



# Analyzing the research in *Integrative & Complementary Medicine* by means of science mapping

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## KEYWORDS

Complementary therapy;  
Integrative therapy;  
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## Abstract

**Objectives:** The research in the *Complementary and Alternative Medicine* (CAM) field is analyzed according to the journals indexed in ISI Web of Science. Science Mapping Analysis (SMA) is used to provide and overview of the conceptual evolution of the CAM field.

**Methods:** The software SciMAT is used to detect and visualize the hidden themes and their evolution over a consecutive span of years. It combines SMA and performance analysis. Twenty one journals related to CAM were analyzed, in four consecutive periods from 1974 to 2011.

**Results:** Strategic diagrams and the thematic evolution of CAM, together with performance indicators (h-index), were obtained. The results show that CAM research has focused on seven main thematic areas: MEDICINAL-PLANTS, CHIROPRACTIC-AND-LOW-BACK-PAIN, ACUPUNCTURE-AND-PAIN, CELL-PROCESSES-AND-DISEASES, LIPID-PEROXIDATION and DIABETES-AND-INSULIN.

**Conclusion:** The research output could be used by the scientific community to identify thematic areas on which interest is focused.

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## 1. Introduction

Complementary and Alternative Medicine (CAM) can be described as a group of health care systems, practices and products which are not considered a part of conventional care (such as chiropractic, ayurveda, homeopathy and naturopathy).<sup>1</sup> On the other hand, Integrative Medicine incorporates aspects of both CAM and conventional care through a combination of conventional medical therapies with those of CAM that have high-quality scientific evidence of safety and effectiveness. Recently, it was concluded that it is unclear whether CAM is used as a substitute for conventional care rather than a complement.<sup>2</sup> An increment in publications and interest related with CAM and Integrative Medicine has been observed. In fact, one of the most important bibliographic databases, the ISI Web of Science (ISIWoS), has established a subject category, *Integrative & Complementary Medicine*, to represent the set of journals that publish the main research works related to both disciplines.

A high quantity of research documents hampers the detailed analysis of any research area. Although an expert on the field could develop a detailed analysis, it would nevertheless be a daunting and tedious task. For this reason, the use of scientific support tools, such as Bibliometrics, is required to facilitate the analysis of a research area by automatically classifying the research conducted in a particular research field in different themes and topics.<sup>3</sup>

Science Mapping Analysis (SMA)<sup>4</sup> is a powerful bibliometric method for the analysis of scientific output. It provides a spatial representation of how disciplines, fields, specialties, and individual documents or authors are related to one other.<sup>5</sup> SMA is focused on monitoring a scientific field and delimiting research areas to determine its structure and its evolution.<sup>6</sup> SMA aims at displaying the structural and dynamic aspects (conceptual, intellectual and social) of scientific research.<sup>7,8,6</sup>

Co-word analysis has been used in SMA to study the conceptual structure of scientific fields, using the most important terms or keywords in the documents.<sup>9</sup> Some examples of the use of SMA in research fields are: cardiology and cardiovascular, library and information science,<sup>11</sup> and intelligent transportation systems.<sup>12,13</sup>

The open-source software SciMAT<sup>14</sup> is a powerful science mapping analysis software tool that presents the following main characteristics<sup>14,15</sup>: (i) it incorporates all the modules necessary to perform an SMA, (ii) it is able to build the majority of the bibliometric networks, it can use different similarity measures to normalize them and it incorporates a variety of clustering algorithms to build the science maps,

(iii) it implements a wide variety of preprocessing tools, (iv) it allows the analyst to perform an SMA in a longitudinal framework, and (v) it builds science maps enriched with bibliometric measures based on citations. Furthermore, SciMAT presents some key features that distinguish it in respect to other science mapping software tools: (a) a powerful preprocessing module to clean the raw bibliographical data, (b) the use of bibliometric measures to study the impact of each element studied, and (c) a wizard to configure the analysis.

Recently, a series of papers analyzing the bibliometric impact of the CAM research field have been published. Danell et al.<sup>16</sup> analyze the evolution of scientific production in academic journals from 1966 to 2007. Fu et al.<sup>17</sup> analyze the document types and the geographical and institutional distribution of the authorship from 1980 to 2009. Tam et al.<sup>18</sup> show the most frequently cited articles published in the journals indexed in the *Integrative & Complementary Medicine* ISIWoS subject category. However, a complete CAM science mapping study is yet to be undertaken. In this paper a complete longitudinal SMA is presented, in which the whole CAM research field is analyzed and its structure and conceptual evolution is demonstrated.

