



OSAC Research Needs Assessment Form

Title of research need:

Herbal and Dietary Supplements and Plant-based Toxins

Keywords:

Herbal, Dietary, Supplements, Plants, Toxins

Submitting subcommittee(s):

Toxicology

Date Approved:

1/26/16

(If SAC review identifies additional subcommittees, add them to the box above.)

Background information:

1. Description of research need:

One of the lesser understood areas in Forensic Toxicology surround both the analytical and interpretive aspects of toxicants in herbal and dietary supplements. These products present clear dangers to public health and safety and have been used for self-harm and purposeful harm to others, including homicide. As there are no regulatory controls over such products, the composition of these materials is often unknown or not consistent with labeling. Non-controlled production can result in opportunistic toxic agents. Many toxicological emergencies and deaths have resulted from human exposures to these products. Plants contain some of the most toxic substances known to man. For the most part, many of the individual natural product constituents found in plants lack analytical methods and interpretive guidance. Sub-populations particularly affected by these aggregate substances include individuals with particular vulnerabilities, such as children, elders, and those with preexisting pathologies.

2. Key bibliographic references relating to this research need:

1. Herbal Products: Toxicology and Clinical Pharmacology. TS Tracy and RL Kingston (Eds). Human Press, Totowa, NJ (2007).
2. Phua DH, Zosel A, Heard K. Dietary supplements and herba medicine toxicities – When to anticipate them and how to manage them (2009). Int J Emerg Med; 2(2): 69-76.
3. Haneef J, et al. Analytical methods for the detection of undeclared synthetic drugs in traditiojal herbal medicines (2013). Drug Testing Analysis; 5: 607-613.
4. Gaillard Y, Pepin G. Poisoning by plant material: Review of human cases and analytical determination of main toxins by high-perfomance liquid chromatography-(tandem) mass spectrometry (1999). J Chrom B: Biomed Sci App; 733(1-2): 181-229.
5. Elliott SP. A case of fatal poisoning with taconite plant: Quantitative analysis in biological fluid (2002); 42(2): 111-115.

3a. In what ways would the research results improve current laboratory capabilities?

Such research will assist in the determination of poisoning, both accidental and purposeful, in cases of known or unknown exposure to herbal and dietary supplements and plants. Specific analytical broad-based strategies using routinely applied processes would be the expected outcome. Once identified, the effects of the toxicants in the outcome of an individual could be elucidated.

3b. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

This particular research would allow the subcommittee to develop a scientific basis for standard or guideline production in the specific areas of herbal, dietary supplement and plant-based analyses and toxicity interpretations. Existing literature demonstrates only general discussion or case-specific issues without addressing applicable techniques for identifying agents of value in forensic toxicological evaluations. Without such a process, exposure of individuals to such agents will only be identified through situational history and will continue to be challenging.

3c. In what ways would the research results improve services to the criminal justice system?

Poisoning cases involving herbal products, dietary supplements and plant-based toxins are underreported. The inability of laboratories to respond to requests for exposures to herbal and dietary supplements and plant-based toxins contributes to this underreporting. The herbal and dietary supplement market in the U.S. and elsewhere is a multi-billion dollar industry, yet there is little regulatory oversight. Further, product analyses demonstrated that labeling often doesn't comport with identified active components. Plant-based exposures are both accidental and purposeful intent to do harm. Only through the availability of broad-based analytical assays will there be a direct laboratory response to this current threat to public health and safety.

4. Status assessment (I, II, III, or IV):

I

| | Major gap in current knowledge | Minor gap in current knowledge |
|---------------------------------------------------|--------------------------------|--------------------------------|
| No or limited current research is being conducted | I | III |
| Existing current research is being conducted | II | IV |

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.

| | |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Subcommittee | Approval date: <input data-bbox="609 231 969 279" type="text"/> |
| <i>(Approval is by majority vote of subcommittee. Once approved, forward to SAC.)</i> | |
| SAC | |
| 1. Does the SAC agree with the research need? Yes No <input data-bbox="954 464 992 499" type="radio"/> | |
| 2. Does the SAC agree with the status assessment? Yes No <input data-bbox="1019 541 1057 577" type="radio"/> | |
| <i>If no, what is the status assessment of the SAC:</i> <input data-bbox="841 611 943 659" type="text"/> | |
| Approval date: <input data-bbox="321 695 682 743" type="text"/> | |
| <i>(Approval is by majority vote of SAC. Once approved, forward to NIST for posting.)</i> | |