Clinical Use of Calcium Bentonite Clay (CBC) in Dentistry and Natural Medicine

Received……..……01/20/16 Scientific Review ……05/10/16 IAOMT Board Review …...…… Re evaluation	Biological Support	Approval Provisional Approval **No Opinion……..…….6/22/16** No Approval

Explanation of IAOMT position:

The IAOMT does not currently have a position on the clinical use of calcium bentonite clay (CBC) in dentistry and natural medicine.

Name of SOC/SR:

Clinical Application of Calcium Bentonite Clay (CBC) in Dentistry and Natural Medicine

Alternative name(s) of SOC/SR: NA

What is this SOC/SR related to:

The purpose of this scientific review is to provide guidance for dentists, physicians and other health care providers for the rational scientific clinical application of calcium bentonite clay. As new research is available, the Scientific Review may be changed.

Is this SOC/SR a:

Review of scientific research about calcium bentonite clay (CBC)

Do you have a vested financial interest in any part of this SOC/SR?

Yes, I am the president and founder of DermaClay, LLC. DermaClay sells clay products worldwide to customers for their own personal health care use and to healthcare practitioners who use clay for detoxification and broad-spectrum antibacterial effects on their patients. See more at www.dermaclay.com

Purpose of the SOC/SR:

The purpose of this paper is to analyze the science about the clinical use of calcium bentonite clay (CBC) in dentistry and natural medicine

SR History:

The IAOMT currently has only one SR on clay. I wrote this SR in 2009, and the title is "Biological Support of Clay Use as a Strong Broad-Spectrum Antibacterial (De-bugging) Agent and Detoxification Vehicle." While this 2016 SR serves as an update to the 2009 SR, this 2016 SR also explores other areas that were not covered in the 2009 SR.

Briefly describe the SR:

I. Introduction
- A. Medical Geology is a field of science that studies the relationship of geological environments and health.
- B. Types of Clay: Bentonites are considered smectites.
- C. Uses for Clay and Minerals in General
- D. History and Culture
  1. There is a lengthy human history of utilizing minerals for medicine.
  2. Geophagy (consumption of the earth) also has a long history.
  3. Research about Culture of Geophagy (eating of the earth)

II. Uses of CBC (or smectites in general)
- A. Aflatoxins are a group of toxins created as byproducts of fungi on corn, peanuts, tree nuts, and other crops. Bentonite clay has been identified as potentially helpful in fighting aflatoxins.
- B. Other
  1. Treatment of certain rheumatic diseases
  2. Dermatological protectors
  3. Cosmetics
  4. Excipients
  5. Absorption of ultra-violet rays
  6. Spas
  7. Healthcare products
  8. Removal of parasites from water
  9. For barriers to prevent environmental pollution
  10. Paper and paperboard products used in food packaging

III. Safety: Like all minerals, however, CBC must be evaluated for its safety.
- A. General
- B. Drug interactions
- C. Allergies

D. Possibility of toxic contamination

<u>Specifically,</u> by outline if appropriate, describe the SR:

I. Introduction
- A. Medical Geology is a field of science that studies the relationship of geological environments and health.
  - "Medical geology is a multidisciplinary scientific field shared by specialists of distinct areas and scientific domains, such as earth sciences, environmental sciences, medicine, public health, biology, biochemistry, chemistry, pharmacy, nutrition, and others."
    - Celso de Sousa Figueiredo Gomes, João Baptista Pereira Silva, Minerals and clay minerals in medical geology, *Applied Clay Science* (2007), doi:10.1016/j.clay.2006.08.006.
- B. Types of Clay

  1. According to a review by Carretero and Pozo published in *Applied Clay Science* in 2011, minerals used in the pharmaceutical and cosmetic industries include: "oxides (rutile, periclase, zincite), carbonates (calcite, magnesite, hydrocincite, smithsonite), sulphates (epsomite, mirabilite, melanterite, chalcanthite, zincosite, goslarite, alum), chlorides (halite, sylvite), hydroxides (brucite, gibbsite, hydrotalcite), elements (sulphur), sulphides (greenockite), phosphates (hydroxyapatite), nitrates (niter), borates (borax) and phyllosilicates (smectite, palygorskite, sepiolite, kaolinite, talc, mica)."
     - Carretero MI, Pozo M. Clay and non-clay minerals in the pharmaceutical and cosmetic industries. Part II. Active ingredients. *Applied Clay Science.* 2010; 47: 171.

  2. Note that bentonites are considered smectites: "The term *bentonite*, which is still very frequent in the business world as well as different pharmacopoeias and cosmetic manuals, is used to designate any plastic, colloidal, swelling clay, basically consisting of a smectite, with

no regard for its origin."

- López-Galindo A, Viseras C, Cerezo P. Compositional, technical and safety specifications of clays to be used as pharmaceutical and cosmetic products. *Applied Clay Science*. 2007 Apr 30;36(1):51-63.

C. Uses for Clay and Minerals in General

1. According to a review by Carretero and Pozo published in *Applied Clay Science* in 2011, uses for clay and non-clay minerals include: "Such minerals may be administered either orally as antacids, gastrointestinal protectors, antidiarrhoeaics, osmotic oral laxatives, homeostatics, direct emetics, antianemics and mineral supplements, or parenterally as antianemics and homeostatics. They may also be used topically as antiseptics, disinfectants, dermatological protectors, anti-inflammatories, local anesthetics, keratolytic reducers and decongestive eye drops. In all cases the LADME process of the minerals is described. In the cosmetic industry minerals are used as solar protectors as well as in toothpastes, creams, powder and emulsions, bathroom salts and deodorants."

