

Isotopic Abundance Analysis Ratio of Consciousness Energy Healing Treated 6-Mercaptopurine Using LC-MS and GC-MS Spectrometry

Alice Branton¹, Mahendra Kumar Trivedi¹, Dahryn Trivedi¹, Snehasis Jana^{2*}

¹Trivedi Global, Inc., Henderson, USA.

²Trivedi Science Research Laboratory Pvt. Ltd., Thane (W), Maharashtra, India

Received November 4, 2020; Revised December 29, 2020; Accepted January 10, 2021

ABSTRACT

The 6-Mercaptopurine, an antineoplastic agent, is useful for the treatment of many diseases. This study was performed to investigate the impact of The Trivedi Effect[®]-Biofield Energy Healing Treatment on the structural properties and the isotopic abundance ratio of 6-mercaptopurine using liquid chromatography-mass spectrometry (LC-MS) and gas chromatography-mass spectrometry (GC-MS) spectroscopy. The 6-mercaptopurine sample was divided into two parts - one part was considered as a control sample (i.e., no Biofield Energy Treatment was provided), while the other part was considered as a treated sample (i.e., treated with The Trivedi Effect[®]-Consciousness Energy Healing Treatment remotely by a renowned Biofield Energy Healer, Alice Branton). The LC-MS spectra of both the samples at retention time (R_t) 2.24 minutes exhibited the mass of the protonated molecular ion peak at m/z 153 [M+H]⁺ (calculated for C₅H₅N₄S⁺, 153.18). The LC-MS based isotopic abundance ratio of P_{M+1}/P_M (²H/¹H or ¹³C/¹²C or ¹⁵N/¹⁴N or ³³S/³²S) in the treated 6-mercaptopurine was significantly decreased by 42.49% compared with the control sample. Thus, ¹³C, ²H, ¹⁵N, and ³³S contributions from (C₅H₅N₄S)⁺ to m/z 154 in the treated sample were significantly decreased compared with the control sample. The GC-MS based isotopic abundance ratio of P_{M+1}/P_M in the treated 6-mercaptopurine was decreased by 1.34% compared with the control sample. Hence, ¹³C, ²H, ¹⁵N, and ³³S contributions from (C₅H₅N₄S)⁺ to m/z 153 in the treated sample were significantly decreased compared with the control sample. However, the isotopic abundance ratio of P_{M+2}/P_M in the treated 6-mercaptopurine was significantly increased by 11.58% compared with the control sample. Therefore, ¹⁸O contributions from (C₅H₅N₄S)⁺ to m/z 154 in the treated sample were significantly increased compared with the control sample. The isotopic abundance ratio of P_{M+1}/P_M (²H/¹H or ¹³C/¹²C or ¹⁵N/¹⁴N or ³³S/³²S) and P_{M+2}/P_M (³⁴S/³²S) in the treated 6-mercaptopurine was significantly altered compared with the control sample. It can be assumed that the changes in isotopic abundance and mass peak intensities could be due to changes in nuclei possibly through the interference of neutrino particles *via* The Trivedi Effect[®] - Consciousness Energy Healing Treatment. The new form of treated 6-mercaptopurine would be better in designing novel pharmaceutical formulations that might offer a better therapeutic response against acute lymphocytic leukemia, chronic myeloid leukemia, Crohn's disease, ulcerative colitis, etc.

Keywords: 6-Mercaptopurine, The Trivedi Effect[®], Biofield Energy, Consciousness Energy Healing Treatment, LC-MS, GC-MS

INTRODUCTION

The 6-mercaptopurine is an antimetabolite anticancer agent. It acts by interfering with nucleic acid synthesis by inhibiting purine metabolism [1,2]. It is used for the medication of cancer and autoimmune diseases, i.e., acute lymphocytic leukemia, chronic myeloid leukemia, Crohn's disease, and ulcerative colitis [3-5]. It has an immunosuppressant property. It was approved for medical use in the U.S.A. since 1953 and also listed as Essential Medicines by the World Health Organization (WHO) [6]. Very common side effects like diarrhea, nausea, vomiting, loss of appetite, stomach and abdominal pain, mouth sores, fatigue, weakness, fever, sore throat, skin rash, pinpoint red spots on the skin, darkening of the skin, yellowing of eyes or skin, hair loss, easy bruising or bleeding, bloody stools, black or tarry stools, dark urine, bloody urine, painful or difficult urination, may suppress the production of blood

cells (both white and red blood cells) and can be linked to the genetic polymorphisms are associated with the mercaptopurine therapy [7-9]. Mercaptopurine is used in the pharmaceutical formulations for oral medications in the form of the tablet and liquid suspension [10-12]. The solubility profile of mercaptopurine is very poor, which is

Corresponding author: Snehasis Jana, Trivedi Science Research Laboratory Pvt. Ltd., Thane-West, Maharashtra, India, Tel: 022-25811234; E-mail: publication@trivedieffect.com

Citation: Branton A, Trivedi MK & Trivedi D, Jana S. (2021) Isotopic Abundance Analysis Ratio of Consciousness Energy Healing Treated 6-Mercaptopurine Using LC-MS and GC-MS Spectrometry. J Drug Design Discov Res, 2(1): 58-66.

Copyright: ©2020 Jana S, Branton A, Trivedi MK & Trivedi D. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

insoluble in water, acetone, chloroform, and diethyl ether, whereas slightly soluble in dilute sulfuric acid; soluble in hot alcohol and dilute alkali solutions [12].

