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Enhanced Computer Tomography Provides Highest Resolution Images

Computer tomography (CT) is used in cancer diagnostics as a standard method for detecting tumors in the body. However, its resolution is too low to facilitate imaging of detailed tissue structures. In a recent article published in Nature Medicine, Dr. Fabian Kiessling, Division of Medical Physics in Radiology, German Cancer Research Center (DKFZ), and Dr. Susanne Greschus, Department of Neuroradiology at the University of Gießen, Germany, have reported about a further development of the standard method which provides highest resolution images within seconds.

So far, computer tomography (CT) and magnetic resonance tomography (MRT) have been used for obtaining images of tumors and their blood supply in the body. The resolution, however, is not high enough to provide images of small vessels that supply a tumor with blood. Although this is possible using micro-CT (µCT), this technique requires long scanning times and high radiation doses. Therefore, this method is suitable only for examining tissue samples and, with considerable limitations, small animals.

The new method explored by Kiessling is called flat panel volumetric computed tomography (fpVCT) and is based on a novel detector system which facilitates short scanning times with 3-dimensional imaging and highest resolution. Thus, researchers were able to obtain a complete scan of a nude mouse in 16 seconds with a resolution that is 8-16 times better than in standard CT. In addition, a change in scanning technique makes it possible to visualize either soft tissue with skin and muscles or the skeleton and vessels. Thus, a tumor within the body can be localized precisely .

The device developed by General Electrics has so far been used only in small animal research; in the long term, it will be employed in clinical practice, too. According to Kiessling, fpVCT has the potential of playing an important role in clinical practice in the future. In humans, it will be used, for example, for obtaining images of fine structures in nodes smaller than 1 cm and for capturing and measuring secondary tumors in the body. A first animal study has shown that fpVCT makes it possible to distinguish between veins and arteries; it also enables physicians to perform repeated examinations for continuous and detailed monitoring of the effects of non-invasive tumor therapy.

Fabian Kiessling, Susanne Greschus, Matthias P. Lichy, Michael Bock, Christian Fink, Silvia Vosseler, Jens Moll, Margareta M. Mueller, Norbert E. Fusenig, Horst Traupe & Wolfhard Semmler: Volumetric computed tomography (VCT): a new technology for noninvasive, high-resolution monitoring of tumor angiogenesis. Nature Medicine 10 (10), 1133-1138, October 2004

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