogonin, and the human neurohormones, melatonin and serotonin, in leaf and stem tissues from *Scutellaria baicalensis*. Additionally, a *Scutellaria baicalensis* root (dried root) contains a variety of flavones, phenylethanoids, amino acids, sterols, and essential oils.

According to 2020 VCRP data, Scutellaria Baicalensis Root Extract is reported to be used in 514 cosmetic products (419 leave-on products, 95 rinse-off products). Of the *Scutellaria baicalensis*-derived ingredients reviewed in this safety

assessment, this is the greatest reported use frequency. The results of concentration of use surveys conducted by the Council in 2018 and 2019 indicate that the maximum leave-on use concentration in this ingredient group is 0.5% Scutellaria Baicalensis Root Extract is in moisturizing products (not spray). According to VCRP and Council survey data, Scutellaria Baicalensis Root Powder is not currently in use in cosmetic products.

*Scutellaria baicalensis* Georgi is one of the 50 fundamental herbs of traditional Chinese medicine.

After a *Scutellaria baicalensis* extract (ethanol extract) was administered orally to rats, the tissue distribution and excretion (in urine and feces) of 2 major flavone constituents was reported. A *Scutellaria baicalensis* root extract (aqueous extract) was also administered orally to rats. After dosing, components of the extract, as well as their metabolites, were detected in the urine, feces, or bile: sulfate and glucuronide conjugates and hydroxylated, methylated, acetylated, and deoxygenated products. When a *Scutellaria baicalensis* root extract (suspended in an aqueous carboxymethyl cellulose sodium salt solution) was administered orally to rats, the 6 major flavonoid components detected in the plasma were rapidly absorbed. A human study was performed to investigate the urinary pharmacokinetics of flavone constituents of a commercial *Scutellaria baicalensis* root powder. The renal excretion of sulfate and glucuronide conjugates was reported.

The teratogenicity of a *Scutellaria baicalensis* root extract (aqueous extract) was evaluated using groups of 30 pregnant Sprague-Dawley female rats. The test substance was administered by gavage to 3 groups, at doses of 0.25, 12.49, and 24.98 g/kg/day, on gestation days 7 to 17. A statistically significant ( $p < 0.05$ ), dose-dependent increase in the incidence of skeletal variations (presence of lumbar ribs) was observed. A dose-dependent increase in the frequency of dilatation of the ureter was also reported. In another study, the effect of a *Scutellaria baicalensis* root extract (aqueous extract) on embryonic development was studied using groups of 18 pregnant ICR mice that received oral doses of 2, 8, or 32 g/kg/day on gestation days 6 to 15. Oral administration of a *Scutellaria baicalensis* root extract (aqueous extract) at or below a dose of 32 g/kg/day during organogenesis did not cause statistically significant fetal external or skeletal malformations. A *Scutellaria baicalensis* root extract (aqueous extract) was also administered orally to 20 pregnant rats. The aqueous extract, in saline (15 g in 750 mL), was administered slowly (186 mg/kg body weight) from day 7 to day 17 of gestation. Fetal lumbar rib incidence was increased on gestational day 20, and then decreased on postnatal day 50. The results of this study suggest that the appearance of lumbar rib is a transient fetal variation rather than teratogenicity or maternal toxicity.

The genotoxicity of a trade name mixture containing 33.33% Scutellaria Baicalensis Root Extract (aqueous extract) was evaluated in the Ames test using the following *S. typhimurium* strains with and without metabolic activation: TA97a, TA98, TA100, TA102, and TA1535. Doses up to 5 µl/dish were tested, and results were classified as negative in all strains tested. The genotoxicity of a *Scutellaria baicalensis* root extract (methanol extract and aqueous extract, 0.1 mL) was also evaluated in the Ames test using *S. typhimurium* strains TA98 and TA 100 with and without metabolic activation. Results for the aqueous extract were positive in strain TA100 with, but not without, metabolic activation. All strain TA98 results for the aqueous extract were negative. Results were negative for the methanol extract, with or without metabolic activation, in both bacterial strains.