- Carretero MI, Pozo M. Clay and non-clay minerals in the pharmaceutical and cosmetic industries. Part II. Active ingredients. *Applied Clay Science.* 2010; 47: 171.

2. A review by Carretero published in *Applied Clay Science* in 2002 identified clay minerals in oral applications (gastrointestinal protectors, osmotic oral laxatives, and antidiarrhoeaics), topical applications (dermotological protectors and cosmetics), excipients, and spas.

- Carretero MI. Clay minerals and their beneficial effects upon human health. A review. *Applied Clay Science.* 2002; 21: 155-163.

D. History and Culture

1. There is a lengthy human history of utilizing minerals for medicine.
   a. It has been practiced since prehistory.
   b. *Homo erectus* and *H. Neanderthalensis* employed it to "cure wounds, soothe irritations, as a method of cleansing the skin, etc."
   c. It was also used in Mesopotamia and Ancient Egypt.
   d. It has been documented by Hippocrates, Aristotle, Dioscorides, and Pliny the Elder.

- All points above from Carretero MI. Clay minerals and their beneficial effects upon human health. A review. *Applied Clay Science.* 2002; 21: 155-163.

2. Geophagy (consumption of the earth) also has a long history.

a. Geophagy has been identified for its importance in human evolution.

- "A clay recovered from an archaeological site occupied by Homo erectus and early H. sapiens was indistinguishable mineralogically, in detoxification capacity and in available minerals, from clays used in Africa today. We suggest that the physiological significance of geophagy made it important in the evolution of human dietary behavior."
  - Johns T, Duquette M. Detoxification and mineral supplementation as functions of geophagy. *The American Journal of Clinical Nutrition.* 1991 Feb 1;53(2):448-56.

b. The domestication of the potato has been linked to geophagy.

- "Detoxification as the adaptive function of geophagy is demonstrated from field and historical data associating clay consumption with the domestication of potentially toxic potatoes…These results, in conjunction with reports of geophagy by nonhuman primates, suggest geophagy as a solution to the impasse chemical deterrents pose to the process of domestication and to chemical constraints on plant exploitation by non-fireusing hominids. The inorganic component of the chemical environment deserves increased attention from chemical ecologists."
  - Johns T. Detoxification function of geophagy and domestication of the potato. *Journal of Chemical Ecology*. 1986 Mar 1;12(3):635-46.

3. Research about Culture of Geophagy (eating of the earth)
   a. Researchers from Cornell created a database of over 480 cultural accounts of geophagy.

They found that the most plausible hypothesis for humans' act of eating earth was that "it protects the stomach against toxins, parasites, and pathogens."

- Press release from the University of Chicago Press Journals on June 2, 2011 [http://www.eurekalert.org/pub_releases/2011-06/uocp-edc060211.php] on the study: Sera L. Young, Paul W. Sherman, Julius Beau Lucks, Gretel H. Pelto, "Why on Earth?: Evaluating Hypotheses about the Physiological Functions of Human Geophagy." *The Quarterly Review of Biology* 86:2 (June 2011).

b. The same press release from the University of Chicago Press Journals elaborated of the research: "The database shows that geophagy is documented most commonly in women in the early stages of pregnancy and in pre-adolescent children. Both categories of people are especially sensitive to parasites and pathogens, according to Young and her colleagues. In addition, geophagy is most common in tropical climates where foodborne microbes are abundant. Finally, the database shows that people often eat earth during episodes of gastrointestinal stress."

- Press release from the University of Chicago Press Journals on June 2, 2011 [http://www.eurekalert.org/pub_releases/2011-06/uocp-edc060211.php] on the study: Sera L. Young, Paul W. Sherman, Julius Beau Lucks, Gretel H. Pelto, "Why on Earth?: Evaluating Hypotheses about the Physiological Functions of Human Geophagy." *The Quarterly Review of Biology* 86:2 (June 2011).

II. Uses of CBC (or smectites in general)

A. Aflatoxins are a group of toxins created as byproducts of fungi on corn, peanuts, tree nuts, and other crops. Bentonite clay has been identified as potentially helpful in fighting aflatoxins.

1. "Results have shown that NS clay [NovaSil clay] binds aflatoxins with high affinity and high capacity in the gastrointestinal tract, resulting in a notable reduction in the bioavailability of these toxins without interfering with the utilization of vitamins and other micronutrients…In summary, enterosorption strategies/therapies based on NS clay are promising for the management of aflatoxins and as a sustainable public health intervention. The NS clay remedy is novel, inexpensive and easily disseminated."

- Phillips TD, Afriyie-Gyawu E, Williams J, Huebner H, Ankrah NA, Ofori-Adjei D, Jolly P, Johnson N, Taylor J, Marroquin-Cardona A, Xu L. Reducing human exposure to aflatoxin through the use of clay: a review. *Food additives and contaminants*. 2008 Feb 1;25(2):134-45.

2. "Importantly, treatment with UPSN [refined calcium montmorillonite clay] resulted in significant protection to mycotoxin-exposed hydra maintained at pH 6.9-7.0…This study demonstrates that UPSN sorbs both mycotoxins tightly at physiologically relevant pH levels, resulting in decreased bioavailability, and that a modified hydra bioassay can be used as an initial screen in vivo to predict efficacy of toxin binding agents."

