Cellular and Molecular Biology
E-ISSN : 1165-158X / P-ISSN : 0145-5680
www.cellmolbiol.org
C M B Association Publisher

Opinion Paper

ABC, a patented innovation in the infusion of teas and herbal plants: enrichment of *Camellia sinensis* leaves with dry extracts from herbal plants

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Received April 15, 2019; **Accepted** April 18, 2019; **Published** April 30, 2019

Doi: http://dx.doi.org/10.14715/cmb/2019.65.4.12

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Abstract: Tea and herbal infusions have been known for millennia for their health benefits. However for plants and active ingredients (of mineral and animal origin), it is necessary to consume very large quantities to achieve what is called the health claim dose, i.e., the dose for which the effect on health claim is established. *Camellia sinensis* leaves is traditionally used as plant infusion. This article aims to review the innovation afforded by the ABC (Bio Concentrate Assets®) patent. The ABC patent has developed an exclusive method of enriching organic tea leaves with organic herbal dry plant extracts using organic acacia gum. This method allows the coupling of concentrated dry extracts from medicinal plants on the *Camellia sinensis* leave extracts using acacia gum (arabic gum) and to reach to low enough health claim doses thanks to a higher concentration of active ingredients (tested until 10 ingredients). An example of ABC application is provided in a brief overview of manufacturing process for the "Gingo® tea" preparation. The main advantages of the ABC patent application are discussed. In conclusion, the ABC process offers a real breakthrough in the market of teas and herbal teas for health and wellness.

Key words: Medicinal plants patent; *Camellia sinensis*; Herbal tea; Nutrition; Health care.

Introduction

Tea (*Camellia sinensis*) is the second most widely consumed beverage in the world after water and it is traditional medicine from China. Tea (*Camellia sinensis*) and herbal infusions have been used for millennia as ethnological uses. However for plants and active ingredients (mineral, animal), very large quantities are often necessary to achieve a health claim dose, ie the dose for which the beneficial effect on health claim could be evidenced. In the past encapsulation for tea has been used to improve the flavour of the tea beverages and the bioavailability of bioactive polyphenols (1). Synergistic of the herbal plant extracts is required (2) but is limited in herbal plant infusions. Arabic gum is a good example of food-grade (E414 as food additive in Europe) reported as a food hydrocolloid for encapsulation systems (3, 4). This article is aimed to review the innovation afforded by the ABC (Bio Concentrate Assets®) patent. The ABC patent has developed an exclusive method using arabic or acacia gum of enriching *Camellia sinensis* leaves for infusion uses. This method allows the coupling of concentrated dry extracts of medicinal plants with the acacia gum on the tea leaves reaching a higher concentration of active ingredients in the final infusion. A brief overview of the developed process for mixed herbal plant extract infusions is provided. Advantages of the ABC process are discussed. In conclusion, the ABC process offers many advantages and offers a real breakthrough in the teas and herbal teas market for health and well-being.

Description of the ABC patent: State of the Art

The ABC process (Bio Concentrate Assets®) has recently been the subject of an exclusive patent application. It reported a specific method of coupling extracts on the tea leaves. This process uses a natural binder, acacia gum from organic farming. The acacia gum dissolved in solution allows the concentrated dry extracts of medicinal plants to be fixed on the tea leaves. The durations of the mixing and drying vary according to the tea leaves, infusion plants and dry extracts originating from medicinal plants. The dry plant extracts can be obtained by a specific extraction process. The process consisted of the sequential step using the total plant or part of the plant. Then the crushed plant is macerated in a liquid in order to extract several constituents including the active ingredients (the molecules of the plants having a health benefit) are generally very soluble. After recovery of the liquid enriched in various soluble constituents of the plant, a filtration has been introduced to remove impurities and to keep only the constituents of interest, namely the active ingredients. The solution obtained is then concentrated under reduced pressure at low temperature and finally drying to obtain a very fine powder enriched in active ingredients namely the dry extract.

Processes already exist to enrich the tea or plant leaves (1). The purpose of these preparations is to obtain, after brewing, liquors rich in active ingredients. Most of the teas and enriched infusions are obtained according to procedures which consist in simply mixing in

a tank the supports (here the *Camellia sinensis* leaves), the powder of active ingredients (herbal plant extract) and an aqueous solution added with a desirable binder. The most common binders are alginates (from algae), binders derived from sugar type dextrose and gelatin. However, the drying phase is generally quite long and requires evaporation of the water used for the dilution of the binder. These techniques introduce 2 principal difficulties during their implementation. First, it has been difficult to distribute the assets evenly (because of their powdery shape) without creating agglomerates. Thus, it is common to end up with herbal plant leaves enriched in a non-homogeneous way. Second, part of the assets is often lost because it sticks to the walls of the tank. This loss has been partly prevented by a two-stage process in which the aqueous solution (water + food binder) is sprayed alone first (thus without any active ingredients) before addition of tthe powder of assets before drying. At the end, a support / binder / active complex is obtained. However, the drying stage is extremely long and requires a lot of energy.

