



Welcome to the January 2017 Issue of the  
Department of Radiology Newsletter!

**Researcher Feature:** Charlie Daniels



Hyperpolarized MRI with  $^{13}\text{C}$ -labelled compounds allows *in vivo* metabolic processes to be characterized non-invasively. The conversion of  $^{13}\text{C}$ -pyruvate to  $^{13}\text{C}$ -lactate has been shown to correlate with both tumor grade and treatment response, however accurate and robust quantification of metabolic changes is imperative in order to make reliable inter- and intra-patient comparisons and to inform clinical decisions. Such analysis of imaging data typically makes use of a defined region or volume of interest (VOI), however results may be very sensitive to the exact definition of the VOI. Simple methods such as thresholding are particularly unsuitable due to the interdependence of metabolite intensities and rapidly changing temporal dynamics.

As part of the  $^{13}\text{C}$  imaging group with Dr. Ferdia Gallagher, Charlie has been working on an unsupervised algorithm for the segmentation of  $^{13}\text{C}$  data in order to automatically detect regions of abnormal metabolism. This offers a unique challenge due to the low spatial resolution, high noise and susceptibility to artifacts and inherent 5-dimensionality (3D spatial, 1D temporal, 1D spectral) of the data. The segmentation uses a hybrid fuzzy Markov random field (MRF) model, which incorporates spatial, temporal and spectral information into Bayesian priors, whilst the incorporation of fuzzy logic effectively handles the low image quality currently associated with hyperpolarized MRI. Figure 1. shows the results of the segmentation applied to data from two rats with subcutaneously implanted tumors.

In an ongoing collaboration with Moffitt Cancer Centre, Tampa FL, Charlie has also been working on mathematical modelling of ovarian cancer under the supervision of Dr. Alexander Anderson. She has built and is now analysing an exploratory simulation model to investigate the role of cancer associated fibroblasts on tumor growth under different tissue conditions. A related project aims to analyse and explain the trends identified in PET data gathered over a course of treatment with a simple model of metabolism and inflammatory response. Finally, she is working more generally on the hyperpolarizer project with Ferdia Gallagher, James Grist, Surrin Deen, Fulvio Zaccagna and the rest of the hyperpolarizer team, preparing to analyse the patient data which is now starting to be produced.

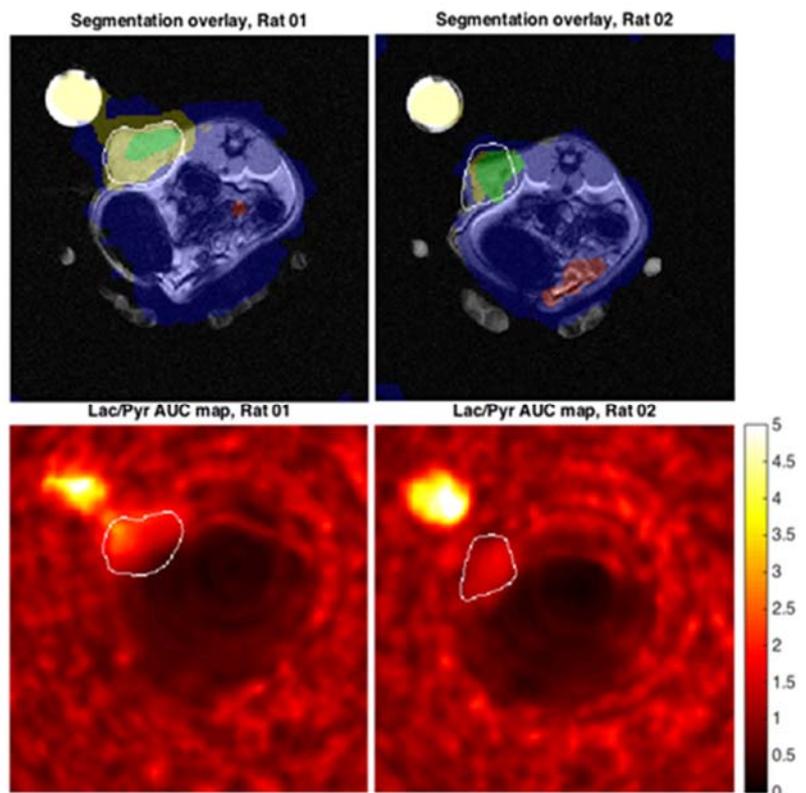


Figure 1. Segmentation maps (above) and corresponding lactate/pyruvate area under the curve (AUC) maps for two rats. Segmentation map shows no conversion (blue), low conversion (yellow), high conversion (green) and alanine production (red). Anatomical tumor boundary in white.

## Department News

We are excited to welcome two new MPhil Students this January!



### **Laura Lechermann**

Laura will be supervised by Dr Ferdia Gallagher and her project is on the “Development of zirconium labelling cancer detection and staging”



### **Julia Carmona**

Julia will be supervised by Professor Fiona Gilbert and her project is on the “Influence of tumoral therapy on perfusion parameters using DCEMRI in estrogen receptor positive and HER2 positive breast cancers”

**This was a short issue! Watch out in the next issue of the Department of Radiology Newsletter for the schedule of ECR Presenters from our department.**

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## **OPEN ACCESS REMINDER**

This is a friendly reminder to all department members who may have upcoming publications. Since HEF-CE’s policy change, in order for any publications to be eligible for REF they must be made Open Access. We want to make sure that as a department we are 100% compliant. The university has a team in place dedicated to making sure this process is as simple as possible. The basics:

**When a journal accepts your paper for publication, [upload it here](#), before you sign any copyright or Open Access agreements.**

See this page for more information: <https://www.openaccess.cam.ac.uk/what-do-i-need-to-do>

You can also contact the open access team directly at: [info@openaccess.cam.ac.uk](mailto:info@openaccess.cam.ac.uk)

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## **Clinical Temporary Location**

As you probably know by now, due to renovations the Clinical School offices have been temporarily (June 2016 - April 2017) relocated to Bay 13 of the old Laboratory of Molecular Biology building. This is across from the hospital Outpatients Entrance. The best place to find details about the move, the temporary location and how the services available will change is this medical library page: <https://cscs.medschl.cam.ac.uk/blog/clinical-school-decant-18-july-2016/>

## Department Website

In every newsletter, we will be requesting that all department members – **including students** - do three things for us:

1 – Please ensure that your Symplectic account is up to date. We pull publication data for the website using this database, so to make sure your publications are up to date on the website, this account must be up to date.

2 – Please send us any news or information about the projects you're working on! We want to publicise the department's achievements as much as possible, and get your names out there.

It goes without saying that it is essential in the current academic market to promote your work, and we want to help you do that!

3 – We will be updated the website staff profiles to new versions soon. Let us know if there is anything you'd like to have included in the new format!

## IT Updates

By now you should all have had a chance to access the Internal Website at

<http://radiology.medschl.cam.ac.uk/internal/>

Please let us know if there's anything you'd like to see added there, either by emailing Ralph, or by filling in the department feedback form here:

<http://radiology.medschl.cam.ac.uk/internal/feedback/>

## Feedback

We are currently working hard to improve communication and development within the department, and a big part of that work requires feedback from you. We are open to hearing any feedback or suggestions you have. If you'd like to provide feedback on anything department related, in addition to coming to see us, you can now provide it through a feedback form located on the Internal website via this link:

**We want to hear from all of you in relation to achievements, updates, news and any information you would like to share with the Department.**