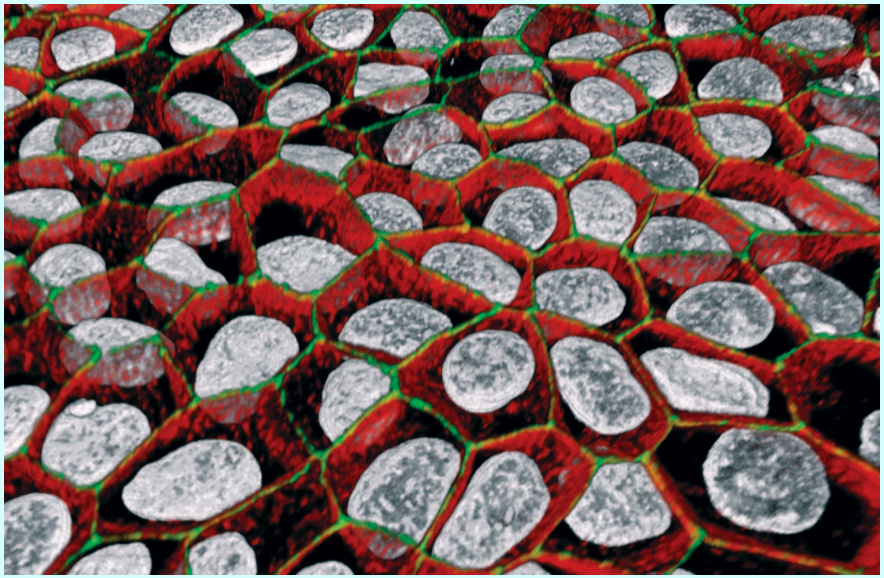
Can we use a recent quantitative
structural characterisation of disordered foams
for early detection of metastasis risk