Improvement of the physicochemical properties is very important for the improvement of solubility, dissolution, absorption, and bioavailability of the pharmaceutical and nutraceutical compounds [13]. In this regard, The Trivedi Effect[®]-Biofield Energy Healing Treatment has a significant effect on various properties such as particle size, surface area, bioavailability and isotopic abundance ratios of pharmaceutical and nutraceutical compounds [14-18]. The Trivedi Effect[®] is a natural and only scientifically proven phenomenon in which a person can harness this inherently intelligent energy and transmit it anywhere on the planet through the possible mediation of neutrinos [19]. "Biofield Energy" the electromagnetic energy field which exists surrounding the living beings, which can transmit the electromagnetic energy in the form of bio-photons, generated by the continuous movement of the electrically charged particles (ions, cells, etc.) inside the body. Biofield Energy Healing specialists can harness the energy from the environment or the "Universal Energy Field" and can transmit into any living and non-living object(s), this process is called Biofield Energy Healing Treatment [20-22]. Biofield based Energy Therapies have been reported with significant outcomes against various disease [23]. The National Center of Complementary and Integrative Health (NCCIH) has recognized and accepted Biofield Energy Healing as a Complementary and Alternative Medicine (CAM) health care approach in addition to other therapies, medicines, and practices such as yoga, Qi Gong, Tai Chi, hypnotherapy, Reiki, etc. [24,25]. These therapies have been accepted by most of the U.S.A. population with several advantages [25]. The Trivedi Effect[®]-Consciousness Energy Healing Treatment has been reported with the significant revolution in the metals, chemicals, ceramics and polymers, crops, microbes, biotechnology, skin health, bone health, cancer cell line, etc. [24-38]. The Trivedi Effect[®]-Biofield Energy Healing Treatment could be an economical approach for the practical problems associated with 6-mercaptapurine for the physicochemical properties for designing better pharmaceutical formulations. The stable isotope ratio analysis has various applications in different scientific fields for understanding the isotope effects resulting from the variation of the isotopic composition of the molecule [39,40]. Isotope ratio analysis can be performed by using the conventional mass spectrometry (MS) techniques such as gas chromatography-mass spectrometry (GC-MS) and liquid chromatography-mass spectrometry (LC-MS) in low micromolar concentration with sufficient precision [39,41]. Therefore, LC-MS and GC-MS were used in this study to characterize the structural properties and evaluate the isotopic abundance ratio analysis of P_{M+1}/P_M ($^2H/^1H$ or $^{13}C/^{12}C$ or $^{15}N/^{14}N$ or $^{33}S/^{32}S$) and P_{M+2}/P_M ($^{33}S/^{32}S$) in The

Trivedi Effect[®] - Consciousness Energy Healing treated 6-mercaptapurine compared to the control sample.

MATERIALS AND METHODS

Chemicals and reagents

6-mercaptapurine was purchased from Tokyo Chemical Industry Co., Ltd., Japan. Other chemicals used during the experiments were of analytical grade available in India.

Consciousness Energy Healing Treatment Strategies

The 6-mercaptapurine powder was the test sample divided into two parts. One part of the 6-mercaptapurine powder sample was considered as a control sample (no Biofield Energy Treatment was provided). However, the other part of 6-mercaptapurine was treated with The Trivedi Effect[®]-Consciousness Energy Healing Treatment remotely under standard laboratory conditions for 3 minutes and known as The Trivedi Effect[®] Treated or Biofield Energy Treated 6-mercaptapurine sample. The Biofield Energy Treatment was provided through the healer's unique energy transmission process by the renowned Biofield Energy Healer, Alice Branton, USA, to the test sample. Further, the control sample was treated with a "sham" healer for comparison purposes. The sham healer did not have any knowledge about the Biofield Energy Treatment. After that, the Biofield Energy Treated and untreated 6-mercaptapurine samples were kept in sealed conditions and characterized using LC-MS and GC-MS, analytical techniques.

CHARACTERIZATION

Liquid chromatography-mass spectrometry (LC-MS) analysis and Calculation of Isotopic Abundance Ratio

The LC-MS analysis of the control and Biofield Energy Treated 6-mercaptapurine was carried out with the help of LC-MS Thermo Fisher Scientific, the USA equipped with an ion trap detector connected with a triple-stage quadrupole mass spectrometer. The column used here was a reversed-phase Thermo Scientific Synchronis C18 (Length-250 mm X ID 4.6 mm X 5 micron), maintained at 25°C. The diluent used for the sample preparation was acetonitrile and water. 10 μ L of the 6-mercaptapurine solution was injected, and the analyte was eluted using 0.1% formic acid in water (mobile phase A; 10%) and acetonitrile (mobile phase B; 95%) pumped at a constant flow rate of 0.5 mL/min. Chromatographic separation was achieved using gradient condition and the total run time was 10 min. Peaks were monitored at 300 nm using the Photo Diode Array (PDA) detector. The mass spectrometric analysis was performed under a +ve ESI mode. The total ion chromatogram, peak area% and mass spectrum of the individual peak which was appeared in LC along with the full scan (m/z 50-300) were recorded. The total ion chromatogram and mass spectrum of the individual peak (appeared in LC-MS) were recorded.

The natural abundance of each isotope (C, O, H, N, and S)

can be predicted from the comparison of the height of the isotope peak with respect to the base peak. The values of the natural isotopic abundance of the common elements are obtained from the literature [40,41-44]. The LC-MS based isotopic abundance ratios (P_{M+1}/P_M) for the control and Biofield Energy Treated 6-mercaptapurine was calculated.

Percentage (%) change in isotopic abundance ratio = $[(IAR_{Treated} - IAR_{Control}) / IAR_{Control}] \times 100$

where $IAR_{Treated}$ = isotopic abundance ratio in the treated sample and $IAR_{Control}$ = isotopic abundance ratio in the control sample.