The genotoxicity of a *Scutellaria baicalensis* root extract (methanol extract and aqueous extract, 100 mg/mL (60 µl)) was evaluated in the *B. subtilis* rec-assay using strains H17 Rec<sup>+</sup> and M45 Rec<sup>-</sup> without metabolic activation. Results for the methanol extract and aqueous extract were positive and negative, respectively.

A *Scutellaria baicalensis* root extract (ethanol extract) had a strong inhibitory effect on melanogenesis in B16F10 melanoma cells. Incubation with a *Scutellaria baicalensis* root extract (ethanol extract) for 24 h resulted in a statistically significant ( $p < 0.01$ ) decrease in melanin levels in a dose-dependent manner at concentrations between 35 µg/mL and 70 µg/mL.

In a study evaluating the antiallergic effects of a *Scutellaria baicalensis* extract (ethanol extract), groups of 6 Sprague-Dawley (SD) rats included rats sensitized with anti-DNP IgE and rats sensitized with anti-DNP IgE and treated with a *Scutellaria baicalensis* extract (28 mg/100 g body weight). Treatment with a *Scutellaria baicalensis* extract inhibited the passive cutaneous anaphylaxis reaction, when compared to the control group. In a study involving groups of 5 female BALB/c mice, a topically applied *Scutellaria baicalensis* root extract (aqueous extract, 0.1%) attenuated the epidermal thickness and mast cell infiltration into the skin in DNCB-induced contact dermatitis.

A *Scutellaria baicalensis* root extract (aqueous extract, 100 and 200 µg/mL) induced apoptosis in peripheral blood leukocytes from leukemia patients, but not from healthy controls. The cytotoxicity of a *Scutellaria baicalensis* root extract (aqueous ethanol extract) was evaluated using HaCaT human keratinocytes. The extract was nontoxic at concentrations up to 30 µg/mL, but statistically significant ( $p < 0.05$ ) cytotoxicity was observed at concentrations of 100 µg/mL and 1000 µg/mL.

A *Scutellaria baicalensis* root extract (ethanol extract) was assayed for estrogenic activity in vitro using a recombinant yeast system with both a human estrogen receptor expression plasmid and a reporter plasmid. The extract was classified as negative for estrogenic activity at concentrations between 0.1 and 1000 µg/mL.

A *Scutellaria baicalensis* root extract (aqueous extract) (comprised in part of baicalin (6.45%), wogonoside (3.37%), baicalein (2.07%), and wogonin (0.48%)) was classified as a non-irritant in 6 rabbits. This test substance was also classified as a non-sensitizer in a test involving 10 guinea pigs.

The skin sensitization potential of an undiluted leave-on product containing 0.001% *Scutellaria Baicalensis* Root Extract was evaluated in an HRIPT involving 220 subjects. The product (0.2 g, under semi-occlusive patch) was applied (24 h) repeatedly to the skin. A low-level reaction was observed in 3 subjects during induction and in 1 subject during challenge. The authors commented that the product did not induce dermal sensitization in any of the subjects tested. A 10% *Scutellaria Baicalensis* trade name mixture (butylene glycol extract) was not an irritant in a patch test involving 12 subjects and was not a sensitizer in an HRIPT (dose per cm<sup>2</sup> not stated) involving 49 subjects. In another HRIPT involving 54 subjects patch tested with an undiluted *Scutellaria Baicalensis* trade name mixture (30% ethanol extract; dose per cm<sup>2</sup> not stated), test results were also negative for skin sensitization.

The phototoxicity of a trade name mixture containing 33.33% *Scutellaria Baicalensis* Root Extract (aqueous extract) was evaluated in the 3T3 neutral red uptake in vitro phototoxicity assay. The maximum test concentration of the trade name mixture was 1000 µg/ml. A PIF of 1 was calculated for the trade name mixture, and was interpreted as a prediction of no phototoxicity.

