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#### ● Welcome

In this month's edition, we will focus on the automatic selection of a region of interest in CTAnalyzer. More specifically we will learn how to separate trabecular and cortical bone with an automated task list without manual input. This task list can be applied to all your samples, maximizing throughput.

#### ● Automatic separation of trabecular and cortical bone

Biomedical research on bone development and pathology often involves studying the bone phenotype of genetically modified mouse and rat strains. In practice, quantitative and qualitative analysis of long bone morphometry is subdivided into the analysis of the trabecular bone and the analysis of the cortical bone separately. To do so, one has to adequately set a region of interest corresponding to either the trabecular bone or the cortical bone. This region of interest selection is usually done manually for every individual bone. Furthermore, per bone multiple regions of interest have to be created on several slices throughout the 3D data volume, which turns it into a very time-consuming task. On top, manual selection of a region of interest is not always objective and thus has a low reproducibility.

With CTAnalyzer software, this selection of the trabecular and cortical region of interest can be done automatically by setting up a task list in custom processing. This way of region of interest selection is not only faster, it can also be performed in a batch and is more accurate compared to manual drawing, thereby increasing reproducibility and lowering variation.

Method note [MN008v2 Automated trabecular and cortical bone selection](#) discusses in detail how to automatically make trabecular and cortical selections in long bones:

1. Reposition the dataset in DataViewer: the data are repositioned as such that the long axis of the bone runs along the Z-axis. The cross-sectional images are then saved as a dataset which is loaded in CTAn.

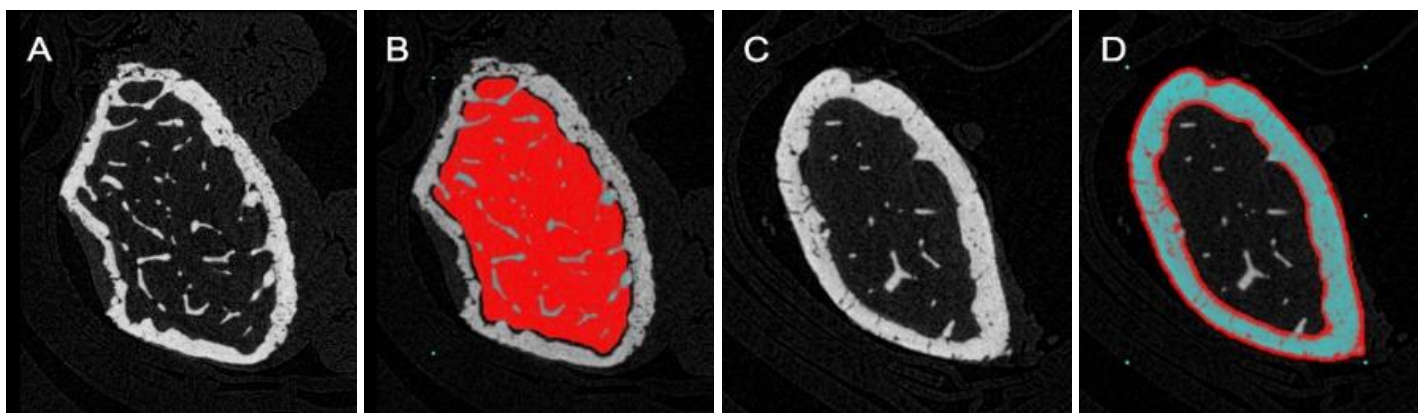


Figure: (A) Representative cross-sectional image through a mouse femur metaphysis where trabecular bone parameters are typically calculated. (B) Automatic trabecular selection of (A) is illustrated in red.

