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A Clinical and Molecular Pathology Investigation of Correlation Spectroscopy (COSY), Exclusive Correlation Spectroscopy (ECOSY), Total Correlation Spectroscopy (TOCSY), Heteronuclear Single–Quantum Correlation Spectroscopy (HSQC) and Heteronuclear Multiple–Bond Correlation Spectroscopy (HMBC) Comparative Study on Malignant and Benign Human Cancer Cells, Tissues and Tumors under Synchrotron and Synchrocyclotron Radiations Using Cyclotron versus Synchrotron, Synchrocyclotron and the Large Hadron Collider (LHC) for Delivery of Proton and Helium Ion (Charged Particle) Beams for Oncology Radiotherapy

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ABSTRACT

In the current study, we have experimentally and comparatively investigated and compared malignant human cancer cells, tissues and tumors before and after irradiating of synchrotron and synchrocyclotron radiations using Correlation Spectroscopy (COSY), Exclusive Correlation Spectroscopy (ECOSY), Total Correlation Spectroscopy (TOCSY), Heteronuclear Single–Quantum Correlation Spectroscopy (HSQC) and Heteronuclear Multiple–Bond Correlation Spectroscopy (HMBC).

Key words: Clinical Pathology, Molecular Pathology, Biospecroscopy, Malignant and Benign Human Cancer Cells, Tissues and Tumors, Synchrotron Radiation, Synchrocyclotron Radiation, Large Hadron Collider (LHC), Proton and Helium Ion (Charged Particle) Beams, Oncology Radiotherapy

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INTRODUCTION

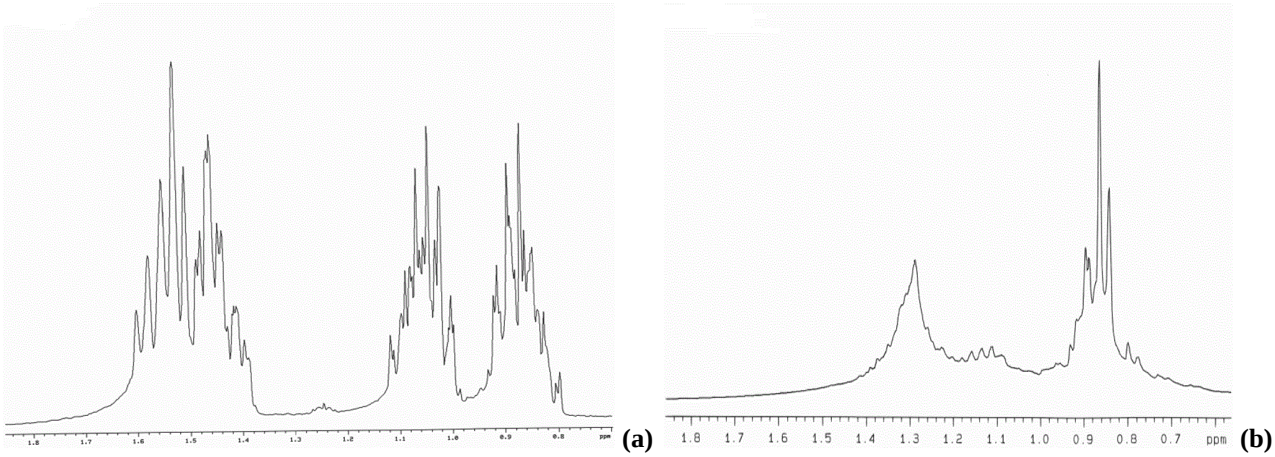
In the current study, we have experimentally and comparatively investigated and compared malignant human cancer cells, tissues and tumors before and after irradiating of synchrotron and synchrocyclotron radiations using Correlation Spectroscopy (COSY), Exclusive Correlation Spectroscopy (ECOSY), Total Correlation Spectroscopy (TOCSY), Heteronuclear Single–Quantum Correlation Spectroscopy (HSQC) and Heteronuclear Multiple–Bond Correlation Spectroscopy (HMBC). It is clear that malignant human cancer cells, tissues and tumors have gradually transformed to benign human cancer cells, tissues and tumors under synchrotron and synchrocyclotron radiations with the passage of time using cyclotron versus synchrotron, synchrocyclotron and the Large Hadron Collider (LHC) for delivery of proton and Helium ion (charged particle) beams for oncology radiotherapy (Figures 1–5) [1–161].