Skin sensitization was observed in a patient after patch testing with 0.5% aqueous *Scutellaria Baicalensis* Extract. The individual developed facial eczema after using a product that contained the extract. The extract is an ingredient of a skin cream that had been used over a period of several weeks. Positive reactions were not observed when 15 control patients were patch tested with *Scutellaria Baicalensis* Extract. Another eczema patient photo-patch tested with 0.2% *Scutellaria baicalensis* Extract (in 50/50 water/alcohol) had a positive reaction at the non-irradiated site and no reaction at the irradiated site. A patient with pruritic erythematous plaques was patch tested with 0.2% *Scutellaria Baicalensis* Root Extract (in 50/50 water/alcohol). Reactions classified as ?+, +, and ++ were observed on days 2, 4, and 7, respectively. In another case report, an eczema patient was patch tested and photo-patch tested with *Scutellaria Baicalensis* Root Extract (0.2% aqueous/ethanol). In both tests, a positive reaction was reported on day 2 (+ reaction) and day 3 (++ reaction). The patch testing of 10 control subjects in this case report yielded negative results.

### **DRAFT DISCUSSION**

*[Please note, this discussion is in draft form and will most likely be modified following the meeting.]*

The Panel initially expressed concern over the increased incidence or a statistically significant, dose-dependent increase in the incidence of skeletal variations (presence of lumbar ribs) in developmental and reproductive toxicity studies on *Scutellaria baicalensis* root extract (aqueous extract) involving Sprague-Dawley rats. However, after further review of the data, the Panel agreed that the study results suggest that the appearance of lumbar ribs induced by the test material was a transient fetal variation rather than teratogenicity or maternal toxicity.

The genotoxicity of *Scutellaria baicalensis* root extracts (methanol extract and aqueous extract) was evaluated in the *Bacillus subtilis* rec-assay using strains H17 Rec<sup>+</sup> and M45 Rec<sup>-</sup> without metabolic activation. Results were positive for the methanol extract and negative for the aqueous extract. However, in Ames tests, results were positive for the aqueous extract and negative for the methanol extract. The Panel noted that, given these mixed results, a repeat of these assays and the addition of another assay (mammalian system) would be needed in order to develop a weight of evidence approach for evaluating the genotoxicity of *Scutellaria baicalensis* root extract.

In in vitro experiments involving B16F10 mouse melanoma cell cultures, *Scutellaria baicalensis* root extract (both the ethanol extract and methanol extract) had an inhibitory effect on melanogenesis. However, in other experiments involving *Scutellaria baicalensis* root extract obtained using other extractants (n-hexane, ethyl acetate, and water), an inhibitory effect on melanogenesis in B16F10 mouse melanoma cells was not observed. Given these findings, the Panel noted that if an effect on melanogenesis is observed in a cell culture system only, then a no-effect-level from an in vivo experiment would be needed to determine whether or not *Scutellaria baicalensis* root extract has any effect on melanogenesis.

After considering that *Scutellaria Baicalensis* Root Extract is being used in suntan products and the in vitro data on the potential inhibitory effect of *Scutellaria baicalensis* root extract on melanogenesis, the Panel noted that phototoxicity data on *Scutellaria Baicalensis* Root Extract and other *Scutellaria baicalensis*-derived ingredients may be needed.

The Panel also expressed concern about pesticide residues, heavy metals, and other plant species that may be present in botanical ingredients. They stressed that the cosmetics industry should continue to use current good manufacturing practices (cGMPs) to limit impurities.