- Brown KA, Mays T, Romoser A, Marroquin-Cardona A, Mitchell NJ, Elmore SE, Phillips TD. Modified hydra bioassay to evaluate the toxicity of multiple mycotoxins and predict the detoxification efficacy of a clay-based sorbent. *Journal of Applied Toxicology*. 2014 Jan 1;34(1):40-8.

B. Other

1. Treatment of certain rheumatic diseases

- "A further product has been developed based on bentonite gel and an extract containing all relevant chemical elements present in the biogenic carbonate sand of Porto Santo. It can be topically applied as healing gel in the treatment of certain rheumatic diseases."
    - Celso de Sousa Figueiredo Gomes, João Baptista Pereira Silva, Minerals and clay minerals in medical geology, *Applied Clay Science* (2007), doi:10.1016/j.clay.2006.08.006

2. Dermotological protectors

- "Clay minerals used as dermatological protectors are kaolinite, talc and smectites which due to their absorbent power, are substances capable of adhering to the skin forming a film which protects it mechanically against external physical or chemical agents. …[This]

action is reinforced by these minerals' capacity to absorb dissolved and suspended substances, such as greases, toxins and even bacteria and viruses."

- Carretero MI. Clay minerals and their beneficial effects upon human health. A review. *Applied Clay Science*. 2002; 21: 157.

3. Cosmetics

- "Therefore, they are recommended for inflammatory processes such as boils, acne, ulcers, etc. They are also used in creams, powders, emulsions, etc., as antiperspirants and to give the skin opacity, remove shine and cover blemishes."
  - Carretero MI. Clay minerals and their beneficial effects upon human health. A review. *Applied Clay Science*. 2002; 21: 158.

4. Excipients

- Carretero MI. Clay minerals and their beneficial effects upon human health. A review. *Applied Clay Science*. 2002; 21: 158.

5. Absorption of ultra-violet rays

- "Sepiolite and smectites have the ability to form complexes with organic compounds which absorb ultra-violet radiation thus enabling them to be used in sun screens with protection factors (Del Hoyo et al., 1998; Vicente et al., 1989)."
  - Carretero MI. Clay minerals and their beneficial effects upon human health. A review. *Applied Clay Science*. 2002; 21: 159.

6. Spas

- A number of clays (bentonite, kaolin, illite–smectite) are used in spas and aesthetic centers for therapeutic purposes on the basis of their softness, small particle size, rheological properties, and their high capacity for water adsorption, cation exchange and heat-retention (Veniale, 1996; Cara et al., 2000; Veniale et al., 2004; Carretero et al., 2006; Veniale et al., 2007; Carretero and Pozo, 2007)."
  - Carretero MI, Pozo M. Clay and non-clay minerals in the pharmaceutical industry: Part I. Excipients and medical applications. *Applied Clay Science.* 2009 Sep 30;46(1):73-80.

7. Healthcare products

- Bentonite and purified bentonite are used in topical suspensions, lotions, and liquid make-up. Other forms of bentonite are used in anti-perspirants, lotions, suntan products, nail lacquers, and lip products.
  - Viseras C, Aguzzi C, Cerezo P, Lopez-Galindo A. Uses of clay minerals in semisolid health care and therapeutic products. *Applied Clay Science*. 2007 Apr 30;36(1):42.

8. Removal of parasites from water

- "Schistosoma mansoni cercariae were removed from clear and turbid water by flocculation with Sudanese bentonite clays, with Moringa oleifera seeds as well as with pure bentonite…Moringa seeds, pure bentonite and one type of bentonite clay were able to reduce the number of cercariae by more than 90%."
  - Olsen A. Low technology water purification by bentonite clay and Moringa oleifera seed flocculation as performed in Sudanese villages: effects on Schistosoma mansoni cercariae. *Water Research*. 1987 May 31;21(5):517-22.

9. For barriers to prevent environmental pollution

- "Current research aims to optimise the performance of bentonite-based barriers under the effects of coupled thermal, mechanical, hydraulic and chemical stresses, for a wide range of pollutants and over long time periods - tens of thousands of years in the case of nuclear waste."
  - Gates WP, Bouazza A, Churchman GJ. Bentonite clay keeps pollutants at bay. *Elements*. 2009 Apr 1;5(2):105-10.

10. Paper and paperboard products used in food packaging

- United States Food and Drug Administration: http://www.fda.gov/Food/IngredientsPackagingLabeling/GRAS/S

COGS/ucm260870.htm

III. Safety: Like all minerals, however, CBC must be evaluated for its safety.

A. General

1. Bentonite is "generally recognized as safe" (GRAS) an ingredient of paper and paperboard products used in food packaging by the United States Food and Drug Administration (FDA).
   - "Bentonite is used to assist in the clarification of juices, beverages, and other food products, as a binding agent for the preparation of pelleted animal feeds, and as an ingredient of coatings and adhesives for food packaging materials."
   - "There is no evidence in the available information on bentonite that demonstrates or suggests reasonable grounds to suspect, a hazard to the public when it is used in the manner now practiced or that might reasonably be expected in the future."
     - http://www.fda.gov/Food/IngredientsPackagingLabeling/GRAS/SCOGS/ucm260870.htm
2. "Whether as active ingredients or as ideal excipients, these minerals must comply with a number of textural and compositional requirements (concerning grain size, degree of mineral purity, water content, major and trace element contents or microbial contamination) and have specific technical properties. Their safety and stability characteristics are vitally important."
   - López-Galindo A, Viseras C, Cerezo P. Compositional, technical and safety specifications of clays to be used as pharmaceutical and cosmetic products. *Applied Clay Science*. 2007 Apr 30;36(1):51-63.