Gas chromatography-mass spectrometry (GC-MS) analysis

GC-MS of the control and Biofield Energy Treated sample of 6-mercaptapurine were analyzed with the help of Perkin Elmer Gas chromatograph equipped with a PE-5MS (30 M x 250 microns x 0.250 microns) capillary column and coupled to a single quadrupole mass detector was operated with electron impact (EI) ionization in positive mode. The oven temperature was programmed from 180°C (14 min hold) to 290°C (14 min hold) @ 10°C/min (total run time 30 min). The sample was prepared taking 80 mg of the 6-mercaptapurine is in 4 ml acetonitrile and water (1:1) as a diluent. Mass spectra were scanned from m/z 20 to 400. The identification of analyte was done by GC retention times and by a comparison of the mass spectra of samples.

The GC-MS based isotopic abundance ratios (P_{M+1}/P_M and P_{M+2}/P_M) for the control and Biofield Energy Treated 6-mercaptapurine was calculated.

Percentage (%) change in isotopic abundance ratio = $[(IAR_{Treated} - IAR_{Control}) / IAR_{Control}] \times 100$

Where $IAR_{Treated}$ = isotopic abundance ratio in the treated sample and $IAR_{Control}$ = isotopic abundance ratio in the control sample.

RESULTS AND DISCUSSION

Liquid chromatography-mass spectrometry (LC-MS)

The LC-MS chromatograms and mass spectra of both the samples of 6-mercaptapurine are shown in **Figures 1 and 2**, respectively. The chromatograms of 6-mercaptapurine showed the single major chromatographic peak at the retention time (R_t) of 2.24 minutes in the case of both the samples (**Figure 1**). These results indicated that the polarity of both the control and Biofield Energy Treated 6-mercaptapurine was the same. As per the literature 6-mercaptapurine was detected with the molecular mass peak $[M]^+$ at m/z 152 MS spectrum in positive ion mode [12]. The mass spectra of both the samples of 6-mercaptapurine (**Figure 2**) exhibited the mass of the protonated molecular ion peak at m/z 153 $[M+H]^+$ (calculated for $C_5H_5N_4S^+$, 153.18) in the control sample and Biofield Energy Treated sample (**Figure 3**).

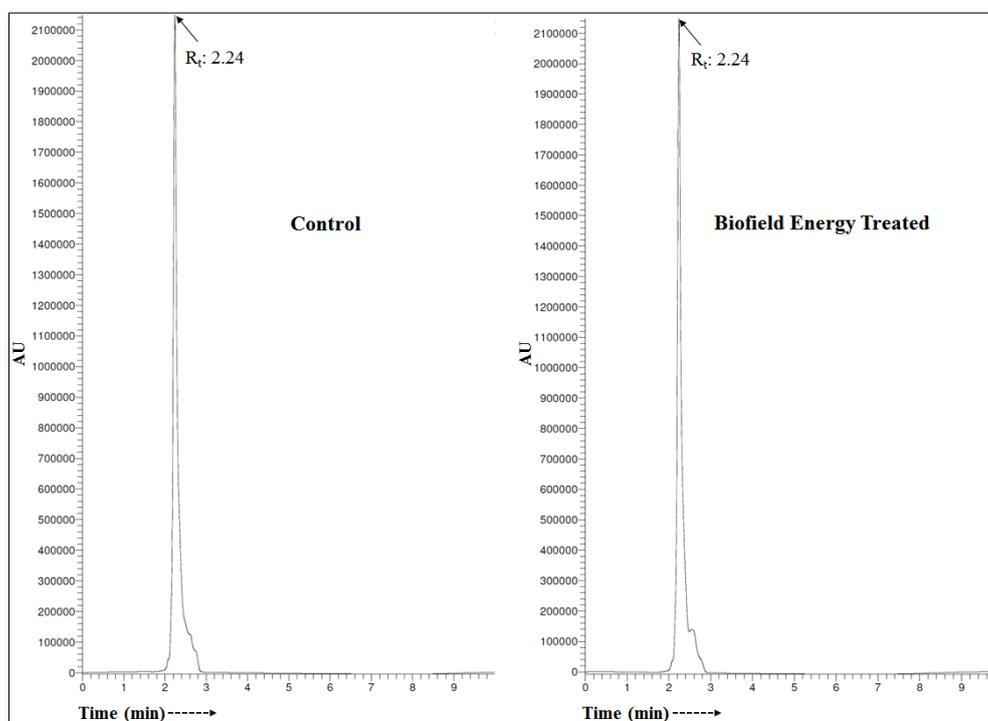


Figure 1. Liquid chromatograms of the control and Biofield Energy Treated 6-mercaptapurine.