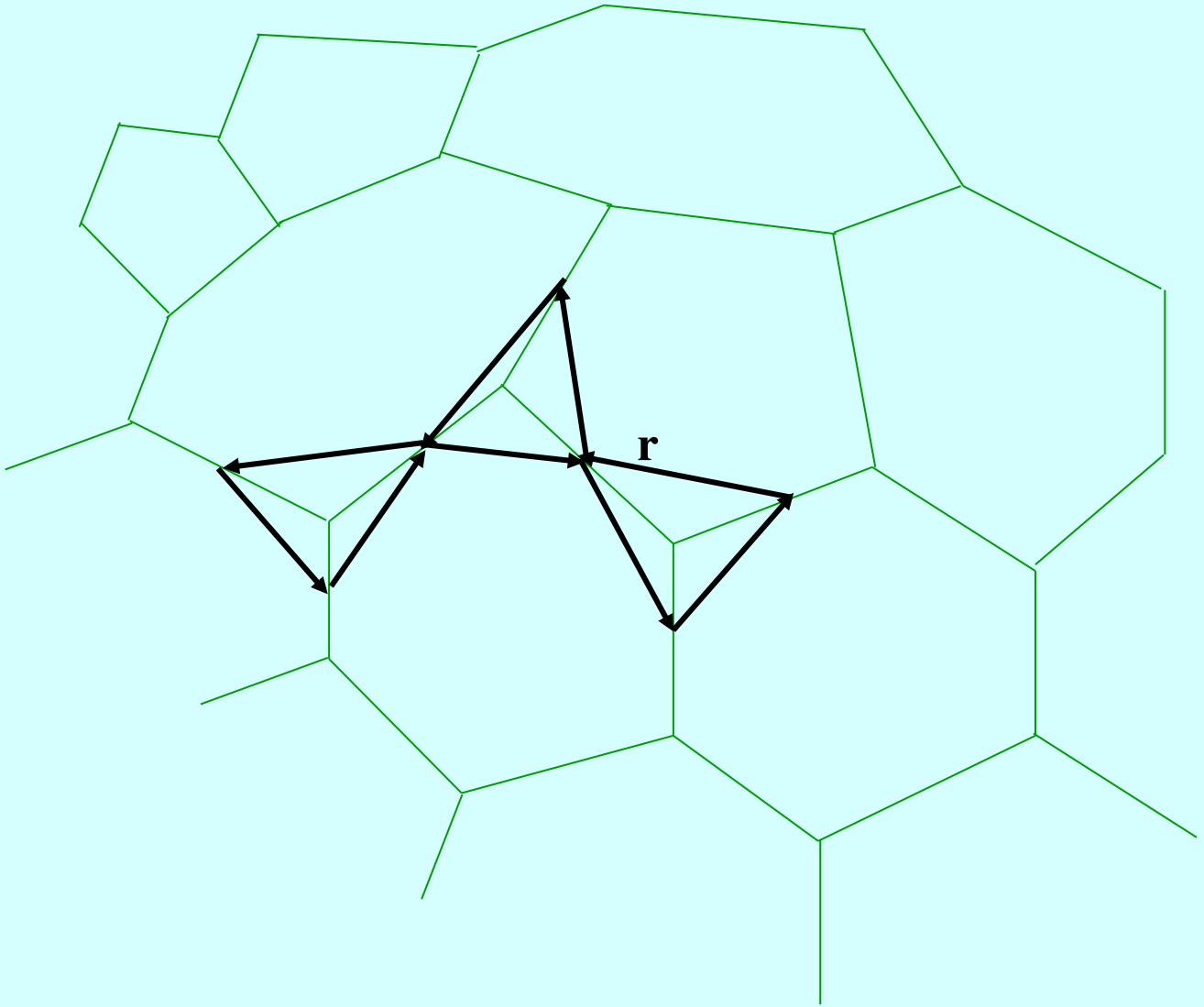
Rafi Blumenfeld

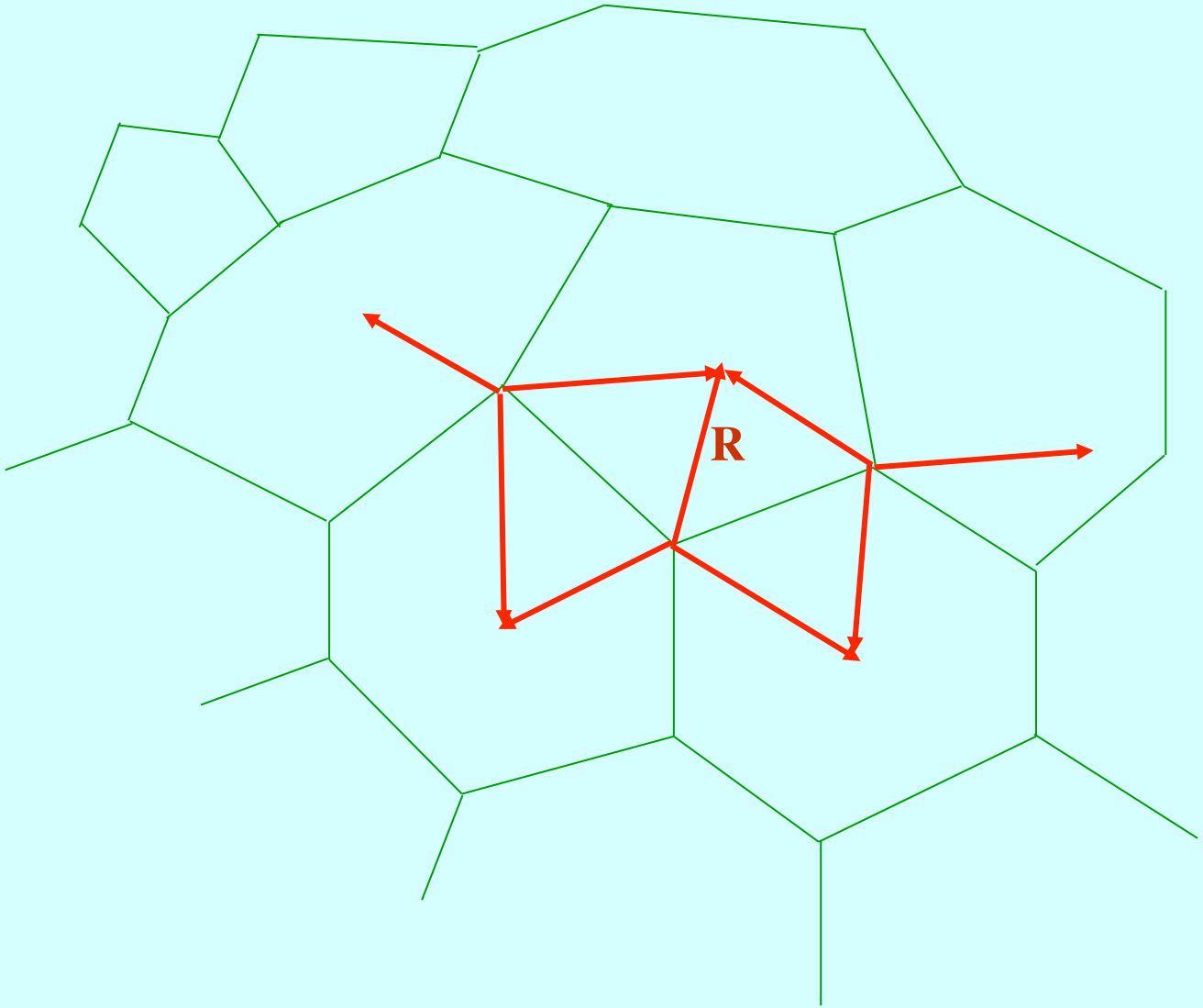
Synopsis:

- Brief description of the characterisation method
- The method's advantages
- Aim of presentation:

  Looking for a collaboration to explore potential application to early detection of metastasis risk

