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Dosimetry of 125I gilia site brachytherapy using Monte Carlo method

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Purpose: One of the applications of 125I, is used to treat brain tumors by injection technique of radioactive liquid inside the balloon Gilia Site in the former site of the tumor which has been surgically implanted. In this treatment the activity utilized is in the range of several hundred mCi, so patients and medical personnel dosimetry in this technique is very important.

Materials/Methods: Dose in the tumor and in the sensitive tissue around that in the period of treatment was calculated when the balloon containing iodine is placed in the tumor. A Glia Site balloon was considered in diameter of 1.5 cm which filled 125I liquid source. The simulations in this research are carried out at all stages with the MCNP code and the VIP phantom was used.

Results: We obtained the duration of treatment to reach the prescribed dose (60Gy in 2mm depth) to the tumor, which for the activity 200mCi was about 8.4 days. Iso-doses were shown that related to the balloon of 125I Liquid in the head. Absorbed dose for healthy tissue in white matter, gray matter and eye lens were calculated 9.12, 5.07 and 0.51 mGy, respectively.

Conclusions: Glia site brachytherapy with 200-300mCi of 125I liquid can be obtained the prescribed dose into the tumor.

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Geo-additive Bayesian model and its application to spatial analysis of malaria problem in Ethiopia

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Background: Malaria is a major public health issue in Ethiopia in terms of both morbidity and mortality, with about 4-5 million Ethiopians affected each year. Because malaria is a serious problem and has severe health and economic burden, it is important to apply methods that will help understand influencing factors. Therefore, this study considers modelling of the dependence of malaria cases on spatial determinants and socio-economic, demographic and geographic variables.

Methods: The analysis carried out in this work exploits the household cluster malaria survey which was conducted from December 2006 to January 2007. A total of 224 clusters of about 25 households were selected each from the Amhara, Oromiya and Southern Nation Nationalities and People (SNNP) regions of Ethiopia. Semi-parametric regression models are used. The spatial analysis is based on a geo-additive model using Kebele as the geographic units of study.

Results: The results showed that households in the SNNP region were found to be at more risk than Amhara and Oromiya regions. Households which have toilet facilities, clean drinking water, and a greater number of rooms and mosquito nets in the rooms have less chance of having household members testing positive for malaria rapid diagnosis test. Moreover, from this study, it can be suggested that incorporating spatial variability is necessary for understanding and devising the most appropriate strategies to reduce the risk of malaria.

Conclusions: In this paper, semi-parametric models were used to model the effects of both socio-economic, demographic and geographic covariates and spatial effects on malaria distribution in Ethiopia. The results obtained from the proposed model suggest a strong positive association between malaria rapid diagnosis test and socio-economic, demographic and geographic factors. From the spatial effects, important spatial patterns of malaria were identified.

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Page 84