At the conclusion of the Panel's discussion at the September 2019 Panel meeting, an Insufficient Data Announcement with the following data requests on *Scutellaria baicalensis*-derived ingredients was issued:

Scutellaria Baicalensis Extract

Scutellaria Baicalensis Root Powder

Scutellaria Baicalensis Root Extract

Scutellaria Baicalensis Sprout Extract

- Genotoxicity (in vitro and mammalian); for ingredient extracts, methanol and aqueous extracts should be tested
- Phototoxicity

#### Scutellaria Baicalensis Root Extract and Scutellaria Baicalensis Root Powder

- An NOAEL for skin pigmentation and anti-inflammatory effects, including the suppression of delayed contact hypersensitivity, is needed

#### Scutellaria Baicalensis Extract

- Skin irritation and sensitization
- 28-day dermal toxicity; if dermal absorption occurs, additional data may be needed

#### Scutellaria Baicalensis Sprout Extract

- Method of Manufacture
- Composition
- Impurities
- Dermal absorption; if dermal absorption occurs, additional data may be needed
- Skin irritation and sensitization

The following data were received from the Personal Care Products Council in response to these data requests: (1) method of manufacture of Scutellaria Baicalensis Root Extract (aqueous extract), (2) in vitro genotoxicity data on a trade name mixture containing 33.33% Scutellaria Baicalensis Root Extract (aqueous extract), (3) in vitro phototoxicity data on a trade name mixture containing 33.33% Scutellaria Baicalensis Root Extract (aqueous extract), and (4) an HRIPT on a leave-on product containing 0.001% Scutellaria Baicalensis Root Extract.

#### CONCLUSION

To be determined.

**TABLES****Table 1.** Definitions and functions of the ingredients in this safety assessment.<sup>1</sup>

<b>Ingredient CAS No.</b>	<b>Definition</b>	<b>Function(s)</b>
Scutellaria Baicalensis Extract 94279-99-9	Scutellaria Baicalensis Extract is the extract of the whole plant, <i>Scutellaria baicalensis</i> .	Antimicrobial Agents
Scutellaria Baicalensis Root Extract 94279-99-9	Scutellaria Baicalensis Root Extract is the extract of the roots of <i>Scutellaria baicalensis</i> .	Skin-Conditioning Agents – Humectant
Scutellaria Baicalensis Root Powder 94279-99-9	Scutellaria Baicalensis Root Powder is the powder obtained from the dried, ground roots of <i>Scutellaria baicalensis</i> .	Abrasives; Fragrance Ingredients; Skin Protectants
Scutellaria Baicalensis Sprout Extract 94279-99-9	Scutellaria Baicalensis Sprout Extract is the extract of the sprouts of <i>Scutellaria baicalensis</i> .	Antioxidants

**Table 2. Components of Scutellaria Baicalensis Extract (ethanol extract).<sup>10</sup>**

5,7,6'-trihydroxyflavone 2'-O-β-D-glucopyranoside
(2R,3R)-3,5,7,2',6'-pentahydroxyflavanone
3,5,7,2',6'-pentahydroxyflavone
Viscidulin III 6-O-β-D-glucopyranoside
Chrysin 6-C-α-L-arabinopyranoside-8-C-β-D-glucopyranoside
Acteoside
5,6'-dihydroxy-7,8-dimethoxyflavone 2'-O-β-D-glucopyranoside
Chrysin 6-C-β-D-glucopyranoside-8-C-α-L-arabinopyranoside
Chrysin 8-C-β-D-glucopyranoside
5,2'-dihydroxy-6-methoxyflavone 7-O-β-D-glucuronopyranoside
(2S)-5,7,2',6'-tetrahydroxyflavanone
Baicalin
Baicalein 7-O-β-D-glucopyranoside
Norwogonin 7-O-β-D-glucuronopyranoside
Wogonin 5-O-β-D-glucopyranoside
Cistanoside D
Chrysin 7-O-β-D-glucuronopyranoside
Oroxylin A 7-O-β-D-glucuronopyranoside
Oroxylin A 7-O-β-D-glucopyranoside
Wogonoside
5,7,6'-trihydroxy-8,2'-dimethoxyflavone
Baicalein
Wogonin
Chrysin
5,6'-dihydroxy-6,7,8,2'-tetramethoxyflavone
Oroxylin A
(2S)-5,7,6'-trihydroxyflavanone 2'-O-β-D-glucopyranoside
(2S)-5-hydroxy-6-methoxyflavanone 7-O-β-D-glucuronopyranoside
Aschrysin 6-C-β-L-arabinopyranosyl-8-C-β-D-glucopyranoside
Chrysin 6-C-β-D-glucopyranosyl-8-C-β-L-arabinopyranoside