MATERIALS, RESEARCH METHOD AND EXPERIMENTAL TECHNIQUES

In the current research, a clinical and molecular pathology investigation of Correlation Spectroscopy (COSY), Exclusive Correlation Spectroscopy (ECOSY), Total Correlation Spectroscopy (TOCSY), Heteronuclear Single–Quantum Correlation Spectroscopy (HSQC) and Heteronuclear Multiple–Bond Correlation Spectroscopy (HMBC) comparative study on malignant and benign human cancer cells, tissues and tumors under synchrotron and synchrocyclotron radiations using cyclotron versus synchrotron, synchrocyclotron and the Large Hadron Collider (LHC) for delivery of proton and Helium ion (charged particle) beams for oncology radiotherapy was studied.

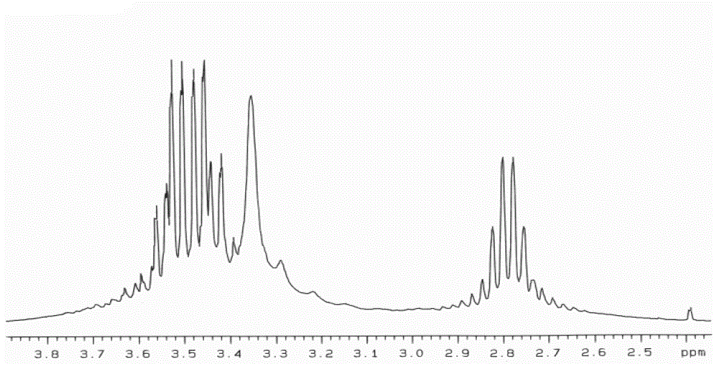
RESULTS AND DISCUSSION

Here, Correlation Spectroscopy (COSY), Exclusive Correlation Spectroscopy (ECOSY), Total Correlation Spectroscopy (TOCSY), Heteronuclear Single–Quantum Correlation Spectroscopy (HSQC) and Heteronuclear Multiple–Bond Correlation Spectroscopy (HMBC) analysis of malignant human cancer cells, tissues and tumors using cyclotron versus synchrotron, synchrocyclotron and the Large Hadron Collider (LHC) for delivery of proton and Helium ion (charged particle) beams for oncology radiotherapy (a) before and (b) after irradiating of synchrotron and synchrocyclotron radiations in transformation process to benign human cancer cells, tissues and tumors with the passage of time was respectively presented (Figures 1–5).

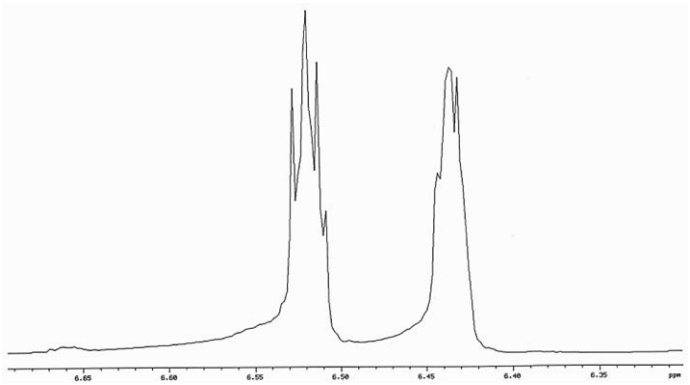


(a) **(b)**

Fig. 1 Correlation Spectroscopy (COSY) analysis of malignant human cancer cells, tissues and tumors using cyclotron versus synchrotron, synchrocyclotron and the Large Hadron Collider (LHC) for delivery of proton and Helium ion (charged particle) beams for oncology radiotherapy (a) before and (b) after irradiating of synchrotron and synchrocyclotron radiations in transformation process to benign human cancer cells, tissues and tumors with the passage of time [1–161].