## 2. Materials and methods

SciMAT is used to develop the SMA presented in this paper. SciMAT is based on the bibliometric analysis methodology defined by Cobo et al.<sup>15</sup> This approach establishes four phases with which to analyze the themes and thematic evolution of a research field:

1. *Research themes detection.* A equivalence index<sup>19</sup> normalized bibliometric co-word network of keywords co-occurrence is built.<sup>9</sup> This is followed by a clustering of keywords in topics/themes using the simple centers algorithm.<sup>20</sup> These clusters correspond to centers of interest or to research problems that are the object of significant interest among researchers.
2. *Low dimensional space layout of research themes.* This is achieved by plotting research themes using two-dimensional strategic diagrams based on the their centrality (degree of interaction of a research theme with other research themes) and density (internal strength of a research theme) rank values.<sup>19</sup> Thus, with both parameters a research field can be understood to be a set of research themes, mapped in a two-dimensional space and classified into four groups<sup>15</sup>: (a) *Motor*: Themes in the upper-right quadrant, which are well developed and important for the structuring of a research field, (b) *Basic and Transversal*: Themes in the lower-right

quadrant, which are important for a research field but are not developed, (c) *Emerging or Declining*: Themes in the lower-left quadrant, which are weakly developed and marginal, and (d) *Highly developed and Isolated*: Themes in the upper-left quadrant, which are well developed but with marginal importance for the field.

3. *Discovery of thematic areas*. The evolution of the previously detected research themes over a set of different periods of time, is analyzed in order to detect the main general evolution areas of the research field, their origins, and their interrelationships. The evolution over the whole period of time is measured as the overlapping of clusters of two consecutive periods. To this end, the inclusion index<sup>21</sup> is used to detect a conceptual nexus between research themes from different periods and, in this way, to identify the thematic areas in a research field. It is worth noting that the research themes, interrelationships could indicate that a particular research theme belongs to a unique thematic area or to more than one thematic area. It could also be the case that a particular research theme cannot be associated with any of the thematic areas identified, and which could therefore be interpreted as the origin of a new thematic area in the research field.
4. *Performance analysis*. In this phase, the relative contribution of research themes and thematic areas to the whole research field is measured quantitatively and qualitatively. In this way, the most prominent, productive and highest-impact subfields may be identified. To do this, the following bibliometric indicators are applied to the different detected themes and thematic areas: number of published documents, number of received citations, and h-index.<sup>22–24</sup>

The data were retrieved from ISIWoS by considering the twenty one journals indexed in the ISI subject category. A total of 18,536 documents (articles, notes and reviews) from 1974 to 2011 were downloaded. In this study citations are also used. Citation counts up to May 2012 were retrieved.

As noted above, the keywords of the documents are used to develop our analysis. Due to the fact that the data have been downloaded from ISIWoS, the author's keywords and Keywords Plus are used jointly.

Using SciMAT, a de-duplicating process was applied over the keywords in order to group those words that are synonymous, as well as the plural and singular forms of the same words, as one single word representing the same concept. Furthermore, because some documents did not contain any keywords, a manual addition of descriptive keywords was carried out to ensure completeness. Finally, some keywords that are meaningless in this context such as stop words, or words with a very broad and general meaning were also removed (e.g. *medicine, disease, outcomes, system*, etc.).

The whole time period (1974–2011) was subdivided into subperiods of more than one year. Additionally, although it is common to use periods of the same time span, in the first years there are low numbers of researchers and publications (see Figs. 1 and 2). Thus, a first subperiod of fifteen years (1974–1989) and a second subperiod of nine years (1990–1999) were set, in order to obtain an adequate number of documents from those periods.

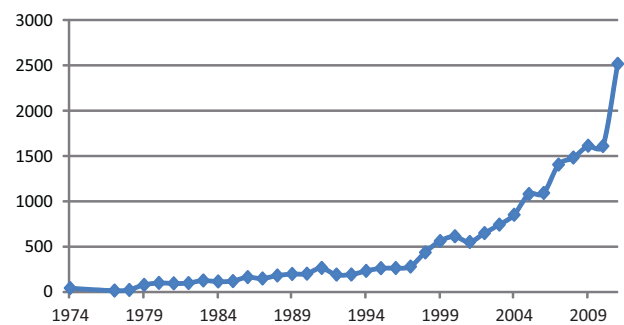


Fig. 1 CAM research documents published from 1974 to 2011.

This was necessary in order to perform a good SMA and to detect the main research themes.

### 3. Results

In this section the science mapping approach described above is applied in order to perform a thorough analysis of the research field of CAM.

#### 3.1. Visualization of CAM themes

In order to analyze the most notable themes of the CAM research field for each subperiod, two kinds of strategic diagrams are built using SciMAT. In the first one, the volume of the spheres is proportional to the number of documents associated with each theme; and in the second one, it is proportional to the number of citations received by the documents associated with each theme. The strategic diagrams and performance analysis are analyzed together. Data for the first period (1974–1989) are shown in Fig. 3a and b, and Table 1

- The *basic theme* MEDICINAL-PLANTS presents the best performance results with the highest h-index and citations count. It is focused on the provenance of plants in traditional medicine. In the following periods, it continues being a very important theme.
- The *motor themes* ACUPUNCTURE and CHINA, and the *basic theme* RATS also have good performance rates with similar values. The theme ACUPUNCTURE is dedicated to the application and effects of treatments using acupuncture. The theme CHINA is centered on medical practice and the health care system in China.
- The *basic theme* AQUEOUS-EXTRACT and the *highly developed and isolated theme* GLYCANS, although with a low