B. Drug interactions

1. "Clay minerals used as excipients can have an influence on two highly important aspects in the drug's bioavailability: its liberation and its stability."
   - Carretero MI. Clay minerals and their beneficial effects upon human health. A review. *Applied Clay Science*. 2002; 21: 158.
2. "All aflatoxin binding agents should be rigorously tested, paying particular attention to their effectiveness and safety in aflatoxin-sensitive animals and their potential for interactions with critical nutrients."
   - Phillips TD. Dietary clay in the chemoprevention of aflatoxin-induced disease. *Toxicological Sciences*. 1999 Dec 1;52(suppl 1):118-26.

C. Allergies

- "All aflatoxin-binding agents [including HSCAS clay] should be rigorously tested, paying particular attention to their effectiveness and safety in aflatoxin-sensitive animals and their potential for interactions with critical nutrients."
  - Phillips TD. Dietary clay in the chemoprevention of aflatoxin-induced disease. *Toxicological Sciences*. 1999 Dec 1;52(suppl 1):118-26.

D. Possibility of toxic contamination

- "On the other hand, it is necessary to study the presence of toxic elements as As, Pb, Hg, Cd, Se, Sb, Cu, Zn, etc., in the clay –water mixed used in spas, about all, it is necessary to know their mobility for avoid possible intoxications."
  - Carretero MI. Clay minerals and their beneficial effects upon human health. A review. Applied Clay Science. 2002; 21: 159.
- An animal study on rats found the presence of toxic elements in the urine of those animals fed clays, leading the researchers to state: "The ingestion of unchecked clays could be hazardous."
  - Mascolo N, Summa V, Tateo F. Characterization of toxic elements in clays for human healing use. *Applied Clay Science*. 1999 Dec 31;15(5):491-500.
- "Measurable concentrations of Hg were found only in the bentonites."
  - Silva PS, Oliveira SM, Farias L, Fávaro DI, Mazzilli BP. Chemical and

radiological characterization of clay minerals used in pharmaceutics and cosmetics. *Applied Clay Science.* 2011 Apr 30;52(1):145-9.

- "Considering the occurrence of hazardous elements in clays and the possibility that adsorptive minerals reduce the availability of nutrients, the clay ingestion must be considered with attention but with no negative prejudices, also considering that the geophagic behaviour in animals are accredited to have positive effects (Dominy et al., 2004)."
    - Tateo F, Summa V. Element mobility in clays for healing use. *Applied Clay Science*. 2007 Apr 30;36(1):64-76.

Conclusion and Recommendations: Members of the IAOMT are encouraged to consider the usefulness of clay in dentistry and medicine. When safety concerns are addressed, limited science supports the age-old ritual of using clay as a healing method thus suggesting a place in modern-day clinical practices. Appendix A contains my personal and clinical research and experiences using CBC.

Manufacturer(s), distributer, or publisher:

MANUFACTURERS:
DermaClay (717) 896-3911: www.DermaClay.com
Magnetic Clay: www.magneticclay.com
Living Clay: www.livingclayco.com
Eytons Earth, www.eytonsearth.org
Enviro Health Intl. LLC www.envirohealthproducts.com
Natures Purity: www.naturepurity.com

References:

SCIENTIFIC LITERATURE:

Brown KA, Mays T, Romoser A, Marroquin-Cardona A, Mitchell NJ, Elmore SE, Phillips TD. Modified hydra bioassay to evaluate the toxicity of multiple mycotoxins and predict the detoxification efficacy of a clay-based sorbent. *Journal of Applied Toxicology*. 2014 Jan 1;34(1):40-8.

Carretero MI, Pozo M. Clay and non-clay minerals in the pharmaceutical and cosmetic industries. Part II. Active ingredients. *Applied Clay Science.* 2010; 47: 171.

Carretero MI, Pozo M. Clay and non-clay minerals in the pharmaceutical industry: Part I. Excipients and medical applications. *Applied Clay Science.* 2009 Sep 30;46(1):73-80.

Carretero MI. Clay minerals and their beneficial effects upon human health. A review. *Applied Clay Science.* 2002; 21: 155-163.

Celso de Sousa Figueiredo Gomes, João Baptista Pereira Silva, Minerals and clay minerals in medical geology, *Applied Clay Science* (2007), doi:10.1016/j.clay.2006.08.006.

Gates WP, Bouazza A, Churchman GJ. Bentonite clay keeps pollutants at bay. *Elements*. 2009 Apr 1;5(2):105-10.

Johns T, Duquette M. Detoxification and mineral supplementation as functions of geophagy. *The American Journal of Clinical Nutrition.* 1991 Feb 1;53(2):448-56.

Johns T. Detoxification function of geophagy and domestication of the potato. *Journal of Chemical Ecology*. 1986 Mar 1;12(3):635-46.

López-Galindo A, Viseras C, Cerezo P. Compositional, technical and safety specifications of clays to be used as pharmaceutical and cosmetic products. *Applied Clay Science*. 2007 Apr 30;36(1):51-63.

Mascolo N, Summa V, Tateo F. Characterization of toxic elements in clays for human healing use. *Applied Clay Science*. 1999 Dec 31;15(5):491-500.