(a)



(b)

Fig. 2 Exclusive Correlation Spectroscopy (ECOSY) analysis of malignant human cancer cells, tissues and tumors using cyclotron versus synchrotron, synchrocyclotron and the Large Hadron Collider (LHC) for delivery of proton and Helium ion (charged particle) beams for oncology radiotherapy (a) before and (b) after irradiating of synchrotron and synchrocyclotron radiations in transformation process to benign human cancer cells, tissues and tumors with the passage of time [1–161].

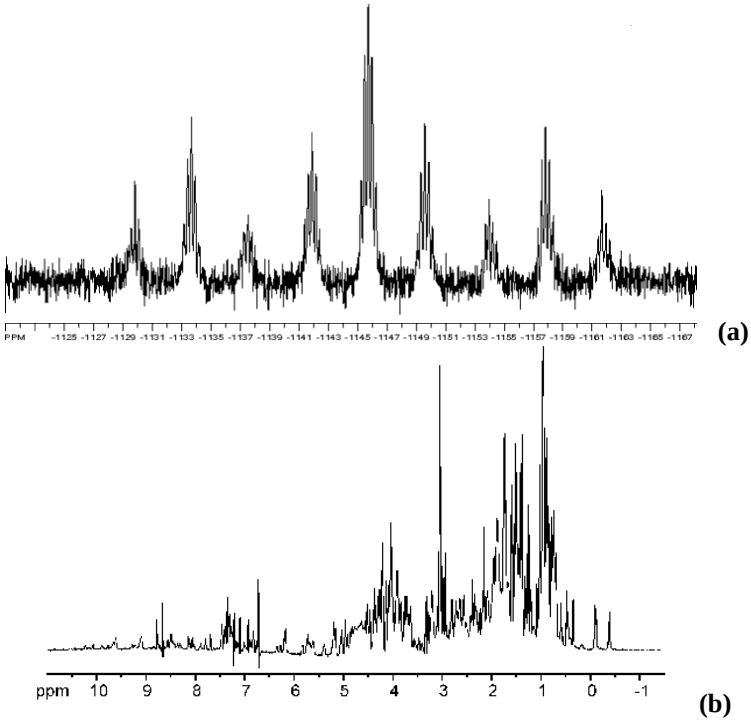


Fig. 3 Total Correlation Spectroscopy (TOCSY) analysis of malignant human cancer cells, tissues and tumors using cyclotron versus synchrotron, synchrocyclotron and the Large Hadron Collider (LHC) for delivery of proton and Helium ion (charged particle) beams for oncology radiotherapy (a) before and (b) after irradiating of synchrotron and synchrocyclotron radiations in transformation process to benign human cancer cells, tissues and tumors with the passage of time [1–161].