Quantifying the structure – quadron construction

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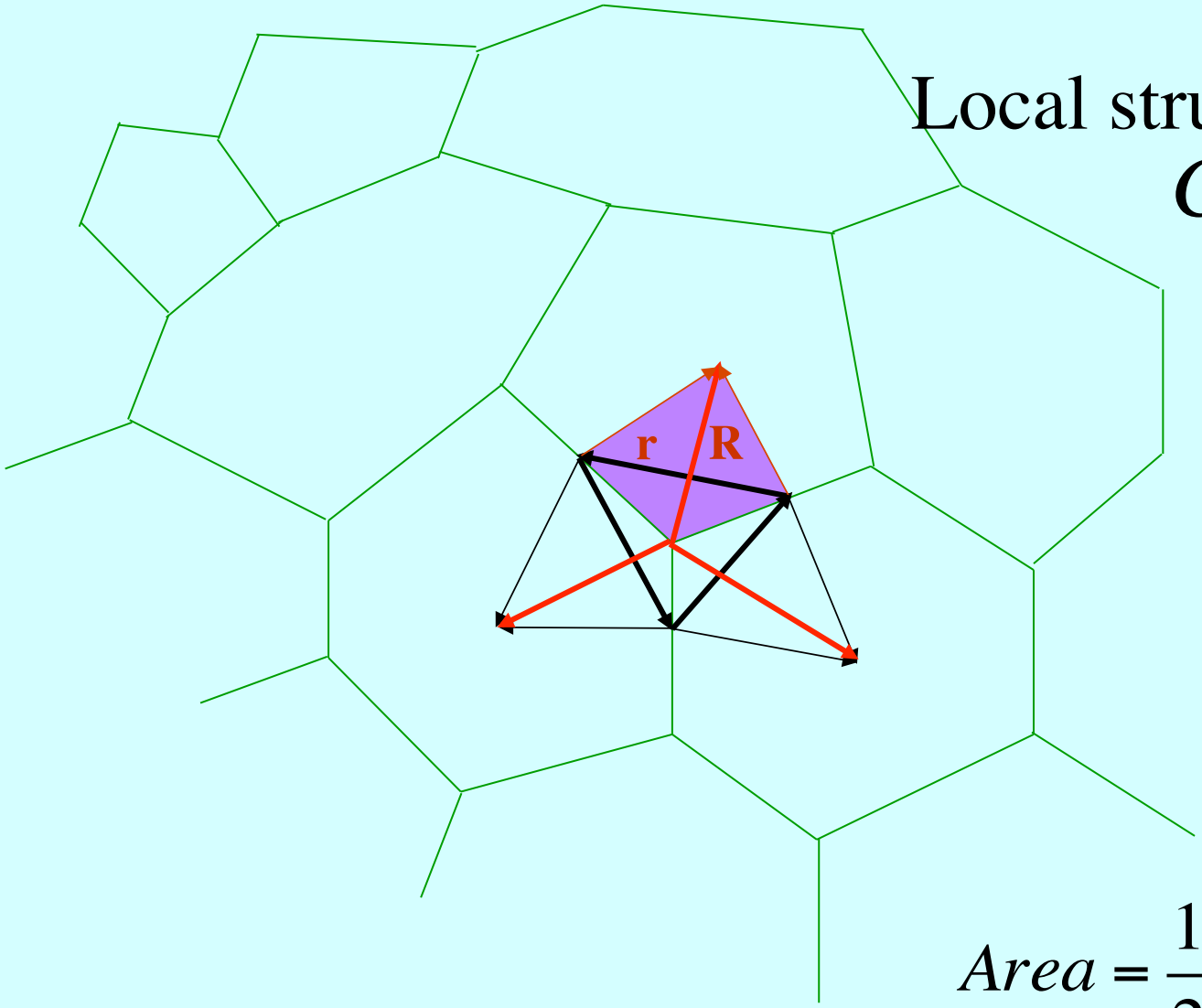
Quantifying the structure – structure tensor