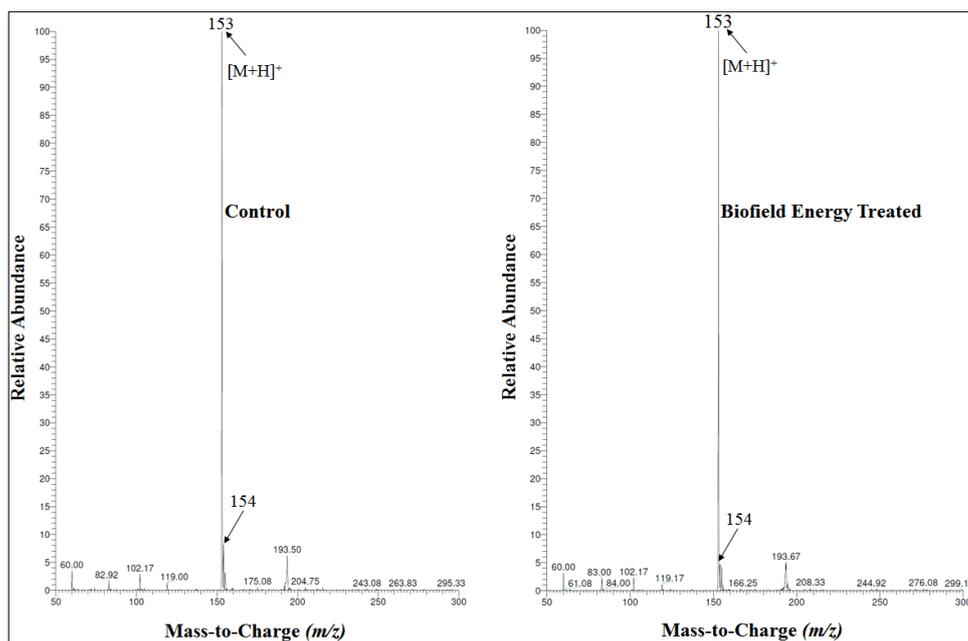


Figure 2. Mass spectra of the control and Biofield Energy Treated 6-mercaptopurine at R_t 2.24 minutes.

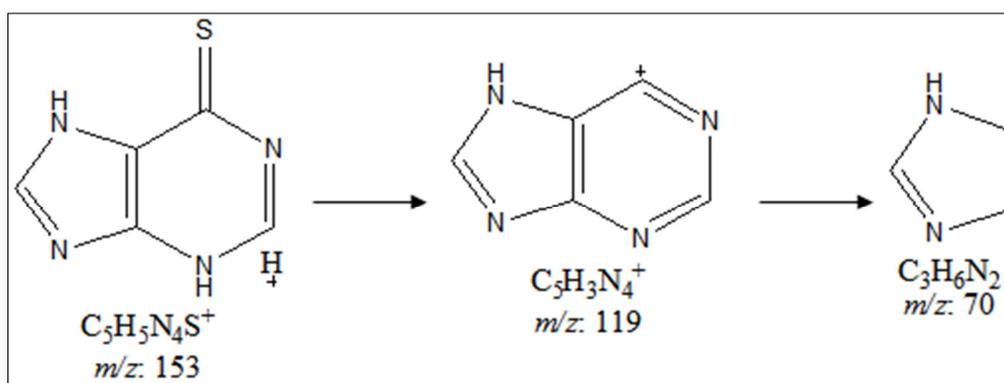


Figure 3. Proposed fragmentation pattern of 6-mercaptopurine.

The LC-MS spectra of both the control and Biofield Energy Treated 6-mercaptopurine showed the mass of the molecular ion peak $[M+H]^+$ at m/z 153 $[M+H]^+$ (calculated for $C_5H_5N_4S^+$, 153.18) with the relative intensity of 100%. The theoretical calculation of P_{M+1} for 6-mercaptopurine was presented below:

$$P(^{13}C) = [(5 \times 1.1\%) \times 100\% \text{ (the actual size of the } M^+ \text{ peak)}] / 100\% = 5.5\%$$

$$P(^2H) = [(5 \times 0.015\%) \times 100\%] / 100\% = 0.075\%$$

$$P(^{15}N) = [(4 \times 0.4\%) \times 100\%] / 100\% = 1.6\%$$

$$P(^{33}S) = [(1 \times 0.08\%) \times 100\%] / 100\% = 0.08\%$$

$$P_{M+1}, \text{ i.e., } ^{13}C, ^2H, ^{15}N, \text{ and } ^{33}S \text{ contributions from } (C_5H_5N_4S)^+ \text{ to } m/z \text{ 154} = 7.26\%$$

The calculated isotope abundance (7.26%) was close to the

experimental value of 8.19% (Table 1). From the above calculation, it has been found that ^{13}C and ^{15}N have a major contribution to m/z 154.

The LC-MS based isotopic abundance ratio analysis P_M and P_{M+1} for 6-mercaptopurine near m/z 153 and 154, respectively of the control and Biofield Energy Treated samples, which were obtained from the observed relative peak intensities of $[M^+]$ and $[(M+1)^+]$ peaks, respectively in the ESI-MS spectra (Table 1). The percentage change of the isotopic abundance ratio (P_{M+1}/P_M) in the Biofield Energy Treated 6-mercaptopurine was significantly decreased by 42.49% compared with the control sample (Table 1). Therefore, it was concluded that the ^{13}C , 2H , ^{15}N , and ^{33}S contributions from $(C_5H_5N_4S)^+$ to m/z 154 in the Biofield Energy Treated sample were significantly decreased compared to the control sample.

Table 1. LC-MS based isotopic abundance analysis results of 6-mercaptopurine in Biofield Energy Treated sample compared to the control sample.

| Parameter | Control sample | Biofield Energy Treated sample |
|---|----------------|--------------------------------|
| P_M at m/z 153 (%) | 100 | 100 |
| P_{M+1} at m/z 154 (%) | 8.19 | 4.71 |
| P_{M+1}/P_M | 0.08 | 0.05 |
| % Change of isotopic abundance ratio (P_{M+1}/P_M) with respect to the control sample | | -42.49 |

P_M : The relative peak intensity of the parent molecular ion [M^+]; P_{M+1} : the relative peak intensity of the isotopic molecular ion [$(M+1)^+$], M : mass of the parent molecule

Gas chromatography-mass spectrometry (GC-MS) analysis

The GC-MS of the control and Biofield Energy Treated 6-mercaptopurine showed the presence of the single chromatographic peak at the retention time of 16.04 min in the chromatogram (Figures 4 and 5). The parent molecular ion peak of 6-mercaptopurine at m/z 152 [M^+] (calculated for

$C_5H_5N_4S^+$, 152.02) in the control sample and Biofield Energy Treated sample, along with the fragment ion peaks near m/z 119 and 70 (Figures 4 and 5) which were proposed corresponded to the molecular formula $C_3H_3N_4^+$ and $C_3H_6N_2^+$, respectively (Figure 3). The mass peak intensities influence the isotopic abundance ratio, which was well supported by the LC-MS based isotopic abundance ratio analysis.