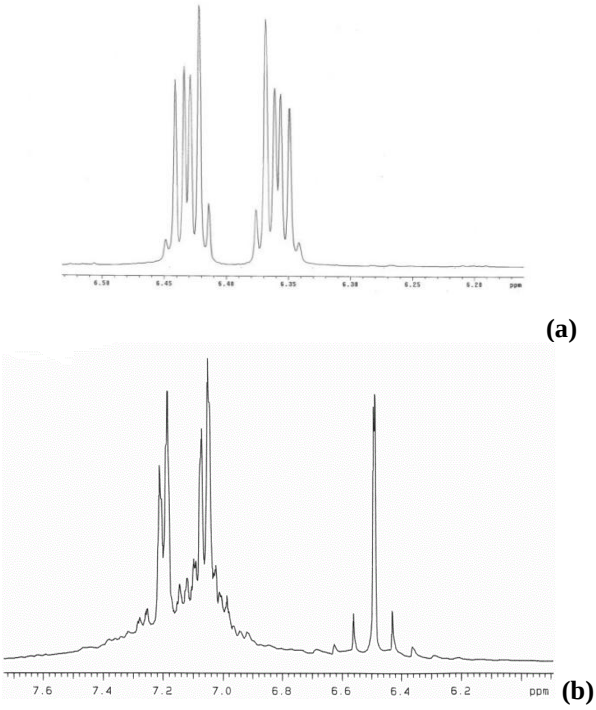


Fig. 4 Heteronuclear Single–Quantum Correlation Spectroscopy (HSQC) analysis of malignant human cancer cells, tissues and tumors using cyclotron versus synchrotron, synchrocyclotron and the Large Hadron Collider (LHC) for delivery of proton and Helium ion (charged particle) beams for oncology radiotherapy (a) before and (b) after irradiating of synchrotron and synchrocyclotron radiations in transformation process to benign human cancer cells, tissues and tumors with the passage of time [1–161].

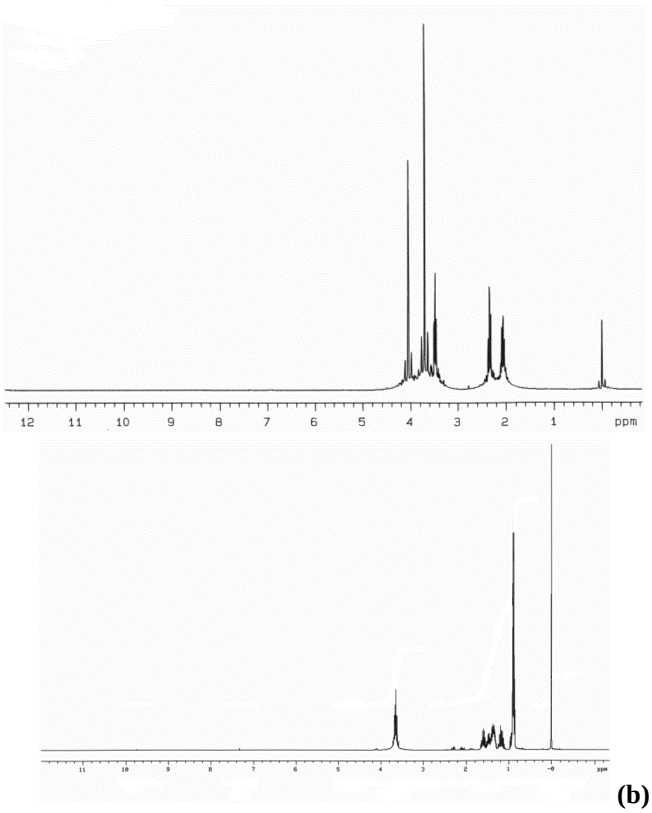


Fig. 5 Heteronuclear Multiple–Bond Correlation Spectroscopy (HMBC) analysis of malignant human cancer cells, tissues and tumors using cyclotron versus synchrotron, synchrocyclotron and the Large Hadron Collider (LHC) for delivery of proton and Helium ion (charged particle) beams for oncology radiotherapy (a) before and (b) after irradiating of synchrotron and synchrocyclotron radiations in transformation process to benign human cancer cells, tissues and tumors with the passage of time [1–161].

CONCLUSIONS, PERSPECTIVES, USEFUL SUGGESTIONS AND FUTURE STUDIES

It can be concluded that malignant human cancer cells, tissues and tumors have gradually transformed to benign human cancer cells, tissues and tumors under synchrotron and synchrocyclotron radiations with the passage of time using cyclotron versus synchrotron, synchrocyclotron and the Large Hadron Collider (LHC) for delivery of proton and Helium ion (charged particle) beams for oncology radiotherapy (Figures 1–5).

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