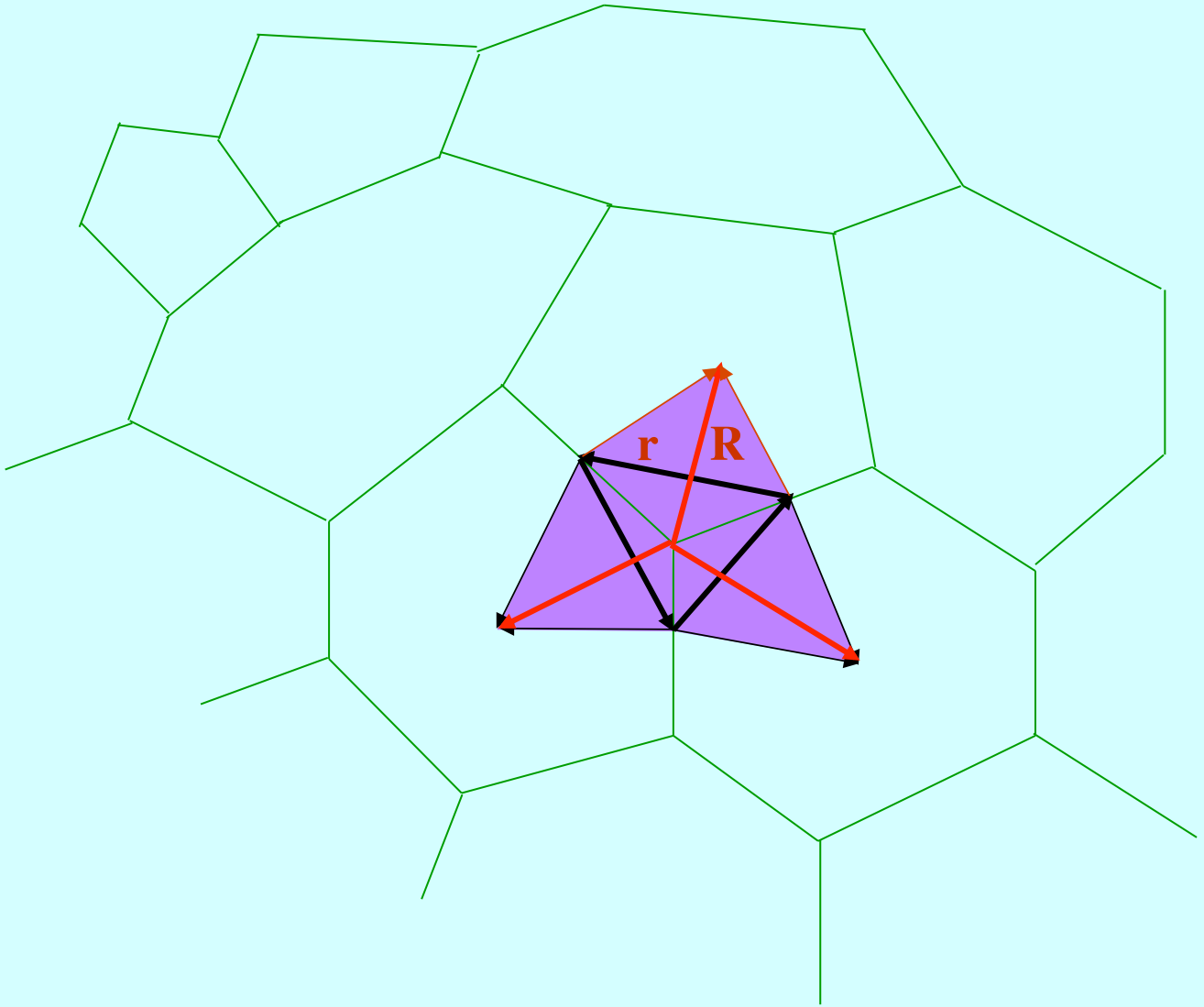


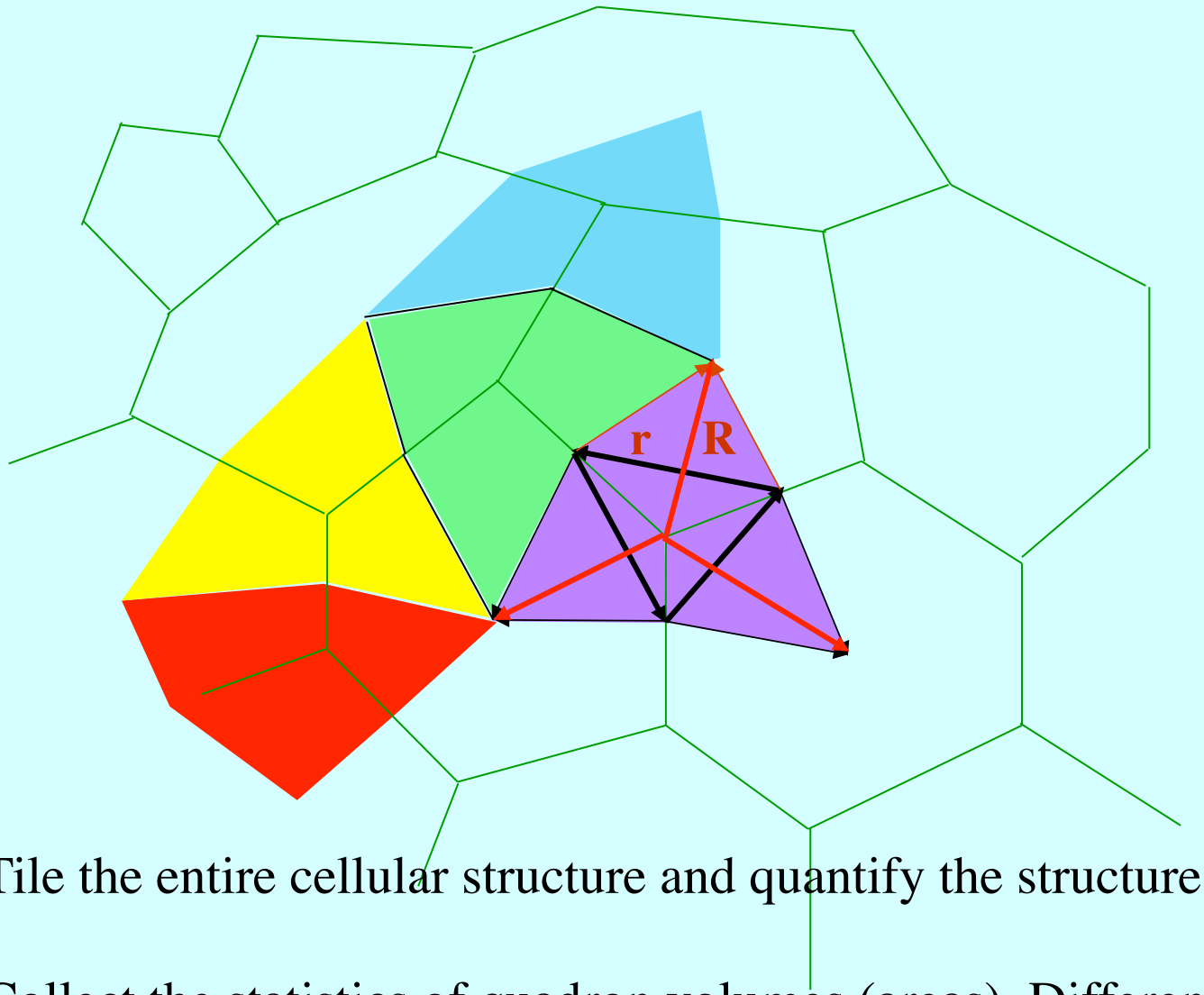
Local structure tensor

$$C_{ij} = r_i R_j$$