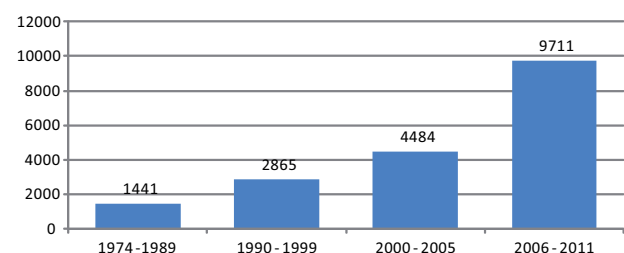
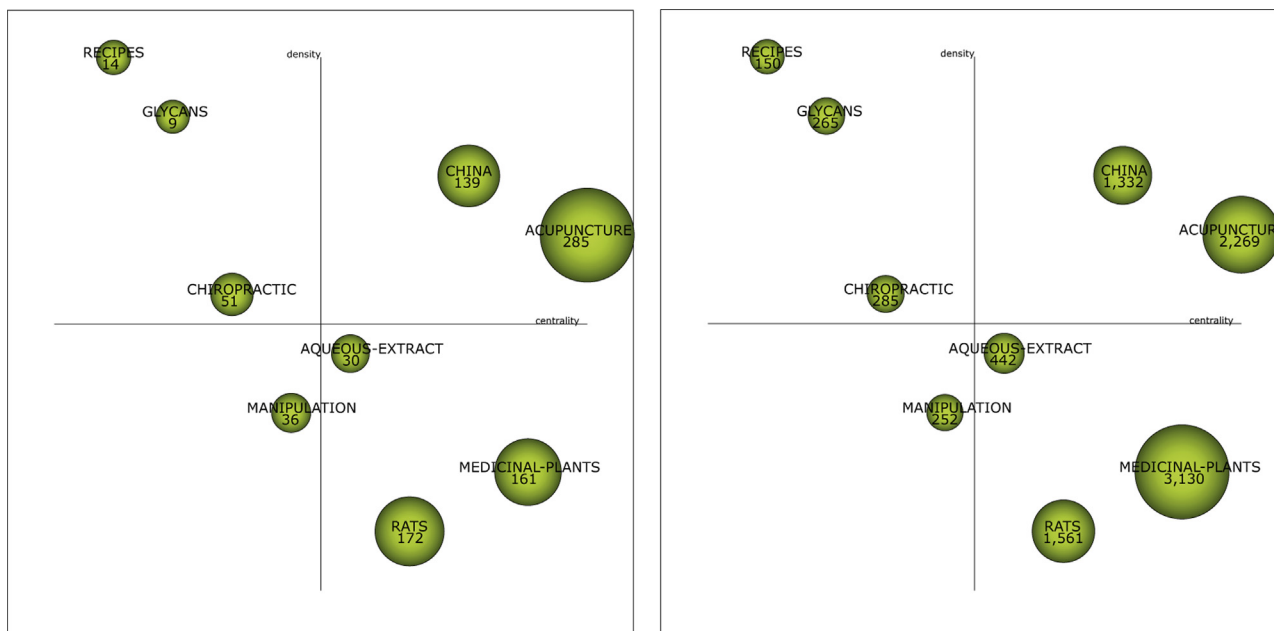


Fig. 2 CAM research documents published in each period.



(a) Strategic diagram based on documents. (b) Strategic diagram based on citation.

Fig. 3 Strategic diagrams for the subperiod 1974–1989.

quantity of documents, present an adequate citations rate and h-index. The former is related to the properties of aqueous extract from plants; the latter is focused on hypoglycemic activity and the antidiabetes effect of some glycans.

- The *isolated theme* CHIROPRACTIC and the *emerging theme* MANIPULATION, both related to the manipulation of body structures and the use of chiropractic as treatment, have a low quantity of documents in the first period. However, in the following periods they demonstrate greater interest from the CAM research community.

From 1990 to 1999, the strategic diagrams shown in Fig. 4a and b are obtained. The bibliometric indicators of this period are shown in Table 1.

- The majority of the *motor*, *basic* and *transversal themes* are related to medicinal plants, experimentation and chiropractic.
- The *motor theme* MEDICINAL-PLANTS obtains the highest impact rate.
- The theme CHIROPRACTIC obtains the highest number of documents and an adequate impact index, and appears as *basic theme*.
- The theme RATS has almost half the number of documents of CHIROPRACTIC, but it has a good impact index. It has similar citations rates to CHIROPRACTIC.
- The *basic and transversal theme* PAIN obtains important values and is closely related to the theme ACUPUNCTURE that appeared in the previous period.
- The *emerging themes* LIPID-PEROXIDATION and CELLS appear in this period with modest performance indicators but they are the baselines of two important themes in the following period of time.