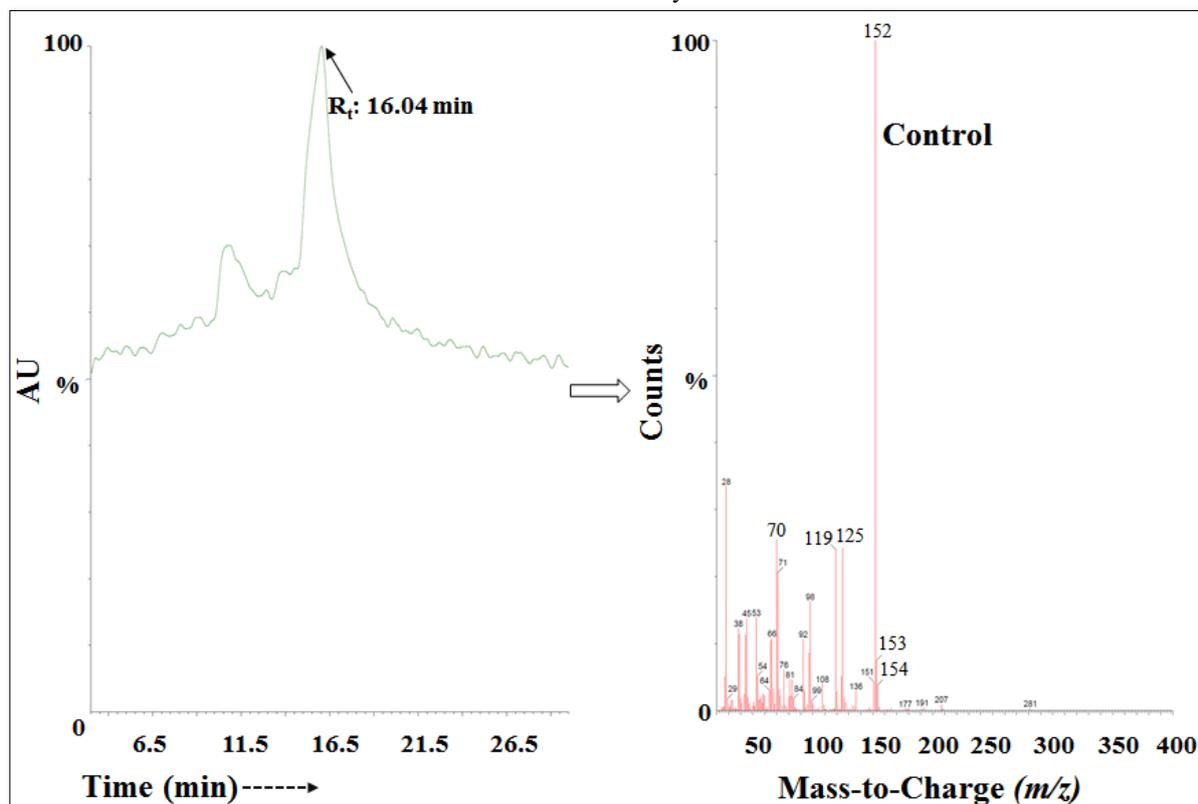


Figure 4. The GC-MS chromatogram and mass spectra of the control 6-mercaptopurine.

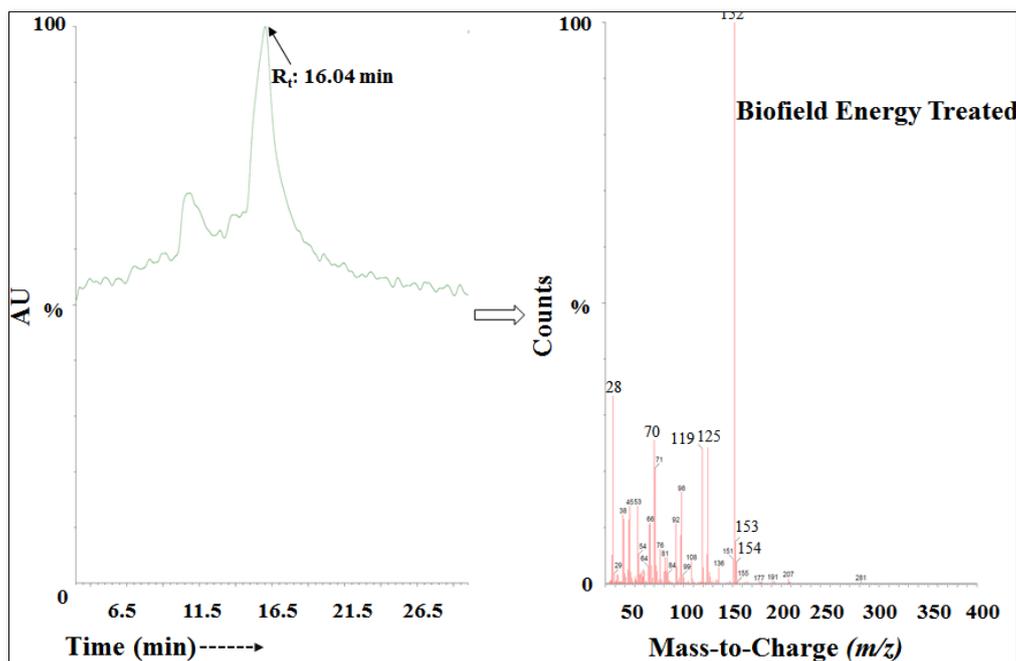


Figure 5. The GC-MS chromatogram and mass spectra of the Biofield Energy Treated 6-mercaptapurine.