**Table 3.** Frequency (2020) and Concentration (2018-2019) of Use According to Duration and Type of Exposure.<sup>14-16</sup>

	<b>Scutellaria Baicalensis Extract</b>		<b>Scutellaria Baicalensis Root Extract</b>		<b>Scutellaria Baicalensis Sprout Extract</b>	
	# of Uses	Conc. (%)	# of Uses	Conc. (%)	# of Uses	Conc. (%)
<b>Totals*/Conc. Range</b>	<b>109</b>	<b>0.000027-0.03</b>	<b>514</b>	<b>0.00001-0.5</b>	<b>NR</b>	<b>0.0002-0.0005</b>
<b>Duration of Use</b>						
<i>Leave-On</i>	93	0.000027-0.03	419	0.0002-0.5	NR	0.00025-0.0005
<i>Rinse off</i>	16	NR	95	0.00001-0.002	NR	0.0002
<i>Diluted for (bath) Use</i>	NR	NR	NR	NR	NR	NR
<b>Exposure Type</b>						
Eye Area	9	NR	30	0.07	NR	NR
Incidental Ingestion	NR	NR	1	0.0045	NR	NR
Incidental Inhalation- Sprays	32 <sup>a</sup> ;31 <sup>b</sup>	0.03 <sup>a</sup>	163 <sup>a</sup> ;151 <sup>b</sup>	0.002 <sup>a</sup>	NR	NR
Incidental Inhalation- Powders	31 <sup>b</sup>	NR	151 <sup>b</sup> ;8 <sup>c</sup>	0.0002-0.35 <sup>c</sup>	NR	0.00025-0.0005 <sup>c</sup>
Dermal Contact	106	0.000027	473	0.00001-0.5	NR	0.0002-0.0005
Deodorant (underarm)	NR	NR	2 <sup>a</sup>	NR	NR	NR
Hair - Non-Coloring	1	0.03	25	0.002	NR	NR
Hair-Coloring	NR	NR	NR	NR	NR	NR
Nail	NR	NR	NR	NR	NR	NR
Mucous Membrane	2	NR	15	0.0002-0.0045	NR	0.0002
Baby Products	3	NR	10	NR	NR	NR

NR = Not Reported

\*Because each ingredient may be used in cosmetics with multiple exposure types, the sum of all exposure types may not equal the sum of total uses.

<sup>a</sup>It is possible that these products may be sprays, but it is not specified whether the reported uses are sprays<sup>b</sup>Not specified these products are sprays or powders, but it is possible the use can be as a spray or powder, therefore the information is captured in both categories<sup>c</sup>It is possible that these products may be powders, but it is not specified whether the reported uses are powders**Table 4.** *Scutellaria baicalensis* root extract Metabolites in the Rat.<sup>8</sup>