- The *motor theme* IN-VITRO related to drugs and experimentation in malaria, achieves an adequate citations count and h-index.
- The *isolated theme* CYCLOOXYGENASE appears with a low quantity of documents and presents an adequate citation count. This theme is related to anti-inflammatory activity, which is an important theme in the following periods.

From 2000 to 2005 the CAM research field increments its scientific production. Data for this third period is shown in Fig. 5a and b, and its bibliometric indicators in Table 1.

- *Motor themes* (e.g. MEDICINAL-PLANTS and LIPID-PEROXIDATION) and important *emerging themes* (e.g. APOPTOSIS and ELECTROACUPUNCTURE) appear with a high impact in the scientific community.
- The research theme MEDICINAL-PLANTS is consolidated as a *motor theme* in this period. It obtains the largest number of documents and the highest impact index.
- The theme LIPID-PEROXIDATION, which refers to the oxidative degradation of lipids, obtains the second best impact index in this period.
- The *motor theme* THERAPY and the *emerging theme* ELECTROACUPUNCTURE appear strongly in this period. Both themes are related to the use of alternative treatments.
- The theme LOW-BACK-PAIN appears as *motor theme* with high density and centrality values, and it obtains an important citation rate and an adequate h-index. It is focused on the characteristics of low back pain and its treatment with therapies such as chiropractic.
- The themes INHIBITION and APOPTOSIS obtain an adequate impact index. They are related to cells processes, specifically to cancer cells.

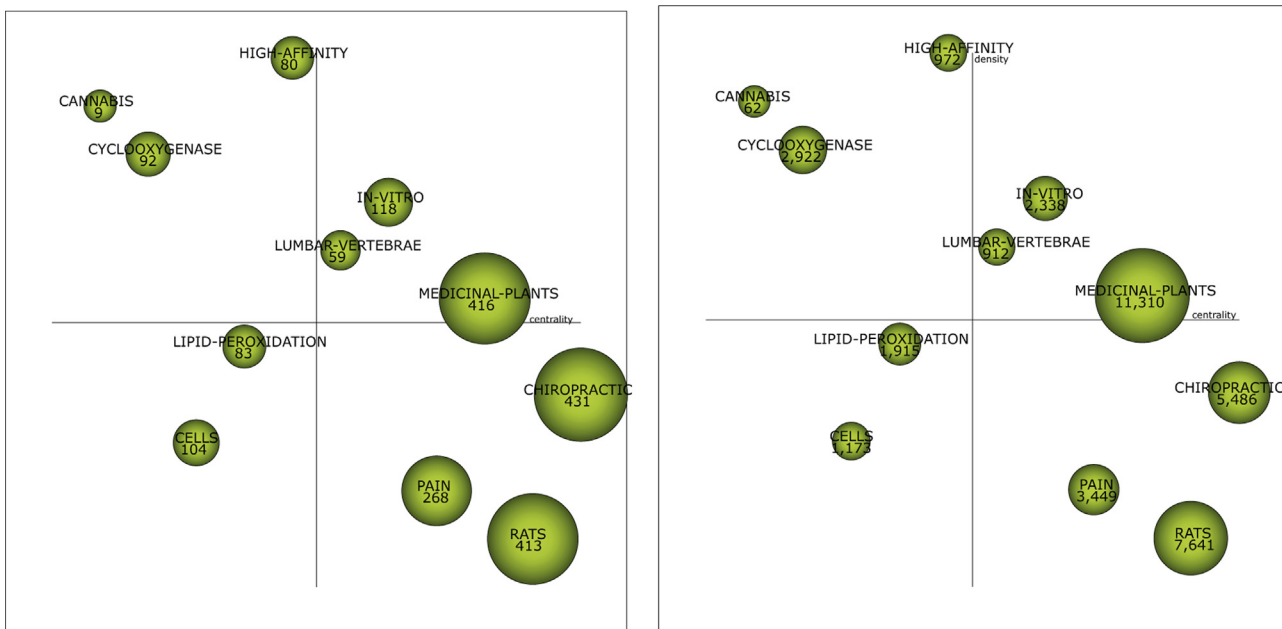
**Table 1** Bibliometric indicators from 1974 to 2011.

