Contribution ID: **35** Type: **not specified**

Tissue characterization in vivo before, during and after ablation procedures with synchrotron radiation

Wednesday 24 June 2020 14:50 (20 minutes)

In modern medical treatment especially of tumor diseases, the interventional ablation using localized application of energy like e.g. microwave based or radiofrequency based ablation is becoming more and more important in curing of small tumor lesions (typically below 3 cm diameter). The curing rates are very good. However, in some cases, recurrence of the cancer is documented. The problem is actually, that in CT imaging neither the correct boundaries of the tumor can be detected with 100% accuracy, nor e.g. the temperature distribution during a microwave ablation nor the boundaries of the destroyed tissue during the ablation can really be seen. Thus, in some cases, the procedure is not destroying the whole tumor. Then the tumor can start growing again. Or the region that is destroyed is too large and there is healthy tissue destroyed which could effect the health status of the patients as well. In the worst case destroyed healthy tissue might result in secondary tumors. Since the ablation cannot be monitore in MRI or US, an x-ray based method is needed. Due to scatter of the large CT beam as well as the broad energy spectrum the contrast in CT is not sufficient for detecting the subtle differences. Using monoenergetic pencil beams, one could do scatter imaging and or speckle imaging to characterize the tissue differences and the changes during the procedure. The information from both imaging methods can be evaluated using AI based methodology. If that imaging and evaluation is successful, that would really benefit the patients because it would allow the optimal destruction of tumors for example in the liver or the lung or maybe even the pancreas while reducing the chance for recurrence and sparing healthy tissue. Certainly there would also be other applications of such imaging approaches even for tissue characterization in diagnostics.

This will obviously need to be proven on in vivo imaging procedures. Thus, we plan, first to develop the procedures, then measure biopsies, afterwards check with tissue that is going to be engineered and then perform in vivo animal studies, with the ablation being performed in-between two imaging sessions.

Primary author: Prof. HOESCHEN, Christoph (Otto-von-Guerike University)

Co-authors: Prof. GRÜNER, Florian (CFEL / UNI-HH); Dr MAHMOODIAN, Naghmeh (Otto-von-Guericke Universität Magdeburg); Dr MACIEJ, Pech (Otto-von-Guericke Universität Magdeburg); Dr WEIMANN, Steffen (Otto-von-Guericke Universität Magdeburg)

Presenter: Prof. HOESCHEN, Christoph (Otto-von-Guericke University)