<b>Metabolite Type*</b>	<b>Formula</b>	<b>Source</b>	<b>Parent Compound**</b>
glucuronide conjugation	C <sub>27</sub> H <sub>26</sub> O <sub>17</sub>	urine and bile	baicalin
glucuronide conjugation	C <sub>22</sub> H <sub>28</sub> O <sub>17</sub>	urine and bile	wogonoside
hydroxylation + sulfation	C <sub>16</sub> H <sub>12</sub> O <sub>9</sub> S	urine	wogonin
sulfate conjugation	C <sub>15</sub> H <sub>10</sub> O <sub>8</sub> S	urine	baicalein
sulfate conjugation	C <sub>16</sub> H <sub>12</sub> O <sub>8</sub> S	urine	wogonin
2 x hydroxylation	C <sub>22</sub> H <sub>26</sub> O <sub>19</sub>	urine	wogonoside
loss of oxygen	C <sub>21</sub> H <sub>18</sub> O <sub>10</sub>	urine	baicalin
2 x hydroxylation	C <sub>15</sub> H <sub>10</sub> O <sub>7</sub>	urine and feces	baicalein
acetylation	C <sub>24</sub> H <sub>22</sub> O <sub>12</sub>	urine	wogonoside
reduction	C <sub>16</sub> H <sub>14</sub> O <sub>5</sub>	urine	wogonin
hydroxylation + methylation	C <sub>22</sub> H <sub>20</sub> O <sub>12</sub>	urine	baicalin
loss of oxygen	C <sub>15</sub> H <sub>10</sub> O <sub>4</sub>	urine and feces	baicalein
hydroxylation	C <sub>16</sub> H <sub>12</sub> O <sub>6</sub>	feces	wogonin
deglycuronide	C <sub>15</sub> H <sub>10</sub> O <sub>5</sub>	feces	baicalin
deglycuronide	C <sub>16</sub> H <sub>20</sub> O <sub>5</sub>	feces	wogonoside

\*Metabolite of parent compound

\*\*Component of *Scutellaria baicalensis* root

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**2020 FDA VCRP Data****Scutellaria Baicalensis Extract**

1A-Baby Shampoos	1
1C-Other Baby Products	2
3D-Eye Lotion	5
3G-Other Eye Makeup Preparations	4
7C-Foundations	1
7F-Makeup Bases	1
7I-Other Makeup Preparations	1
10E-Other Personal Cleanliness Products	2
12A-Cleansing	9
12C-Face and Neck (exc shave)	31
12D-Body and Hand (exc shave)	10
12F-Moisturizing	25
12G-Night	3
12H-Paste Masks (mud packs)	4
12I-Skin Fresheners	1
12J-Other Skin Care Preps	6
13A-Suntan Gels, Creams, and Liquids	3
<b>Total</b>	<b>109</b>

**Scutellaria Baicalensis Root Extract**

1B-Baby Lotions, Oils, Powders, and Creams	8
1C-Other Baby Products	2
3A-Eyebrow Pencil	1
3B-Eyeliners	2
3D-Eye Lotion	13
3E-Eye Makeup Remover	1
3G-Other Eye Makeup Preparations	13
5A-Hair Conditioner	3
5E-Rinses (non-coloring)	3
5F-Shampoos (non-coloring)	9
5G-Tonics, Dressings, and Other Hair Grooming Aids	7
5I-Other Hair Preparations	3
7B-Face Powders	2
7C-Foundations	11
7F-Makeup Bases	3
7I-Other Makeup Preparations	6
9A-Dentifrices	1
10A-Bath Soaps and Detergents	4
10B-Deodorants (underarm)	2
10C-Douches	2
10E-Other Personal Cleanliness Products	8
11A-Aftershave Lotion	2
11E-Shaving Cream	1
12A-Cleansing	41
12C-Face and Neck (exc shave)	114

12D-Body and Hand (exc shave)	18
12F-Moisturizing	133
12G-Night	15
12H-Paste Masks (mud packs)	22
12I-Skin Fresheners	7
12J-Other Skin Care Preps	54
13A-Suntan Gels, Creams, and Liquids	1
13B-Indoor Tanning Preparations	2
<b>Total</b>	<b>514</b>

**Scutellaria Baicalensis Root Powder - No FDA Data**

**Scutellaria Baicalensis Sprout Extract - No FDA Data**



**Memorandum**

**TO:** Bart Heldreth, Ph.D.  
Executive Director - Cosmetic Ingredient Review (CIR)

**FROM:** Carol Eisenmann, Ph.D.  
Personal Care Products Council

**DATE:** November 19, 2019

**SUBJECT:** Scutellaria Baicalensis Root Extract

Anonymous. 2019. Summary of an HRIPT (product contains 0.001% Scutellaria Baicalensis Root Extract).