Themes	Periods			
	1974–1989	1990–1999	2000–2005	2006–2011
ACUPUNCTURE	285–2269–23			
RATS	172–1561–20	413–7641–39		
MEDICINAL-PLANTS	161–3130–31	416–11310–51	838–22094–62	2056–13945–37
CHINA	139–1332–21			
CHIROPRACTIC	51–285–8	431–5486–33		
MANIPULATION	36–252–8			
AQUEOUS-EXTRACT	30–442–13			
RECIPES	14–150–6			
GLYCANS	9–265–8			
PAIN		268–3449–29		741–2759–18
IN-VITRO		118–2338–28		
CELLS		104–1173–18		1805–9179–29
CYCLOOXYGENASE		92–2922–29		
LIPID-PEROXIDATION		83–1915–23	570–13146–50	1044–6639–31
HIGH-AFFINITY		80–972–18		
LUMBAR-VERTEBRAE		59–912–20		
CANNABIS		9–62–5		
ANTI-INFLAMMATORY			717–14020–49	2182–11542–30
INHIBITION			686–12647–47	
THERAPY			585–9644–42	
LOW-BACK-PAIN			449–4684–28	1095–3922–22
ELECTROACUPUNCTURE			410–5139–29	
DOUBLE-BLIND			241–3887–31	1000–4202–23
APOPTOSIS			191–3741–32	1238–5555–24
STREPTOZOTOCIN			132–3870–33	
QUALITY-OF-LIFE				1086–4388–24
NF-KAPPA-B				935–4711–26
PREVALENCE				927–3458–22
ALTERNATIVE-MEDICINE				876–3036–19
LEAVES				511–3219–23
EXERCISE				445–1644–15
TOXICITY				427–2929–25
BRAIN				357–1902–20
GLUCOSE				300–2224–21
ANXIETY				285–1242–17
CHILDREN				249–846–12
MALARIA				235–1480–19
RISK				216–841–14
INSULIN-RESISTANCE				215–932–15

Data in cells: Number of documents–number of citations–h-index.

During the period 2006–2011 the CAM discipline was consolidated as an important research field. In this period there are more documents than in the previous ones and many new themes appear. Its strategic diagrams are shown in Fig. 6a and b, and its bibliometric indicators in Table 1:

- There is a higher number of *motor themes* than in the previous period. Indeed, there is also a considerable number of *emerging themes*, which indicates that the CAM research field continues to grow and develop.
- The theme MEDICINAL-PLANTS is consolidated as a *motor theme*. It again presents the best impact indicators.
- The baseline themes of the CAM research field that present the best impact indexes are: MEDICINAL-PLANTS, ANTI-INFLAMMATORY, LIPID-PEROXIDATION, APOPTOSIS and CELLS.
- APOPTOSIS is considered to be an important *motor theme* with adequate bibliometric indicators. During this period, the subject has a ten times higher number of documents than in the previous.
- The theme LOW-BACK-PAIN is also consolidated as *motor theme* with high density and centrality values, and it obtains an important citation rate and a considerable h-index too.
- The theme NF-KAPPA-B appears as a *motor theme* with a good impact index. This is related to cells apoptosis applied to cancer cells.
- Both QUALITY-OF-LIFE and EXERCISE are new themes that appear in this period. Both themes are related to the use



(a) Strategic diagram based on documents. (b) Strategic diagram based on citation.

Fig. 4 Strategic diagrams for the subperiod 1990–1999.

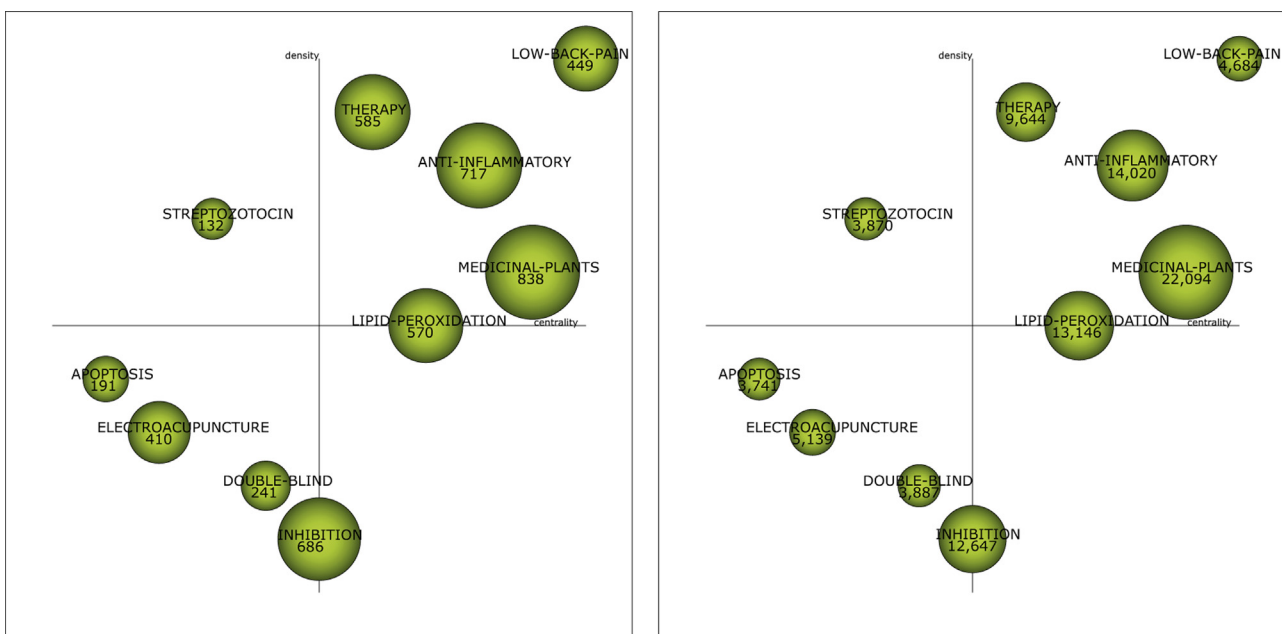
of physical therapies as treatment. Particularly, QUALITY-OF-LIFE is also closely intertwined with cancer problems.