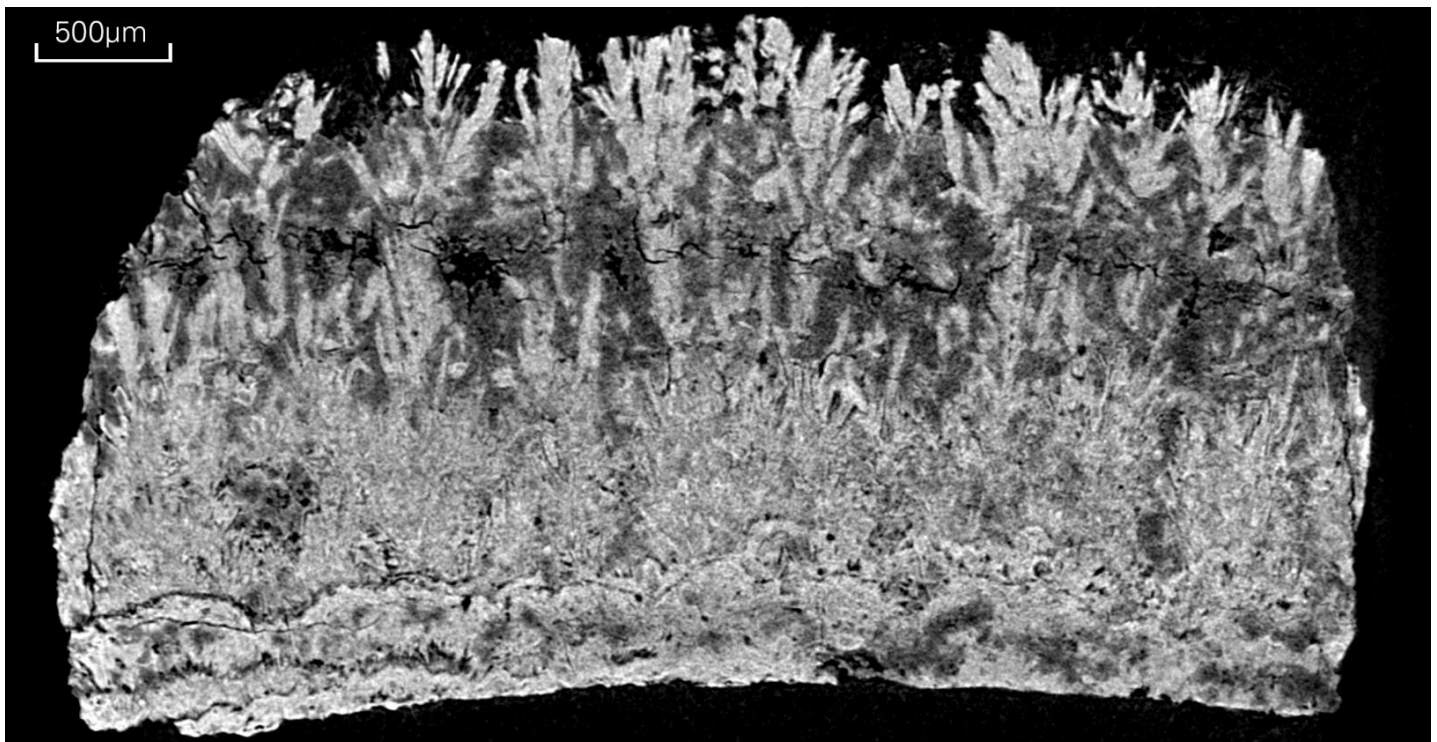
(C) Representative cross-sectional image through a mouse femur diaphysis where cortical bone parameters are typically analyzed. (D) Automatic cortical selection of (C) is illustrated in red.

2. Save a ROI dataset: with the growth plate as a reference point, a sub volume of data is saved for the metaphysis (trabecular analysis) and diaphysis (cortical analysis). No region of interest should be applied in the XY plane.
3. Run the task list: all sub volumes saved in step 2 can now be loaded as a batch in the CTAn Batman software to be processed automatically with the task list described in the linked method note.

One has to note that this procedure assumes a rather 'normal' bone morphometry. When this assumption is not fulfilled, the region of interest section may be imperfect, for example when large fragments of the bone are resorbed (i.e. osteolytic bone tumors) or when trabecular and cortical bone have a very similar appearance (i.e. severe osteopetrotic bone phenotypes). In the latter cases, a manual approach can't be avoided.

## ● Image of the Month

Reconstructed slice through a Kidney stone (size 3\*2.5\*5 mm) scanned with the SkyScan 1172 (60kV, 0.5mm Al filter, 2µm pixel size). It's composed out of Brushite (35%), Carapatite (35%) and Struvite (30%). The feather-like structure is made of Brushite, which grows and spreads from the bottom of the stone, assumed to be the origin. This component is produced in pathologies that lead to urinary calcium and phosphate super saturation, such as hyperparathyroidism. The kidney stone was provided by the Laboratory of Clinical Chemistry, University Hospital of Liège, Sart-Tilman (Belgium).



## ● Bruker microCT News

- We are hiring! All vacancies can be found at [our website](#). If you wish to be a part of our international team and successful company, please email your motivation letter and detailed curriculum vitae to [info.BmCT@bruker.com](mailto:info.BmCT@bruker.com).
- Updates (August 2015) for NRecon, CTVOX and DataViewer are available from [our website](#).

## ● Upcoming events

Bruker microCT will participate with an exhibit in the forthcoming conferences. Please click the link below for more information. We hope to see you there!

- [BCEIA](#) Oct. 27-30 Beijing, China
- [PEFTEC](#) Nov.18-19 Antwerp, Belgium
- [MRS](#) Nov.29 - Dec.04 Boston, USA