Olsen A. Low technology water purification by bentonite clay and Moringa oleifera seed flocculation as performed in Sudanese villages: effects on Schistosoma mansoni cercariae. *Water Research*. 1987 May 31;21(5):517-22.

Phillips TD, Afriyie-Gyawu E, Williams J, Huebner H, Ankrah NA, Ofori-Adjei D, Jolly P, Johnson N, Taylor J, Marroquin-Cardona A, Xu L. Reducing human exposure to aflatoxin through the use of clay: a review. *Food additives and contaminants*. 2008 Feb 1;25(2):134-45.

Phillips TD. Dietary clay in the chemoprevention of aflatoxin-induced disease. *Toxicological Sciences*. 1999 Dec 1;52(suppl 1):118-26.

Press release from the University of Chicago Press Journals on June 2, 2011 [http://www.eurekalert.org/pub_releases/2011-06/uocp-edc060211.php] on the study: Sera L. Young, Paul W. Sherman, Julius Beau Lucks, Gretel H. Pelto, "Why on Earth?: Evaluating Hypotheses about the Physiological Functions of Human Geophagy." *The Quarterly Review of Biology* 86:2 (June 2011).

Silva PS, Oliveira SM, Farias L, Fávaro DI, Mazzilli BP. Chemical and radiological characterization of clay minerals used in pharmaceutics and cosmetics. *Applied Clay Science.* 2011 Apr 30;52(1):145-9.

Tateo F, Summa V. Element mobility in clays for healing use. *Applied Clay Science*. 2007 Apr 30;36(1):64-76.

United States Food and Drug Administration: http://www.fda.gov/Food/IngredientsPackagingLabeling/GRAS/SCOGS/ucm260870.htm

Viseras C, Aguzzi C, Cerezo P, Lopez-Galindo A. Uses of clay minerals in semisolid health care and therapeutic products. *Applied Clay Science*. 2007 Apr 30;36(1):42.

Legal Aspects of this SOC/SR:

LEGAL ASPECTS OF REVIEW:
Today, different forms of clay are increasingly used both internally and externally by those interested in natural healing, and bentonite is included on the FDA's famous "GRAS" list (http://www.fda.gov/Food/IngredientsPackagingLabeling/GRAS/SCOGS/ucm260870.htm) . "GRAS" stands for "Generally Recognized as Safe". According to FDA, items on the GRAS list are not subject to pre-market review and do not need FDA approval before release to the public.

Since we are dealing with an unprocessed, 100% natural, pure clay to be used in home care settings in a similar way tooth paste (which also have clay in it) and mouth washes are used, in our experience, we have found it to be unnecessary to add its use to our present "Informed Consent" forms.

AUTHOR'S CLOSING THOUGHTS:

Appendix A contains my personal and clinical research and experiences of using CBC.

APPENDIX A: AUTHOR'S PERSONAL RESEARCH AND EXPERIENCES OF USING CBC

Sources cited in this section are listed by the source number and page number in parentheses.

I. Introduction

A. CBC basic considerations

1. In order for the CBC to work, there are several specific steps that have to be followed:

a. One has to choose a pure, non-processed CBC.

b. The most important fact of having CBC to function properly, in any healthcare settings, is to bring the clay particle in physical contact with the target microbe, virus, fungus, yeast or unwanted heavy metals found in the oral cavity (3:26).

c. If clay is hydrated, it will work better and is more likely to produce the desired effect.

2. "Clays are little chemical drug-stores in a packet," said Dr. Lynda Williams, Ph.D., a geochemist from Arizona State University of the School of Earth & Space Exploration in Tempe, Arizona (4). She has also stated, "So far, clay killed everything we tested" (1:19).

3. Important: The power of clay to detoxify may lessen the benefits of prescription drugs, so it is important not to use clay until the drugs have been fully absorbed by one's body. Obtain that information from the pharmacist.

B. Components of CBC vs. human body and other general information

1. The composition of clay minerals is very similar to the composition of human minerals (2:19):

The three primary minerals of CBC		The three primary minerals of human body	
silica	40%	silica	42%
calcium	28%	calcium	28%
magnesium	12%	magnesium	12%

2. In addition to the above three primary minerals, there are 71 additional minerals in a typical sample of montmorillonite clays found in Nevada (6).

3. There are three most commonly used forms of unprocessed, pure clay:

a. Dry clay powder form (dry clay)

b. Hydrated, premixed clay to pure water (clay mask)

c. Liquid clay premixed to pure water (liquid clay)

II. Clinical Application of Clay

A. Clay use in an integrative dental office

1. Intra-oral use:

a. Any patient with gingivitis should start brushing with clay 3X per day.

b. Patients with mild to severe periodontal disease should gently brush with either dry or hydrated clay several times per day. The last evening brushing is to be done just before bedtime. At that time one needs to apply the clay to and particularly in between the teeth. If necessary, one needs to use one's fingers to press the clay between the teeth and roots to increase the actual contact of clay and microbes in between one's teeth. Remember, clay works better when it comes in contact with the microbes. Important, do not rinse after the last clay application. That allows the clay to work all night, killing the microbes attacking one's periodontal structures. Swallowing clay is not harmful and may be beneficial, so one does not have to worry about swallowing clay while sleeping.

c. Intra oral pizza burn or other trauma injuries resulting in pain can be lessened by applying clay directly on the affected area. Any one of the clay forms (dry, premixed or liquid) can be used for this purpose.

d. Post oral surgery sites can be covered with clay to lessen post-surgical infections.

e. Patients with abscessed teeth should see a dentist ASAP. If that is not possible, use three of the clay modalities by drinking 1 oz. of the liquid clay several times per day. Pack the clay over the intraoral infected area and set a clay poultice directly over the infected area on the facial skin. Repeat that application until you get help or the pain subsides.

f. Bad breath may be treated with a clay mask and liquid clay. Start by drinking 1 ounce of liquid clay several times per day. Brush your teeth and particularly your tongue with clay mask also several times per day. Rinsing with and drinking liquid clay, in addition to brushing with clay, will eliminate three of the most common sources of bad breath.