- The theme PAIN appears as a *basic and transversal theme* and is related to the use of alternative medicine to mitigate pain in some diseases.
- The themes BRAIN, TOXICITY, and ANXIETY appear as *emerging themes* and could represent the beginning of new research lines in the CAM research field.

### 3.2. Conceptual evolution of CAM

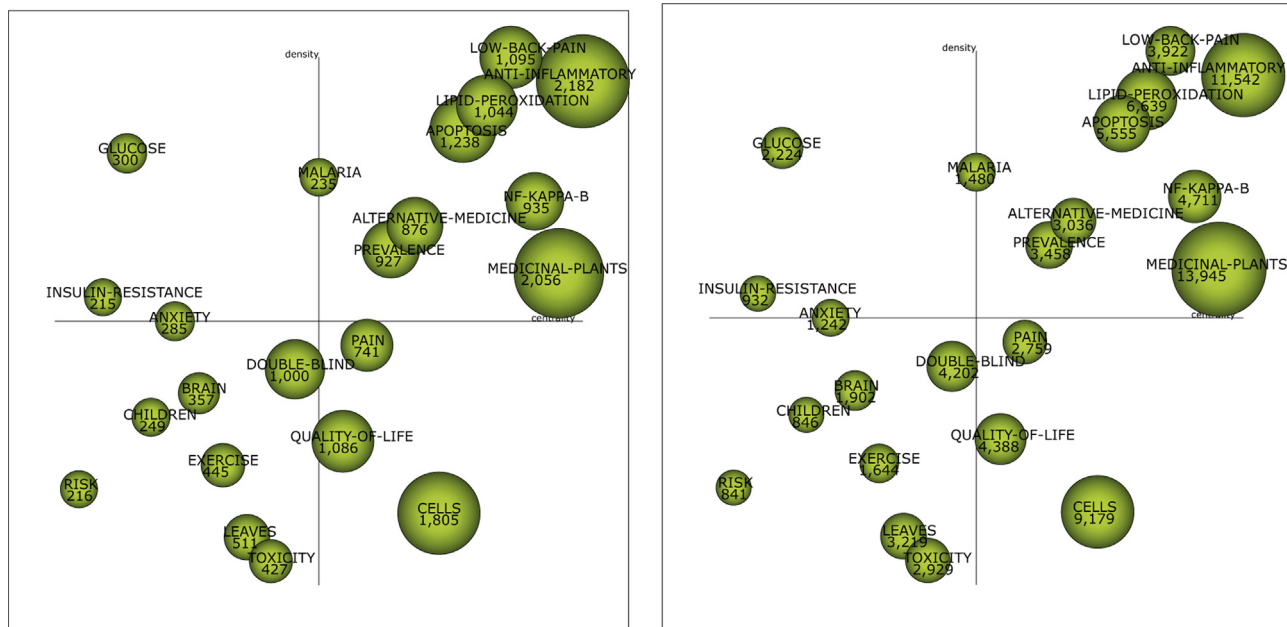
Next, the thematic evolution of CAM research field is examined. Analyzing the themes over the four periods, seven thematic areas have been detected:

1. ACUPUNCTURE-AND-PAIN
2. CELL-PROCESSES-AND-DISEASES



(a) Strategic diagram based on documents. (b) Strategic diagram based on citation.

Fig. 5 Strategic diagrams for the subperiod 2000–2005.



(a) Strategic diagram based on documents.

(b) Strategic diagram based on citation.

Fig. 6 Strategic diagrams for the subperiod 2006–2011.

3. MEDICINAL-PLANTS
4. ANTI-INFLAMMATORY-ACTIVITY
5. LIPID-PEROXIDATION
6. CHIROPRACTIC-AND-LOW-BACK-PAIN
7. DIABETES-AND-INSULIN

In the thematic evolution diagram shown in Fig. 7, each column corresponds to a period, 1974–1989, 1990–1999, 2000–2005 and 2006–2011 respectively. The volume of the spheres is proportional to the number of documents associated with each theme. Solid lines mean that the linked themes share the name: both themes have the same name, or the name of one of the themes is part of the other theme. A dotted line means that the themes share elements that are not the name of the theme. The color-shadows group the themes which belong to the same thematic area. If there are themes that have more than one shadow, this means that these themes belong to more than one thematic area. Some themes do not have a shadow, because these themes do not belong to any thematic area. In Table 2 their respective global quantitative and impact measures are provided.

Analyzing Fig. 7 and Table 2 several findings may be pointed out:

1. Regarding the thematic composition the main remarkable points are:
  - The thematic area MEDICINAL-PLANTS is mainly composed of *motor* and *basic* themes. It includes in its origin one *motor* theme and one *basic* theme. MEDICINAL-PLANTS becomes the most consolidated thematic area in CAM since all its themes are *motor* themes in the most recent periods.
  - CHIROPRACTIC-AND-LOW-BACK-PAIN starts with one *isolated* and one *emerging* theme and it develops into an important *motor* theme in the last period.