$$Area = \frac{1}{2}\left(r_x R_y - r_y R_x\right)$$

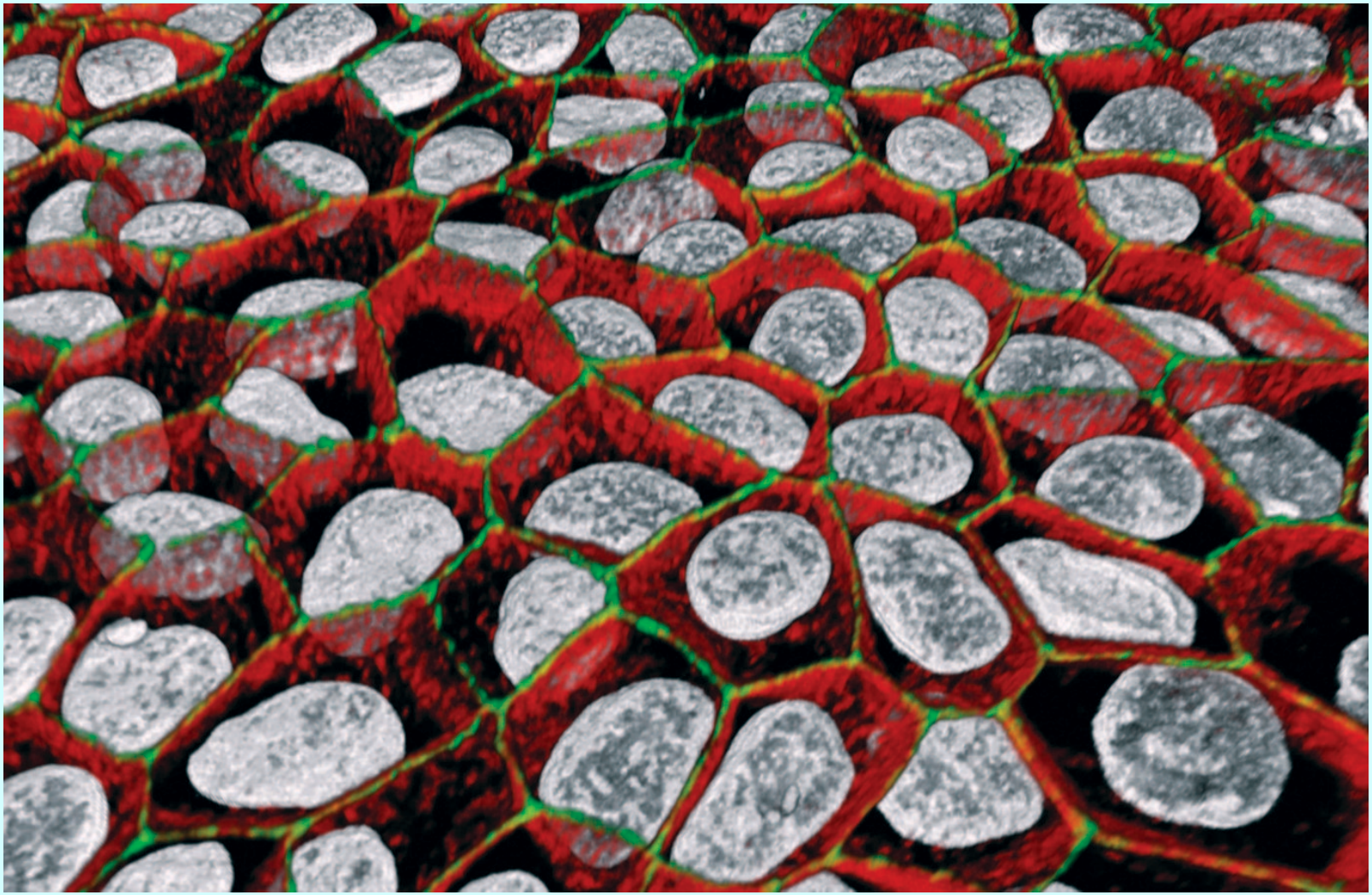
Quantifying the structure – tiling the space