Nov 2019

Product Number	% Source/aria Bark/Amnits Root Extract	Product Type	HRIPT Test Year/No	Occlusivity	Complete if S subjects	Did formula induce an allergic response	Number of Subjects Exhibiting Low Level Reaction During Induction	Number of Subjects Exhibiting High Level Reaction During Induction	Number of Subjects Exhibiting Low Level Reaction During Challenge	Number of Subjects Exhibiting High Level Reaction During Challenge	pass/fail comments
1	0.001	LEAVE ON	YES	SEMI-OCCLUSIVE	220	NO	3	0	1	0	PASS Did not induce dermal sensitization in any of the human subjects tested.

Product 1

ICDRG Reading Scale	Degree
No Visible Reaction	0
Faint, Minimal Erythema	1
Erythema	1
Intense Erythema	2
Intense Erythema, Induration, Vesicles	3
Severe reaction with erythema, induration, Vesicles, Pustules (May be weeping)	4
Edema	5
No 5th reading	N9R
No reading	

Details of Test Methodology and Results	
0	panelist discontinued due to reactions
24 hrs	patch duration
9	induction patches
3	weeks induction
2	week rest period
virgin site	challenge patch
24 hrs, 48 hrs, 72 hrs, 96 hrs	challenge readings
0.7gms	Amount of product applied
	Test Material Concentration/Dilution
	As is/Next

Grading Scale Interpretation	
Low Level Reactions	0 or 1
High Level Reaction	2 and above



**Memorandum**

**TO:** Bart Heldreth, Ph.D.  
Executive Director - Cosmetic Ingredient Review (CIR)

**FROM:** Carol Eisenmann, Ph.D.  
Personal Care Products Council

**DATE:** January 6, 2020

**SUBJECT:** Scutellaria Baicalensis Root Extract

Anonymous. 2020. Summary information Scutellaria Bacalensis Root Extract (Ames assay and phototoxicity assay).



January 2020

### Summary Information *Scutellaria Baicalensis* Root Extract (CAS 94279-99-9)

A trade name mixture contains 33.33% *Scutellaria Baicalensis* Root Extract. This extract is an aqueous extract manufactured using the following steps:

Botanical Raw Material → Cut and Clean → Water Extraction → Concentration Phase → Spray Dry

#### 1. Genotoxicity/Mutagenicity:

An *in vitro* "Bacterial reverse mutation assay/ Ames test", *S. typhimurium* (TA97a, TA98, TA100 TA102 and TA1535) with and without an exogenous metabolic activation system according to: OECD Guideline for Testing Chemicals: Bacteria reverse mutation test 471 was completed on the trade name mixture containing 33.33% *Scutellaria Baicalensis* Root Extract.

#### Abstract:

The purpose of this experiment was to evaluate the induction of histidine-deficient *Salmonella* (TA97a, TA98, TA100 TA102 and TA1535) by the trade name mixture with and without an exogenous metabolic activation system (Aroclor 1254-induced rat liver S9).

Tests were performed with or without the addition of the S9 mixture and a corresponding negative/solvent control was also set. The doses tested in this AMES trial were 5, 2.5, 1.25 and 0.625 µl/dish.

The trade name mixture did not show significant cytotoxicity in all tested strains (TA97a, TA98, TA100, TA102, and TA1535) with or without S9 mixture.