The GC-MS spectra of both the control and Biofield Energy Treated 6-mercaptapurine showed the mass of the molecular ion peak $[M]^+$ at m/z 152 (calculated for $C_5H_4N_4S^+$, 152.02). The theoretical calculation of P_{M+1} for 6-mercaptapurine was presented as below:

$$P(^{13}C) = [(5 \times 1.1\%) \times 100\% \text{ (the actual size of the } M^+ \text{ peak)}] / 100\% = 5.5\%$$

$$P(^2H) = [(4 \times 0.015\%) \times 100\%] / 100\% = 0.06\%$$

$$P(^{15}N) = [(4 \times 0.4\%) \times 100\%] / 100\% = 1.6\%$$

$$P(^{33}S) = [(1 \times 0.08\%) \times 100\%] / 100\% = 0.08\%$$

$$P_{M+1}, \text{ i.e., } ^{13}C, ^2H, ^{15}N, \text{ and } ^{33}S \text{ contributions from } (C_5H_5N_4S)^+ \text{ to } m/z \text{ 153} = 7.24\%$$

From the above calculation, it has been found that ^{13}C and ^{15}N have a major contribution to m/z 153.

Similarly, the theoretical calculation of P_{M+2} for 6-mercaptapurine was presented as below:

$$P(^{34}S) = [(1 \times 4.21\%) \times 100\%] / 100\% = 4.21\%$$

$$P_{M+2}, \text{ i.e., } ^{34}S \text{ contributions from } (C_5H_5N_4S)^+ \text{ to } m/z \text{ 154} = 4.21\%$$

From the above calculation, it has been found that only ^{34}S has a major contribution to m/z 153. The calculated isotopic abundances (4.21) were close to the experimental value of 3.8 (Table 2).

The GC-MS based isotopic abundance ratio analysis of 6-mercaptapurine in the control and treated samples were

calculated. P_M , P_{M+1} , and P_{M+2} for 6-mercaptapurine near m/z 152, 153, and 154, respectively of the control and treated samples, which were obtained from the observed relative peak intensities of $[M]^+$, $[M+1]^+$, and $[M+2]^+$ peaks, respectively in the mass spectra and are presented in Table 2. The isotopic abundance ratio of P_{M+1}/P_M in the Biofield Energy Treated 6-mercaptapurine was decreased by 1.34% compared with the control sample (Table 2). Hence, ^{13}C , 2H , ^{15}N , and ^{33}S contributions from $(C_5H_5N_4S)^+$ to m/z 153 in the treated sample were decreased compared with the control sample. However, the isotopic abundance ratio of P_{M+2}/P_M in the treated was significantly increased by 11.58% compared with the control sample (Table 2). Hence, ^{34}S contributions from $(C_5H_5N_4S)^+$ to m/z 154 in the treated sample were significantly increased compared with the control sample.

LC-MS and GC-MS study confirmed the structure of the sample as 6-mercaptapurine. The isotopic abundance ratios of P_{M+1}/P_M ($^2H/^1H$ or $^{13}C/^{12}C$ or $^{15}N/^{14}N$ or $^{33}S/^{32}S$) and P_{M+2}/P_M ($^{34}S/^{32}S$) in the treated sample were significantly altered compared to the control sample. As per modern physics, neutrinos change identities which are only possible if the neutrinos possess mass and could interchange their phase from one phase to another internally. Therefore, the neutrinos could interact with protons and neutrons in the nucleus, which indicated a close relation between neutrino and the isotope formation [19,40,41]. The altered isotopic composition at the molecular level of The Trivedi Effect[®]-Consciousness Energy Healing Treated 6-mercaptapurine might be due to the alteration in neutron to proton ratio in the nucleus. It can be hypothesized that the changes in isotopic abundance

could be due to changes in nuclei possibly through the interference of neutrino particles *via* The Trivedi Effect® - Consciousness Energy Healing Treatment. The new form of 6-mercaptopurine (Biofield Energy Treated) would be

particularly useful to design better pharmaceutical formulations that might offer a better therapeutic response against many diseases.

Table 2. GC-MS based isotopic abundance analysis results of 6-mercaptopurine in control and Biofield Energy Treated samples.

| Parameter | Control sample | Biofield Energy Treated sample |
|---|----------------|--------------------------------|
| P_M at m/z 152 (%) | 100.00 | 100.00 |
| P_{M+1} at m/z 153 (%) | 7.48 | 7.38 |
| P_{M+1}/P_M | 0.07 | 0.07 |
| % Change of isotopic abundance ratio (P_{M+1}/P_M) with respect to the control sample | | -1.34 |
| P_{M+1} at m/z 154 (%) | 3.80 | 4.24 |
| P_{M+1}/P_M | 0.04 | 0.04 |
| % Change of isotopic abundance ratio (P_{M+2}/P_M) with respect to the control sample | | 11.58 |

P_M : The relative peak intensity of the parent molecular ion [M^+]; P_{M+1} : the relative peak intensity of the isotopic molecular ion [$(M+1)^+$]; P_{M+2} : the relative peak intensity of the isotopic molecular ion [$(M+2)^+$], M : Mass of the parent molecule