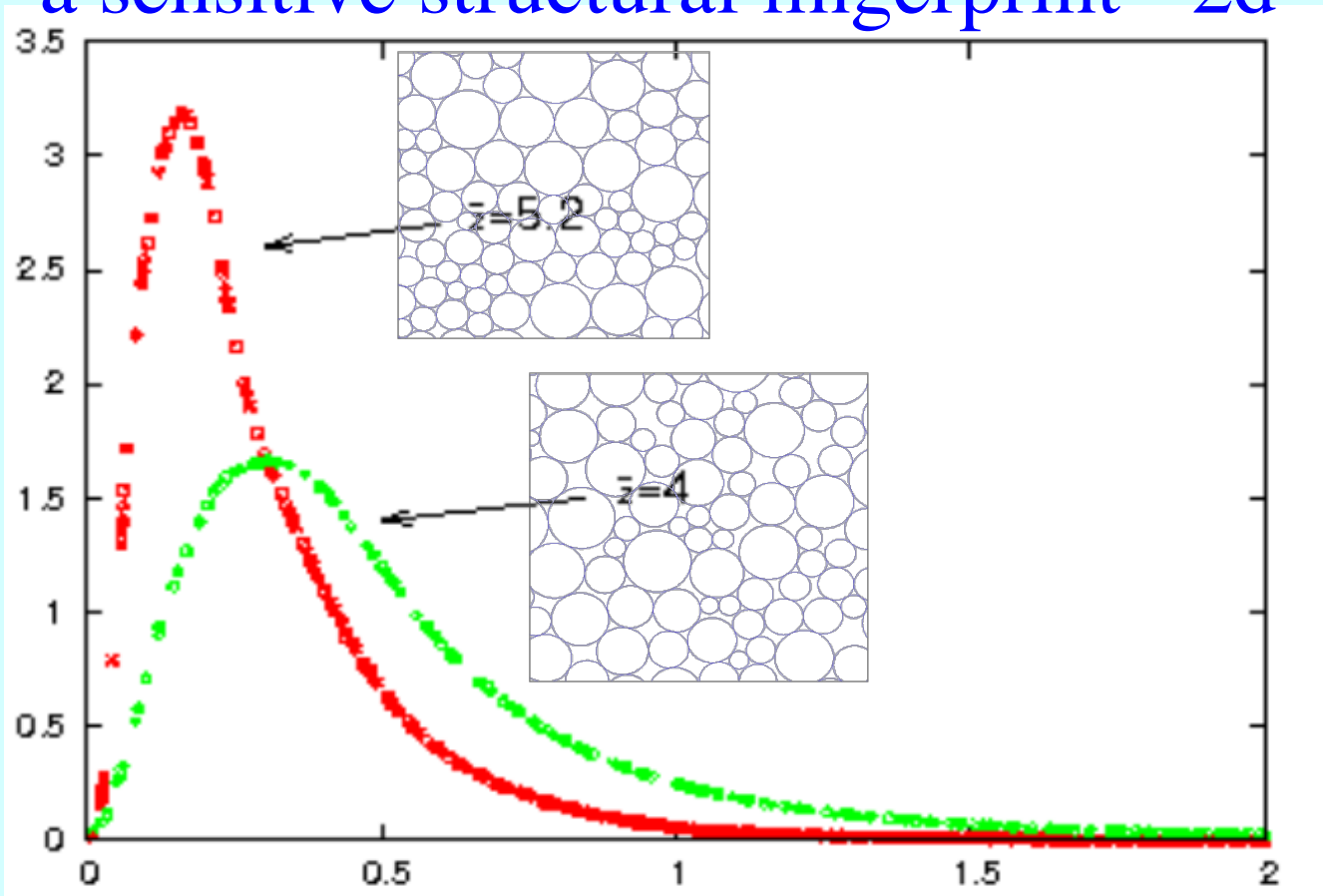


1. Tile the entire cellular structure and quantify the structure at every quadron.

2. Collect the statistics of quadron volumes (areas). Different systems have different statistics.