In presence of the trade name mixture, with or without S9 mixture at the tested doses (5, 2.5, 1.25 and 0.625 µl/dish), the average number of revertant colonies induced was not greater than or equal to the corresponding negative/solvent control 2 times the group mean (for TA97a, TA98, TA100 and TA102), or 3 times (for TA1535). It also showed no concentration-dependent increase.

Conclusion: The bacterial back mutation test (Ames) was effective and the trade name mixture was negative in this test. The conclusion is = Not mutagenic

#### 2. Phototoxicity :

An *in vitro* "3T3 Neutral Red Uptake" according to: People's Republic of China Standard GB/T 21769-2008 "Chemicals, 3T3 Neutral Red Uptake (NRU) *in vitro* phototoxicity Testing Method", equivalent to OECD Guideline for Testing of Chemicals - In Vitro 3T3 NRU phototoxicity test was completed on the trade name mixture containing 33.33% *Scutellaria Baicalensis* Root Extract.

#### Abstract:

For Balb/c 3T3 cells, cultured with DMEM (Dulbecco's Modified Eagle's Medium) supplemented with 10% new-born calf serum, incubate at 37°C and 5% CO<sub>2</sub> and humidified condition. Collect cell density and dispense 100 µl of medium in 96-well plates to make cell density at 1×10<sup>4</sup> cells per well.

After incubate in the incubator, randomly choose one of the 96-well plates to perform the determination of cytotoxicity(-Irr), this is control plate. Randomly choose another one to test for photo cytotoxicity(+Irr), this is the treatment plate.

Use the non-treated cells as negative control (NC). Use different concentrations of chlorpromazine hydrochloride to have positive control, every set of samples should have 3 duplicates. The maximum concentration of the trade name material tested was 1000 µg/ml.

Use cell concentration as x-axis and cell viability as y-axis, appropriate continuous dose-response curve(model) and reference to the European union instructions EU 67/548/EEC Appendix VB.41 "3T3 Neutral Red Uptake (NRU) in Vitro Phototoxicity Test Methods". A Photo-irritation-factor (PIF) is calculated.

Result: PIF=\*1" predicts: "no phototoxicity"

Conclusion: No phototoxicity



## Memorandum

**TO:** Bart Heldreth, Ph.D.  
Executive Director - Cosmetic Ingredient Review (CIR)

**FROM:** Alexandra Kowcz, MS, MBA  
Industry Liaison to the CIR Expert Panel

**DATE:** September 11, 2019

**SUBJECT:** Draft Report: Safety Assessment of *Scutellaria baicalensis*-Derived Ingredients as Used in Cosmetics (draft prepared for the September 16-17, 2019 CIR Expert Panel meeting)

The Personal Care Products Council respectfully submits the following comments on the draft report, Safety Assessment of *Scutellaria baicalensis*-Derived Ingredients as Used in Cosmetics.

Chemistry, Definition - It would be helpful to include a reference for the plant part definitions.  
Composition, *Scutellaria Baicalensis* Extract - The title of reference 5 indicates that this was an aqueous extract. This should be stated in the text.

ADME, Animal, Oral, *Scutellaria Baicalensis* Extract - The title of reference 17 suggests that the kinetics of components of a *Scutellaria Baicalensis* Extract were also examined when it was co-administered with *Acacia catechu*. Was there a difference when the preparations of the two plants were given together?

ADME, Animal, Oral, *Scutellaria Baicalensis* Root Extract - What is "andoroxylin A"? Table 2 includes "Oroxylin A" and oroxylin A is mentioned in the beginning of the paragraph that includes "andoroxylin A"; should "andoroxylin A" be "oroxylin A"?

Effect on Melanogenesis - As several different extracts are discussed in this paragraph, it is not clear what is meant by "this *Scutellaria baicalensis* root extract". It is presented after a sentence on the ethyl acetate extract, but appears to be describing effects similar to the methanol extract.

Summary - In the description of the method of manufacture, it should be stated that the dried raw material is extracted before the extract is concentrated, filtered and packaged.