CONCLUSIONS

The experimental results concluded that The Trivedi Effect® - Consciousness Energy Healing Treatment showed a significant impact on the isotopic abundance ratios and mass peak intensities of 6-mercaptopurine. The LC-MS based isotopic abundance ratio of P_{M+1}/P_M ($^2H/^1H$ or $^{13}C/^{12}C$ or $^{15}N/^{14}N$ or $^{33}S/^{32}S$) in the Biofield Energy Treated 6-mercaptopurine was significantly decreased compared with the control sample. Thus, ^{13}C , 2H , ^{15}N , and ^{33}S contributions from $(C_5H_5N_4S)^+$ in the Biofield Energy Treated sample were significantly decreased compared with the control sample. The GC-MS based isotopic abundance ratio of P_{M+1}/P_M in the Biofield Energy Treated 6-mercaptopurine was decreased as compared with the control sample. Hence, ^{13}C , 2H , ^{15}N , and ^{33}S contributions from $(C_5H_5N_4S)^+$ in the Biofield Energy Treated sample were significantly decreased compared with the control sample. However, the isotopic abundance ratio of P_{M+2}/P_M in the Biofield Energy Treated 6-mercaptopurine was significantly increased compared with the control sample. Hence, ^{18}O contributions from $(C_5H_5N_4S)^+$ in the Biofield Energy Treated sample were significantly increased compared with the control sample. It can be assumed that the changes in isotopic abundance and mass peak intensities could be due to changes in nuclei possibly through the interference of neutrino particles *via* The Trivedi Effect® - Consciousness Energy Healing Treatment (Biofield Energy Healing Treatment). The new form of Biofield Energy Treated 6-mercaptopurine would

be better designing novel pharmaceutical formulations that might offer a better therapeutic response against acute lymphocytic leukemia, chronic myeloid leukemia, Crohn's disease, and ulcerative colitis, etc.

ACKNOWLEDGMENTS

The authors are grateful to the Sophisticated Instrumentation Centre for Applied Research & Testing (SICART) India, Trivedi Science, Trivedi Global, Inc., Trivedi Testimonials, and Trivedi Master Wellness for their assistance and support during this work.

REFERENCES

1. Salser JS, Balis ME (1965) The Mechanism of Action of 6-Mercaptopurine: I. Biochemical Effects. *Cancer Res* 25: 539-543.
2. Dubinsky MC (2004) Azathioprine, 6-mercaptopurine in inflammatory bowel disease: Pharmacology, efficacy and safety. *Clin Gastroenterol Hepatol* 2(9): 731-743.
3. Present DH, Korelitz BI, Wisch N, Glass JL, Sachar DB, et al. (1980) Treatment of Crohn's disease with 6-mercaptopurine: A long-term, randomized, double-blind study. *N Engl J Med* 302: 981-987.
4. Schmiegelow K, Glomstein A, Kristinsson J, Björk O, Salmi T, et al. (1997) Impact of morning versus evening schedule for oral methotrexate and 6-mercaptopurine on relapse risk for children with acute