2. Extra-Oral use of Calcium Bentonite Clay:

a. Since some dentists are now injecting patients' faces with Botox toxins, it is logical for integrative dentists to

seek out the use of 100% natural CBC skin treatments with similar results. People who give themselves clay facial treatments find their skin getting rejuvenated, as well as wrinkles lessening or disappearing along with black heads, white heads, pimples and many other skin ailments. It is not only quite inexpensive, but it can be done in the privacy of one's own home.

b. Following are some common skin issues dentists often find in their patients:

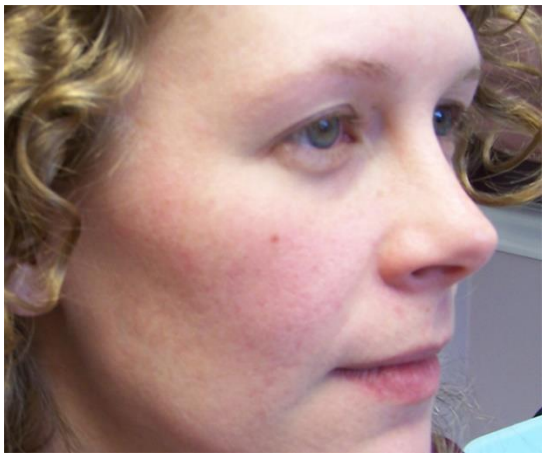
i. Accidental falls resulting in cuts, abrasions, torn skin pain, bleeding and swelling. The use of CBC is phenomenal in those situations. It works like a charm.

ii. Many common skin issues such as acne, black heads, cold sores, dry skin, moles and warts can be easily treated with CBC with excellent results. The recommendation is to take 1-2 oz. of liquid clay several times per day internally, and then cover the lesions with clay mask to be covered with either bandage or Saran Wrap.

B. Personal experiences of the author

1. Example #1: Here is a personal experience where this author was presented with an accidental fall of an older relative (70+) down the stairs, resulting in a tear of the front lower leg skin and fascia, causing substantial pain and bleeding. It happened several years ago while spending our Thanksgiving holiday at the Outer Banks, NC, with my two cousins from Finland. One of them fell and tore the front of her lower leg seriously. By the time I saw the trauma area, she was bleeding and in much pain. The only thing I had with me was a jar of pure CBC powder. I tried to mix it in tap water, but it was impossible to mix in such a hurry, so I just put the partially wetted clay powder right on the open wound and headed for the nearest hospital emergency room. Fortunately, there was a new hospital only 10 minutes away from where we were staying. By the time we got there, she had no pain and the bleeding had stopped. She continued the CBC use while in USA, as well as when she got back to Finland. She never developed any kind of infection at the trauma site even though the doctors expected that to happen because of her age and the trauma location. Her leg totally healed with no scarring.

2. Example #2: A facial MRSA Staph Infection (2:99) that had failed to response to repeated antibiotic treatments was permanently healed with CBC treatments. We have a beautiful adult female patient who had developed a MRSA infection on the right cheek several years ago. From lab tests, her physician had diagnosed her facial lesions as a MRSA infection. After repeated treatments with a strong antibiotic regimen, it was concluded that the antibiotic drugs did not eliminate the MRSA infection. The next step would have been a surgical intervention leading into facial disfigurement. Her mother-in-law, a chiropractic physician who was one of our patients, was introduced to Calcium Bentonite Clay. She was all for trying the CBC treatment and was totally surprised when the clay killed the MRSA microbes in a short period of time, and the girl's face healed back to normal. After her healing was complete, her physician tested her again and found her to be totally free of MRSA bacteria in her body. The photographs shown here were taken before and after the clay treatments.



Her treatment sequence was as follows: Our patient covered the MRSA lesion with hydrated clay, covering the clay with a large bandage to keep it moist. She would change the clay and the bandage every morning and evening.

The healing time was short, only a couple of weeks the most. We have taken photographs of her face when she comes in for her prophy appointments, and her face continues to look beautiful with no scarring or any sign of infection present.

Important: In the USA 126,000 new MRSA cases are found every year. Of those admitted, 5,000 will be fatal. MRSA almost always starts as a skin lesion. CBC has the potential to save 5,000 lives every year.

3. Example # 3: A dentist friend developed Carpal Tunnel Syndrome on his working right hand. Every time he would pick up a drill and start working on his patients, it would cause him severe pain in the palm of his hand. The recommended medical solution was to surgically cut several nerves in the palm of his hand with no guarantee of any improvement. That is a very frightening surgery for a dentist to contemplate. It could have ended his career. He asked me if our clay would help him. Since I have learned never to say never to clay treatments, I told him it was a worth of try. What did he have to lose? I gave him a bathing CBC and instructed him to soak his affected hand for an hour in warm (104-107°F) clay water 3-4 times per week using ½ - 1 cup of clay each time. It took several months for him to improve, but today he works full time and has no pain at all. This supports what Paul R. Marin writes: "Anything which will promote circulation (and clay does just that) helps to relieve inflammation, aids in removal of local toxins, and soothes irritated muscles and tendons will help Carpal Tunnel Syndrome" (9).