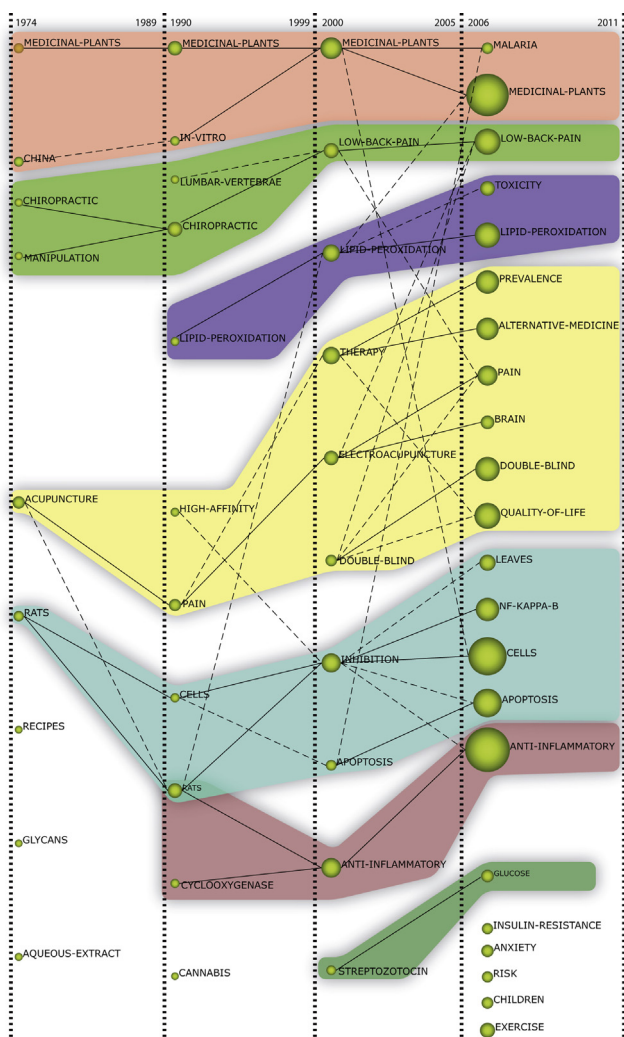
- The thematic area LIPID-PEROXIDATION starts as an *emerging* theme and becomes an important theme in the last period.
  - ACUPUNCTURE-AND-PAIN starts as a *motor* theme, and becomes the thematic area that presents a greater number of themes. In the last period it is composed by *motor*, *basic* and *emerging* themes.
  - CELLS-PROCESSES-AND-DISEASES starts with *basics* and *emerging* themes but presents a high growth in last period with important *motor* and *basic* themes.
  - ANTI-INFLAMMATORY-ACTIVITY starts with both an *isolated* theme and a *basic* theme and converges into one of the most important *motor* themes.
  - The thematic area DIABETES-AND-INSULIN is composed of *isolated* themes.
2. Regarding the structural evolution, the most remarkable aspects are:
    - The CAM research field presents great cohesion, due to the fact that the majority of detected themes are grouped in a thematic area and originate from a theme identified in a previous period. Furthermore, most of the evolutions are part of a *thematic nexus*.
    - Four thematic areas start in the first period: MEDICINAL-PLANTS, CHIROPRACTIC-AND-LOW-BACK-PAIN, ACUPUNCTURE-AND-PAIN and CELLS-PROCESSES-AND-DISEASES. In the second period three new thematic areas appear: LIPID-PEROXIDATION and ANTI-INFLAMMATORY-ACTIVITY. Finally, in the third period a new thematic area emerges: DIABETES-AND-INSULIN.
    - Some very recent themes (e.g. EXERCISE and ANXIETY) could not be identified with any thematic area. They could be considered to be emergent new thematic areas.

**Table 2** Performance measures for the detected areas.

Theme name	Number of documents	Number of citations	h-index
ACUPUNCTURE-AND-PAIN	6856	45,105	53
CELLS-PROCESSES-AND-DISEASES	6055	49,427	57
MEDICINAL-PLANTS	3963	55,629	74
ANTI-INFLAMMATORY-ACTIVITY	3404	36,125	59
LIPID-PEROXIDATION	2124	24,629	53
CHIROPRACTIC-AND-LOW-BACK-PAIN	2121	15,541	40
DIABETES-AND-INSULIN	432	6094	37

- Most thematic areas evolve in a continuous and compact way from their beginning until the last period, that is, there are no gaps in their evolution.
  - Both thematic areas ACUPUNCTURE-AND-PAIN and CELLS-PROCESSES-AND-DISEASES present a growing pattern. The rest of the thematic areas tend to shrink in terms of the number of themes in each period.
3. Regarding the performance and impact indicators some aspects should be highlighted:

- The thematic area MEDICINAL-PLANTS is the most important in terms of the number of citations, with the highest h-index and the best impact index. On the other hand, ACUPUNCTURE-AND-PAIN is the most important in terms of the number of documents, with almost twice the amount of documents that MEDICINAL-PLANTS has.
- Both thematic areas LIPID-PEROXIDATION and ANTI-INFLAMMATORY-ACTIVITY present a high citations rate and h-index despite the fact that in their origins they appeared as *emerging* and *isolated theme* respectively.
- All thematic areas show a growing pattern in terms of the number of documents. The cases of MEDICINAL-PLANTS and ANTY-INFLAMMATORY-ACTIVITY are particularly significant, as they achieve a very high growth in the last period.
- The thematic area DIABETES-AND-INSULIN presents a low impact in CAM, but it presents a growing pattern. This could suggest that its impact will grow in the future.

**Fig. 7** Thematic evolution of *Integrative & Complementary Medicine* (1974–2011).

#### 4. Discussion

This study shows the conceptual structure of the CAM research area by means of SMA and co-word networks. The conceptual themes and thematic areas of CAM have been visualized by means of the research core of papers published in the academic database ISIWoS.

This research highlights seven different main thematic areas in CAM: (i) MEDICINAL-PLANTS, related with the use and properties of medicinal plants in the treatment of diseases; (ii) CHIROPRACTIC-AND-LOW-BACK-PAIN, related to the treatment and prevention of disorders of the neuromusculoskeletal system and the effects on general health by means of manual therapy. Most people who seek chiropractic care do so for low back pain<sup>25</sup>; (iii) LIPID-PEROXIDATION, related to the oxidative degradation of lipids, a reaction that most often affects polyunsaturated fatty acids; (iv) ACUPUNCTURE-AND-PAIN, related to the penetration of the skin with needles to stimulate certain points on the body, this is a component of traditional Chinese medicine and it is used to treat various types of pain, neurological problems and stroke rehabilitation<sup>26,27</sup>; (v) CELLS-PROCESSES-AND-DISEASES, related to the cell proliferation and specifically to tumor cells; (vi) ANTI-INFLAMMATORY-ACTIVITY, related to substances or treatments that reduce inflammation pro-



cesses; (vii) DIABETES-AND-INSULIN, related to diabetes and its treatment.

Some of the findings are worthy of further comment. The thematic area MEDICINAL-PLANTS obtains the best impact index with the highest values in terms of the number of citations and h-index. This means that MEDICINAL-PLANTS is a growing research area with a good rate of published documents that captures the attention of the CAM research field. It is therefore a highly developed a thematic area of CAM. The thematic area ACUPUNCTURE-AND-PAIN is the most fully developed with the highest number of documents published. The amount of documents published and the different issues related to it suggest that pain treatment with alternative therapies is another major issue in CAM. Both of the thematic areas CELLS-PROCESSES-AND-DISEASES and CHIROPRACTIC-AND-LOW-BACK-PAIN present a constant growth. The citations in themes CELLS and LOW-BACK-PAIN have increased in the last period, so these issues may attract further attention in the future. Finally, it is important to highlight the growth of ANTI-INFLAMMATORY-ACTIVITY and LIPID-PEROXIDATION, especially the former. The theme ANTI-INFLAMMATORY has become the most productive in the last period studied, ahead of MEDICINAL-PLANTS. They began as minor themes but in the last period they obtain important performance rates, so they could be two interesting new lines of research.

It is remarkable that some words related to the areas of biofeedback, meditation or yoga did not appear in the strategic diagrams. In the whole knowledge base the frequency of these keywords is not sufficient for them to appear. For example, BIOFEEDBACK does not exceed the threshold established to appear in diagrams; MEDITATION appears in the last period related to the theme QUALITY-OF-LIFE; YOGA also appears in the last period related to the theme EXERCISE. Moreover, odd or counter-intuitive inclusions can be found. These inclusions are probably due to the preponderance of in vitro studies, but there is insufficient objective data to make this claim. The results are shown without stating whether there is a preponderance of in vitro studies as apposed to clinical studies.

There are some limitations related to the use of SciMAT. The maps generated depend on the selected parameters. It may use different similarity measures to normalize and different clustering algorithms to build the maps, but the result depends on the parameters used. Therefore, supervision is required in order to obtain an adequate map. Another weakness is that the use of an external software to layout the final graphics may be necessary. Furthermore, the visualization techniques are powerful but somewhat limited. It would be interesting to use different visualization techniques for a better understanding of the results. The last note-worthy weak point is that the de-duplicating process is carried out manually. Algorithms cannot currently be used to perform this task reliably, and keywords must consequently be supervised in person.

## 5. Conclusion

The results shown in this work allow decisions to be made. The scientific community can identify thematic areas on which attention is focused and others that are growing in

terms of interest they attract. The citations and scientific production in CAM are focused on two big thematic areas, medicinal plants and acupuncture related to pain treatment. In the last period, the interest in anti-inflammatory processes has grown and it is capturing the attention of the research field.

## Conflict of interest statement

No conflict of interest to disclose.

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