- lymphoblastic leukemia. Nordic Society for Pediatric Hematology and Oncology (NOPHO). J Pediatr Hematol Oncol 19: 102-109.
5. Sack DM, Peppercorn MA (1983) Drug therapy of inflammatory bowel disease. Pharmacotherapy 3: 158-176.
 6. World Health Organization (2015) 19th WHO Model List of Essential Medicines (April 2015). Available online at: https://www.who.int/medicines/publications/essentialmedicines/EML2015_8-May-15.pdf
 7. Mercaptopurine (2020) Available online at: <https://en.wikipedia.org/wiki/Mercaptopurine>
 8. Yang JJ, Landier W, Yang W, Liu C, Hageman L, et al. (2015) Inherited NUDT15 variant is a genetic determinant of mercaptopurine intolerance in children with acute lymphoblastic leukemia. J Clin Oncol 33: 1235-1242.
 9. Moriyama T, Nishii R, Perez-Andreu V, Yang W, Klussmann FA, et al. (2016) NUDT15 polymorphisms alter thiopurine metabolism and hematopoietic toxicity. Nature Genet 48: 367-373.
 10. Lerner EI, Flashner-Barak M, Achthoven EV, Keegstra H, Smit R (2012) Formulations of 6-mercaptopurine. US patent US8188067 B2.
 11. Ade TB, Hjalgrim LL, Nersting J, Breitzkreutz J, Nelken B, et al. (2016) Evaluation of a pediatric liquid formulation to improve 6-mercaptopurine therapy in children. Eur J Pharm Sci 83: 1-7.
 12. National Center for Biotechnology Information (2020). PubChem Compound Summary for CID 667490, Mercaptopurine. Available online at: <https://pubchem.ncbi.nlm.nih.gov/compound/Mercaptopurine>
 13. Cherson R (2009) Basic pharmacokinetics. 1st ed. Pharmaceutical Press, London.
 14. Trivedi MK, Patil S, Shettigar H, Bairwa K, Jana S (2015) Spectroscopic characterization of biofield treated 6-mercaptopurine and tinidazole. Med Chem 5: 340-344.
 15. Trivedi MK, Mohan R, Branton A, Trivedi D, Nayak G, et al. (2015) Evaluation of biofield energy treatment on physical and thermal characteristics of selenium powder. J Food Nutr Sci 3: 223-228.
 16. Branton A, Jana S (2017) The influence of energy of consciousness healing treatment on low bioavailable resveratrol in male *Sprague Dawley* rats. Int J Clin Dev Anatomy 3: 9-15.
 17. Trivedi MK, Branton A, Trivedi D, Nayak G, Panda P, et al. (2016) Evaluation of the isotopic abundance ratio in biofield energy treated resorcinol using gas chromatography-mass spectrometry technique. Pharm Anal Acta 7: 481.
 18. Trivedi MK, Branton A, Trivedi D, Nayak G, Sethi KK, et al. (2016) Determination of isotopic abundance ratio of biofield energy treated 1,4-dichlorobenzene using gas chromatography-mass spectrometry (GC-MS). Mod Chem 4: 30-37.
 19. Trivedi MK, Mohan TRR (2016) Biofield energy signals, energy transmission and neutrinos. Am J Mod Phys 5: 172-176.
 20. Rubik B (2002) The biofield hypothesis: Its biophysical basis and role in medicine. J Altern Complement Med 8: 703-717.
 21. Nemeth L (2008) Energy and biofield therapies in practice. Beginnings 28: 4-5.
 22. Rivera-Ruiz M, Cajavilca C, Varon J (2008) Einthoven's string galvanometer: The first electrocardiograph. Tex Heart Inst J 35: 174-178.
 23. Rubik B, Muehsam D, Hammerschlag R, Jain S (2015) Biofield science and healing: History, terminology and concepts. Glob Adv Health Med 4: 8-14.
 24. Koithan M (2009) Introducing complementary and alternative therapies. J Nurse Pract 5: 18-20.
 25. Barnes PM, Bloom B, Nahin RL (2008) Complementary and alternative medicine use among adults and children: United States, 2007. Natl Health Stat Report 12: 1-23.
 26. Trivedi MK, Tallapragada RM (2008) A transcendental to changing metal powder characteristics. Met Powder Rep 63: 22-28.
 27. Trivedi MK, Nayak G, Patil S, Tallapragada RM, Latiyal O (2015) Studies of the atomic and crystalline characteristics of ceramic oxide nano powders after bio field treatment. Ind Eng Manage 4: 161.
 28. Trivedi MK, Nayak G, Patil S, Tallapragada RM, Latiyal O, et al. (2015) Effect of biofield energy treatment on physical and structural properties of calcium carbide and praseodymium oxide. Int J Mater Sci Appl 4: 390-395.
 29. Trivedi MK, Branton A, Trivedi D, Nayak G, Mondal SC, et al. (2015) Morphological characterization, quality, yield and DNA fingerprinting of biofield energy treated alphonso mango (*Mangifera indica* L.). J Food Nutr Sci 3: 245-250.
 30. Trivedi MK, Branton A, Trivedi D, Nayak G, Mondal SC, et al. (2015) Evaluation of biochemical marker-

- Glutathione and DNA fingerprinting of biofield energy treated *Oryza sativa*. Am J Bio Sci 3: 243-248.
31. Trivedi MK, Branton A, Trivedi D, Nayak G, Charan S, et al. (2015) Phenotyping and 16S rDNA analysis after biofield treatment on *Citrobacter braakii*: A urinary pathogen. J Clin Med Genom 3: 129.
 32. Trivedi MK, Patil S, Shettigar H, Mondal SC, Jana S (2015) Evaluation of biofield modality on viral load of Hepatitis B and C viruses. J Antivir Antiretrovir 7: 083-088.
 33. Trivedi MK, Patil S, Shettigar H, Bairwa K, Jana S (2015) Phenotypic and biotypic characterization of *Klebsiella oxytoca*: An impact of biofield treatment. J Microb Biochem Technol 7: 203-206.
 34. Nayak G, Altekar N (2015) Effect of biofield treatment on plant growth and adaptation. J Environ Health Sci 1: 1-9.
 35. Ansari SA, Trivedi MK, Branton A, Trivedi D, Nayak G, et al. (2018) *In vitro* effects of biofield energy treated vitamin D₃ supplementation on bone formation by osteoblasts cells. Biomed Sci 4: 10-17.
 36. Koster DA, Trivedi MK, Branton A, Trivedi D, Nayak G, et al. (2018) Evaluation of biofield energy treated vitamin D₃ on bone health parameters in human bone osteosarcoma cells (MG-63). Biochem Mol Biol 3: 6-14.
 37. Trivedi MK, Patil S, Shettigar H, Mondal SC, Jana S (2015) The potential impact of biofield treatment on human brain tumor cells: A time-lapse video microscopy. J Integr Oncol 4: 141.
 38. Trivedi MK, Patil S, Shettigar H, Gangwar M, Jana S (2015) *In vitro* evaluation of biofield treatment on cancer biomarkers involved in endometrial and prostate cancer cell lines. J Cancer Sci Ther 7: 253-257.
 39. Schellekens RC, Stellaard F, Woerdenbag HJ, Frijlink HW, Kosterink JG (2011) Applications of stable isotopes in clinical pharmacology. Br J Clin Pharmacol 72: 879-897.
 40. Weisel CP, Park S, Pyo H, Mohan K, Witz G (2003) Use of stable isotopically labeled benzene to evaluate environmental exposures. J Expo Anal Environ Epidemiol 13: 393-402.
 41. Muccio Z, Jackson GP (2009) Isotope ratio mass spectrometry. Analyst 134: 213-222.
 42. Rosman KJR, Taylor PDP (1998) Isotopic compositions of the elements 1997 (Technical Report). Pure Appl Chem 70: 217-235.
 43. Smith RM (2004) Understanding Mass Spectra: A Basic Approach. Second Edition, John Wiley & Sons, Inc.
 44. Jürgen H (2004) Gross Mass Spectrometry: A Textbook 2nd edition. Springer: Berlin.