C. Clay use in Natural Medicine

1. Note there are hundreds of health conditions that have been and can still be treated with clay (CBC) today. Either one or more forms of clay may be used at the same time. Also, clay is person specific. One size will not fit all. Experimenting is the key to find out what form of clay works the best and how much and how long to use it.

2. For this particular SR, the author can only review a few of the most common health issues referenced in many publications including one of the newest publications by Perry A~ 2015 (2). This well done publication has detailed list of 180 ailments naturally treated with CBC (2:51-117).

a. Acidic Body (2:54) is one of the most important issues since acidity is one of the main reasons for most of the chronic diseases a person suffers today. Most everything we drink and consume makes us acidic. Using clay can change the pH of the body from acidic to alkaline, and by doing so, one will help every function of one's body. By continuing to use clay can keep a person alkaline. Drinking 2 oz. of liquid clay 3 times per day increasing it to 4 oz. per each serving will start the process (2:49). The second part of this alkalizing process is to take clay baths (2:37). Use 1-2 cups premixed clay in a warm water (104-107 F) 2-3 times weekly for 15-20 minutes each time for 3 months. It is important to use pH strips to test your first morning saliva and urine to visualize the alkalizing process and to be able to make adjustments to one's protocol of clay use. Please note: since we are naturally detoxifying while sleeping, the morning urine is always more toxic than saliva.

b. Healthy GI tract including the Colon (2:32, 72) is the most important organ to start with. Our GI tract helps us to stay healthy and alive. Liquid clay will help to improve the health of the GI tract. Capsulated or tablet clays are not recommended because clay will lose its therapeutic properties if the clay is processed. Single serving: 2 oz. liquid clay. Liquid clay usage suggestions: Take clay 3X daily. Clay baths to be taken 2-3 times per week and if necessary.

c. Diarrhea (2:78) is a health issue that needs a prompt, ongoing application of CBC after each loose stool episode. One needs to drink 1 oz. of CBC immediately after each diarrhea episode. The CBC use continues till the diarrhea issue is over. When infants have diarrhea, add ¼-1/2 teaspoon of CBC to their juice, milk or water bottle, and shake it well. Do not stir it. The clay treatment is recognized worldwide as a very effective treatment for diarrhea and cholera.

Dr. Frederic Damrau, MD, has stated that CBC is "Safe and highly effective" in treating acute diarrhea" (11).

d. Flu – Influenza (2:84): Since flu has a viral origin, then recovering from flu means that those flu viruses needs to be eliminated. Since the flu viruses have an opposite molecular ionic charge than clay molecules ions do, they are relatively easily eliminated from one's body. Start with 2 oz. liquid CBC 3X per day increasing the amount to 4 oz. 3X per day. It is also important to gargle with liquid CBC as needed. Additionally, one needs to apply a 10" diameter CBC poultice over the liver area for one hour. After 3 days the poultice may also be used during the night while sleeping. A daily CBC bath with 1 cup of clay for 15-20 minutes is also very helpful.

e. Lyme Disease (2: 97): First, confirm the diagnose before starting the treatment sequence with CBC. This disease needs an aggressive action for it to succeed. Start taking 2 oz. of CBC 3X daily increasing the amount of clay to ultimately use 6 oz. CBC 3X day away from any prescription oral medication. In addition, start taking 4, two cup CBC baths per week 15-20 minutes each. After 2 weeks continue taking 2 CBC bath per

week with 1 cup of clay for 3 months. Apply 1 inch-thick CBC poultice about 10 inches in diameter over your liver area, changing it twice daily. After 3 days this poultice may be applied overnight if needed. Take a CBC daily enema using 2 oz. of liquid CBC in one pint of water as needed. If one knows the bite area, cover the area with wet CBC for 10 hours at a time. If the disease has passed the brain cell barrier use a clay helmet over one's head and neck and leave in place for 30 minutes.

f. Insect bites (2:83, 93): For most insect bites and stings, the CBC treatment is virtually the same. The only difference is that some insect bites (spiders) may be life threateningly dangerous and need to be attended within seconds after the bite. If that is the case, in addition to clay mask application, one needs to drink also 2 oz. of clay liquid and get immediate medical help. It may be a matter of life and death. The immediate treatment is to take a handful of clay (CBC) mask and immediately put it on the bite/sting site covering it well. Leave it in place to dry or cover with a large bandage or plastic wrap. Repeat the process as often as needed till the swelling, pain and redness is gone. (2:83, 93)

g. Detoxification (2:34): This is one of author's favorite topics because CBC works so well in removing toxins from one's body. We, as people and animals, are exposed to a hundreds of thousands of toxic chemicals every single day in our lives including Hg. It is becoming more and more difficult to try to avoid the unnecessary and often hidden exposures that constantly bombard us. The worst thing is that there are three more toxins added to the environment every hour. Today we are faced with GMO plants and Roundup-ready pesticides used in most food plants including corn, soy, sugar beets, zucchini, yellow squash, just to name a few. Our big favorite fish we eat, salmon, will now be genetically modified (GMO) without any proof of safety whatsoever. Closer to home, there are over 16,900+ chemicals and chemical families used in dentistry today. Very little human safety testing has ever been done to prove that all of those chemicals we dentists use are safe for us and for our patients. For example, we have over 800 different composite resins from which to choose when restoring our patients' teeth with "white" filling materials. Of all those 800+ composite fillings, only 29 (as of today) are BPA-free according to Walter Clifford 1/28/2016. As Hg-amalgam fillings leak Hg, composite resin fillings leak BPA. According to the CCR LAB records, out of 60,000+ blood serum tests done, 99.5% of the test samples react to the Hg groups including the elemental Hg from dental amalgam fillings (12).