The ABC process, an exclusive patent is a unique method of enriching tea leaves or herbal infusions. This method allows the coupling of concentrated organic dry extracts of medicinal plants on tea leaves (*Camellia sinensis*). The major advantage of the coupling of active ingredients on tea leaves thanks to the ABC patent is that it makes it easier to reach the dosage levels and therefore to claim the health benefits of infusion with smaller amounts of herbs. Thus, it is possible to use several dry extracts of plants with complementary actions for optimal efficiency, in addition to tea, within a single infusion bag of 1.5 to 2g. In addition, this process uses organic acacia gum which allows adhesion of the concentrated dry extracts of medicinal plants tea leaves. The table 1 reports the composition in mg and percentage of the "Gingo® tea" associating constituents known to improve blood circulation. The red vine dry extract used has an 3: 1 enrichment ratio. Thus, each 200 mg of red grape dry extract used is actually the equivalent of 600 mg of dry red vine leaf. Similarly, the elderberry dry extract is a 3: 1 enrichment ratio and therefore for 40 mg of elderberry dry extract used, 120 mg of fresh elderberry are required. Hence, the ABC process allows the use of smaller quantities to reach the dose necessary to claim a health benefit on the blood circulation. Several plant extracts can be used for even more synergistic actions on the blood circulation provided by a simple infusion bag.

Advantages of the ABC process

This method brings several advances: the mixture produced is very homogeneous, no loss of material is observed on the walls of the mixers. Indeed, the active agents are coupled uniformly on the leaves and only on tea leaves or herbal tea plants. Following the method disclosed in the invention, no formation of agglomerates of active principles detrimental to the appearance or losses on the walls of the mixer were observed. The amount of water necessary for the adsorption of the active agents on the sheets is reduced. Since the evaporation of ethanol is faster than that of water (boiling point of 78.4 °C vs 100 °C), the drying time is significantly reduced during final stage of drying. As a result, the method according to the invention is more economical in time and energy. Acacia gum also has the advantage of being used in small quantities because its coupling power is high. In addition, its glycemic index is low. Finally, the acacia gum used comes from organic farming to offer 100% organic teas and herbal teas This process can be used as a delivery system of one or more than 10 active(s) principle(s), including herbal teas or teas obtained by the implementation of the process. A further advantage of the process is that there are no residual traces of alcohol after drying and that the flavour and aroma features of the products are not affected by the use of ethanol in other processes.

Possible applications of the ABC process

In a previous study using cultured cells, we have demonstrated *in vitro* the safety of the herbal tea plant extract containing Hawthorn (*Crataegus oxyacantha*), Melissa (*Melissa officinalis*) and Tila (*Tilia europaea*) in ratios traditionally used for insomnia and anxiety treatments (5). We obtained evidence for a protective dose dependent effect of the herbal tea plant extracts when used as a preventive method to protect kidney against hypoxia/reoxygenation injuries. The ABC process could improve the quantity of constituent of the infusion and permits to test more combination of different herbal plant extract (5). Among the new applications it will be of interest to explore its application in antioxidative stress injuries induced as we have previously done with other herbal remedies (*Gingko biloba, Desmodium adsendens*, *Camellia sinensis*) (6-9).

Conclusion

The ABC process has many advantages and offers a real breakthrough in the teas and infusions already in the market for health and wellness. Specifically, active

Table 1. Composition of the « Gingo® tea".

DENOMINATION	Ingredient quantity (in mg)/ infusion bag (TOTAL : 2000 mg)	%
Organic Green Tea	490	24.50
Organic Hibiscus	370	18.50
Organic Ginkgo	394	19.70
Organic Verbena	100	5
Organic Red Vine Dry Extract	200	10
Organic Elderberry Dry Extract	40	2
Organic Lemon grass	400	20
Organic Acacia Gum	6	0.30

plant extracts are evenly distributed on tea leaves and the process that saves energy and time. A 100% organic infusion since acacia gum can be sourced organically, uses an organic acacia gum (a food additive in low concentration) with a low glycemic index, which limits or even removes incidental impact of consumption on blood glucose. A 100 % organic tea and others herbal plants can be manufacturated since acacia gum can be sourced organically. The ABC process is used to make a tea or a biological herbal tea enriched with multiple active ingredients (up to 10 ingredients have been tested) that can be delivered equivalently in each cup of tea. The infused drink contains highly bioavailable active ingredients that are found in much greater amounts than with a simple infusion of plants. These are all concentrated assets that will distribute more easily in the body, for optimal health or wellness.

Acknowledgements
We are most grateful to Pr François-André Allaert (CEN, Dijon, France) and Mathilde Fontaine (Thé de la Pagode, Paris, France) for the help and discussions. We thank Drs S. Sennoune, R Martinez-Zaguilan (Texas Tech University, Health Sciences Center, USA), S. Pierre (Marshall Institute for Interdisciplinary Research (MIIR), Huntington, USA) and S. Whiting (University of Saskatchewan, Canada) for helpful revision of this manuscript.

Author Contributions
The authors' responsibilities were as follows: All authors participated in the writing and take responsibility for the content of this report.

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