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Targeted cancer therapy with the alpha emitter actinium-225

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The targeted treatment of cancerous tumors by alpha-emitting radionuclides has shown remarkable efficacy in recent clinical trials [1]. It is likely that this treatment option will ultimately be applicable to a wide range of cancers and other diseases, subject to the development of specific carrier molecules. Currently Ac-225 is being produced from natural ingrowth in existing stocks of Th-229. However, future wide application for radiotherapy will require many orders of magnitude more radionuclide than can currently be produced. Consequently, following up on earlier work at the European Commission's Joint Research Centre (JRC) [2], we are pursuing various alternative production methods. In this paper, an overview of internal radiotherapy with alpha emitters is given, along with recent clinical experience, as well as possible schemes for the large-scale production of Ac-225 using different target materials and irradiation facilities.

[1] A. Morgenstern et al., "An overview of targeted alpha therapy with 225actinium and 213bismuth," *Curr. Radiopharm.* 11 (2018) 200.

[2] C. Apostolidis et al., "Cyclotron production of Ac-225 for targeted alpha therapy," *Appl. Radiat. Isot.* 62 (2005) 383.

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