i. Hg detoxification (2:34): In order to explain a great need for an organized detox program to eliminate Hg from the human body, we first will examine the urgency as to why we dental professionals need to learn and practice detoxification. It is vital for one to understand why to detox before one learns how to do it. Since clinical dental staff that work chairside on patients placing and removing Hg-Amalgam fillings, our main focus of "Detoxification" will be on Hg exposure to dentists and dental assistants. Exposures to different metals and toxins like aflatoxins, Roundup Ready Glyphosate herbicides and Agent Orange type toxins utilize the same clay detox routines.

Since dentists have been told, for the last 175 years, about the safety of Hg-Amalgam dental fillings materials, they have never had any doubts that Hg-Amalgam dental fillings would be anything else but "safe and effective." So, dentists remove and implant Hg fillings into their patients' teeth. The most vocal information source of Hg-amalgam safety has come from the American Dental Association ever since the formation of that group. However, this author's search of the IAOMT database has discovered that ADA and other publications have published numerous research articles warning dentists about toxic exposure to Hg-Amalgam beginning with dental students and continuing through the careers of dentists and dental assistants.

Scientific research has concluded that dental related elemental Hg exposure starts in the first year in dental school and continues through graduation. While dental students are kept in the dark about Hg building up in their bodies, readers of JADA, the *Journal of the American Dental Association*, have been informed about the dangers of Hg exposure since 1976. That year, an article in JADA informed everybody that there was a need of safety measures to be taken (13, 14, 15, 16). The latest ADA warning about Hg toxicity to dental professionals came in the form of a "Cover Story" article in the JADA September 2015 issue referring to a study that started in 1965, 50 years ago. The conclusion of ADA's study states the following: "Our results suggest a positive association between Elemental Hg exposure and tremor" (27). Dentists having tremors have suffered permanent brain damage from Hg exposure. It is not a surprise that dentists, men and women alike, are experiencing chronic health issues right along with their patients who also are at risk. Since every person has a different threshold of tolerance to toxic Hg exposure, not every person reacts the same way to chronic Hg exposures (17,

18).

Also it is very common for dentists and dental assistants to have Hg-Amalgam fillings implanted in their own teeth. That makes their professions even doubly dangerous because not only are they exposed to low levels of Hg all their working hours in their dental offices, but at the same time, they are being exposed to low levels of Hg from their own Hg-amalgam fillings. The following most common disease categories are noted here: Neuropsychological, Neurological (Brain Damage), Respiratory and Cardiovascular. Those are some of the most hideous chronic diseases known to mankind. Female dentists also suffer from female oriented diseases like miscarriages as well (19, 20, 21, 23, 25, 26).

For the longest time, it was difficult to find out how toxic a person really is, until now. Quick Silver Scientific, owned by Chris Shade, PhD, now has a very reliable way to test a person and tell how Hg-toxic that person actually is. In order to find out how well CBC works by removing Hg from one's body, it is important to develop a base line Hg level before starting the detoxification program.

ii. Clay detoxification program for removing Hg from one's body: Hg detox program starts with clay baths (104-107°F) temperature. Clay baths are the most gentle, comfortable, effective and least expensive form of Hg detoxification. Start with 1 cup of clay and stay in the tub for 15-20 minutes each time in the beginning. As your body gets used to clay baths, increase the clay in the tub incrementally 2 cups per bath. If one is a dentist or a dental assistant who is continuously exposed to Hg one may want to take a clay bath at the end of each working day. Pregnant dentists or assistants are recommended to use foot baths only while expecting. (Caution: The used clay you see on the bottom of the tub, when the bath is over, may be very toxic, even though it just came out of you. Do not touch it with your hands. Clean it out of your tub and dispose it into the garbage can outside your home. If you put the used clay into the waste can inside your home, you will get Hg vapors inside your home.)

Start drinking 2 oz. of liquid clay 3 times per day increasing the liquid clay intake to 4 oz. of clay per day (away from any oral medication one maybe taking, of course.) Taking internal clay also requires a person to drink plenty of pure water to flush out the clay particles containing the toxic molecules from the body. Place a 1" thick 10" diameter clay poultice over one's liver for 1 hour. After repeating this routine for 3 days it is also recommended to apply the clay poultice overnight.

As it took a long time to build up Hg in one's body to a noticeable level, it will take some time to eliminate Hg from one's body, particularly from one's brain. To remove Hg from one's brain, the clay helmet becomes very helpful. Brain helmet clay is to be mixed to a thick consistency. Clay is mixed with warm water (104-107°F). It is then placed in a 1" thick layer, like a helmet, over the head and neck areas. The whole area, including the head and neck minus the face, is covered with Saran Wrap and a thick bath towel, keeping the clay warm. Leave the clay helmet on at first 10-15 minutes, working up to 45 minutes. After each session clean hair, scalp and neck well with warm water, relax and drink plenty of water.

Continue these routines for 3-6 months and then be tested again to see where your new Hg level is in your body. Once you know where you are you can adjust your routine depending on your Quick Silver Scientific test results.

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