The quadron volume distribution as a sensitive structural fingerprint - 2d

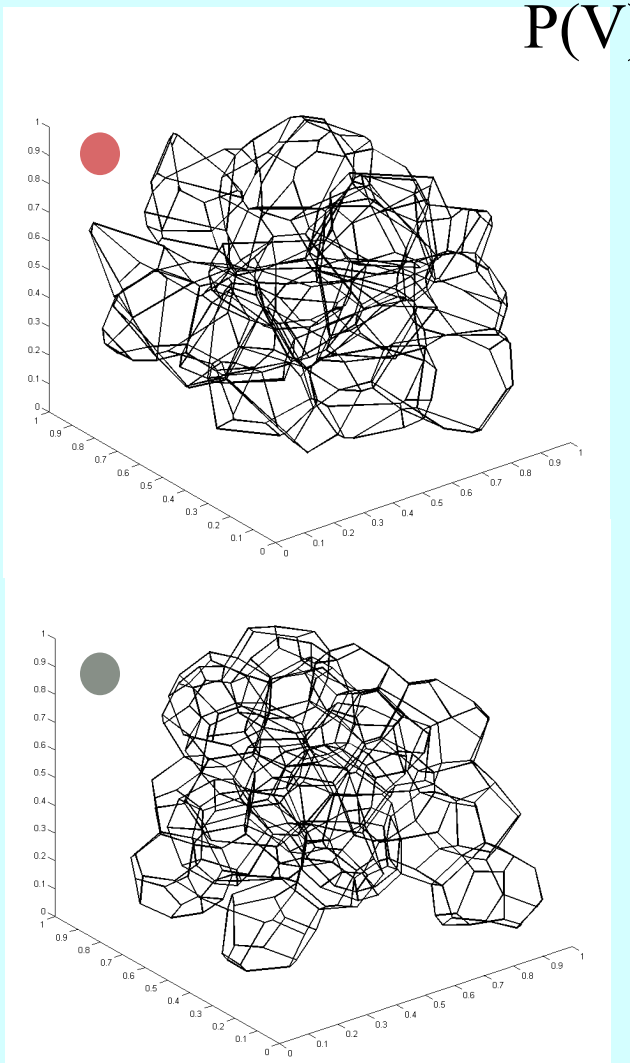


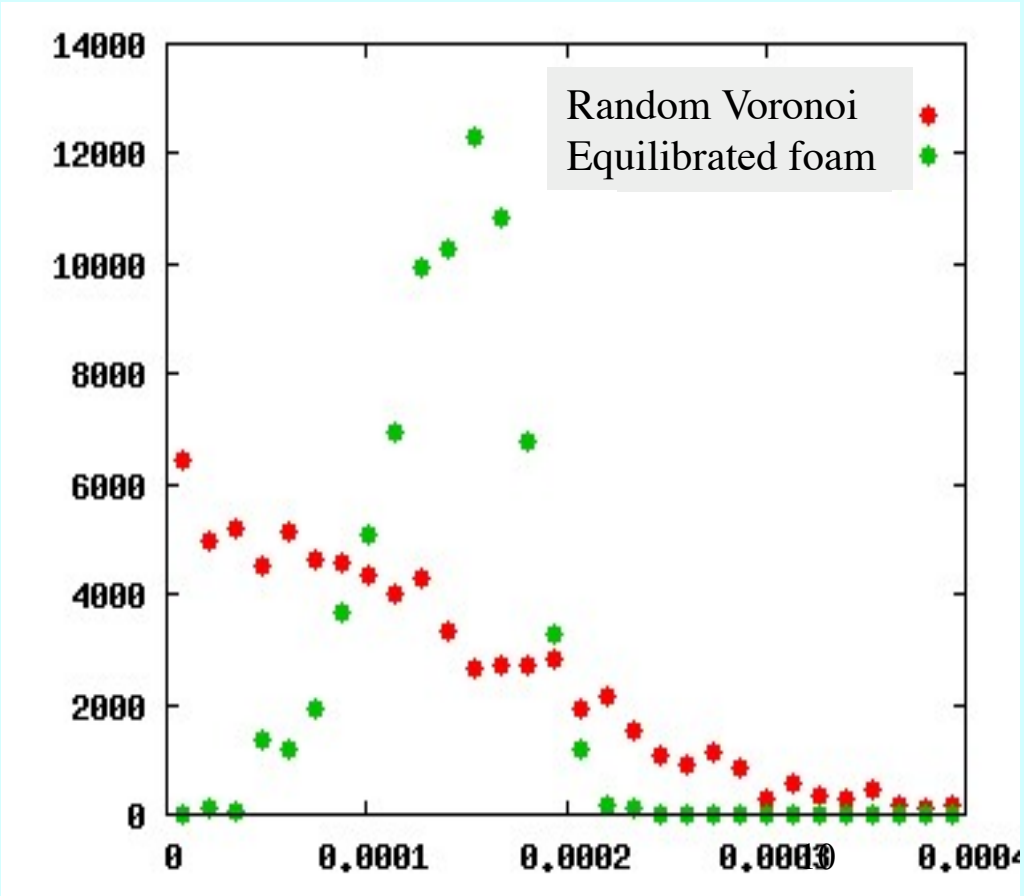
Same method in 3d - Comparison between two foam-like systems:

3d

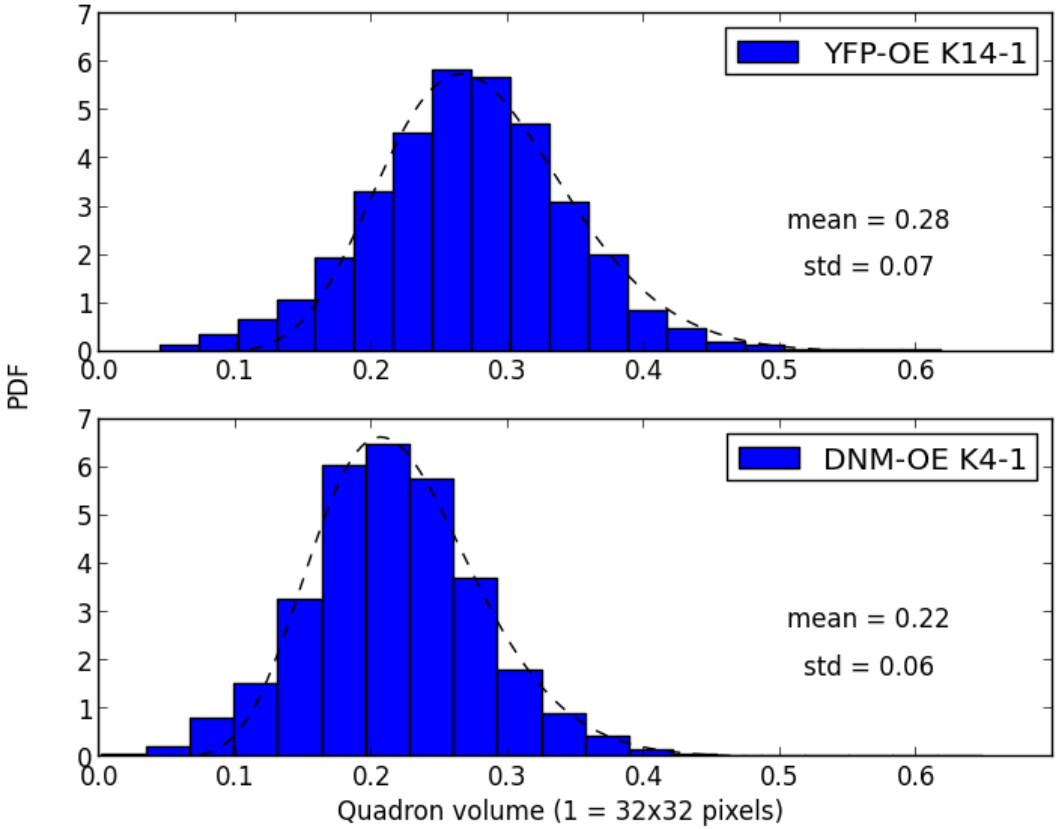
Red - a system is generated from a random Voronoi tessellation;
Green - the same system treated as a foam and evolved to minimise surface energy.

The distributions are completely different.
P(V) is sensitive to the structure.

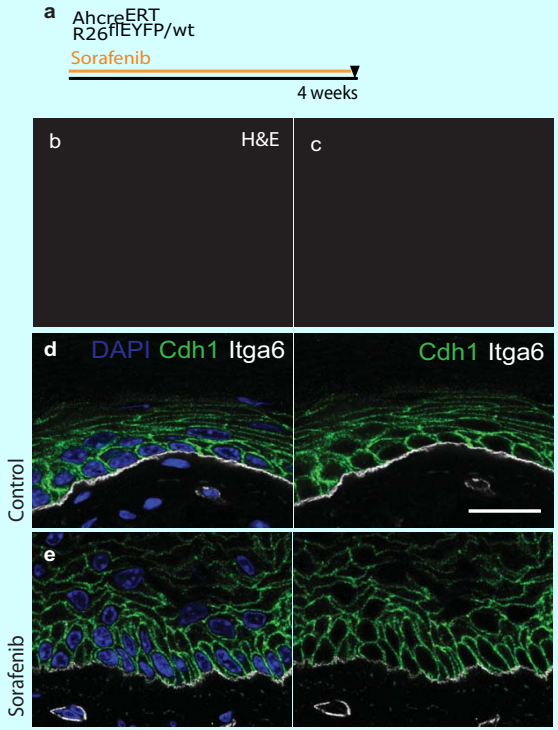




Basal slices of normal and infected cell tissues



Basal slices of normal and infected cell tissues



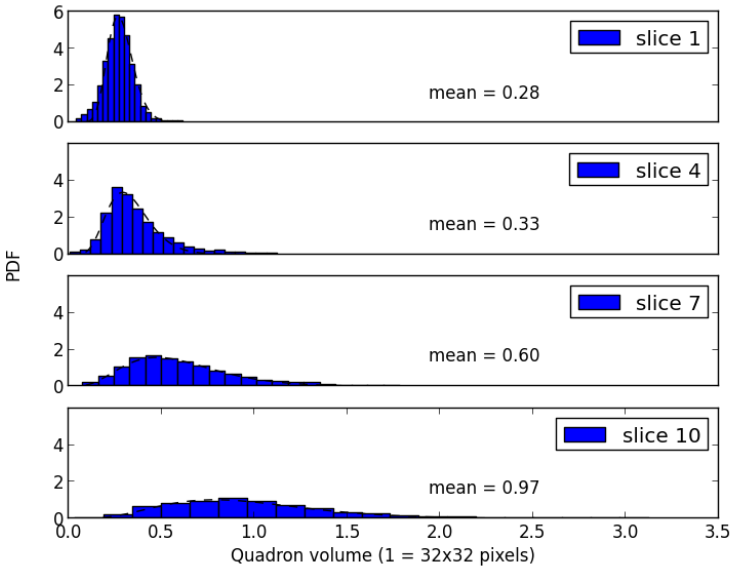


Figure 3 Characterization of effect of Sorafenib on cell morphology. (a) Protocol: Animals were treated with indicated doses of Sorafenib by ip injection for 28 days on alternate days. (b,c) H&E of OE for Sorafenib (b) and control treated animals (c). (d,e) Cryosections stained for Cadherin1 (green) and Itga6 (white). Scale bar, 20 µm. (b) Animals treated with vehicle control. (c) Animals treated with Sorafenib.