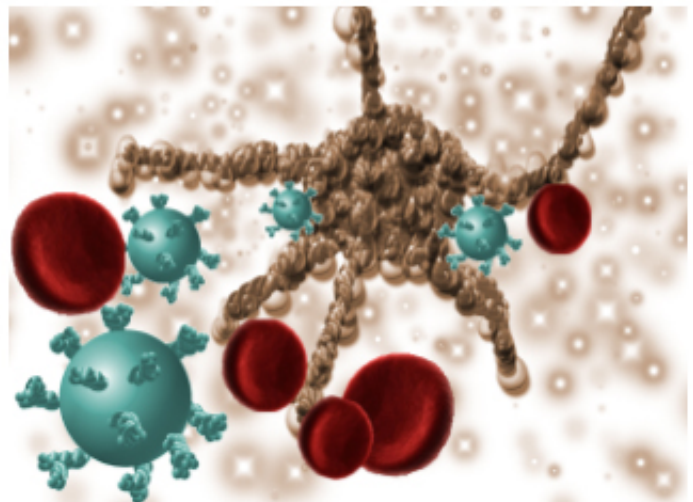
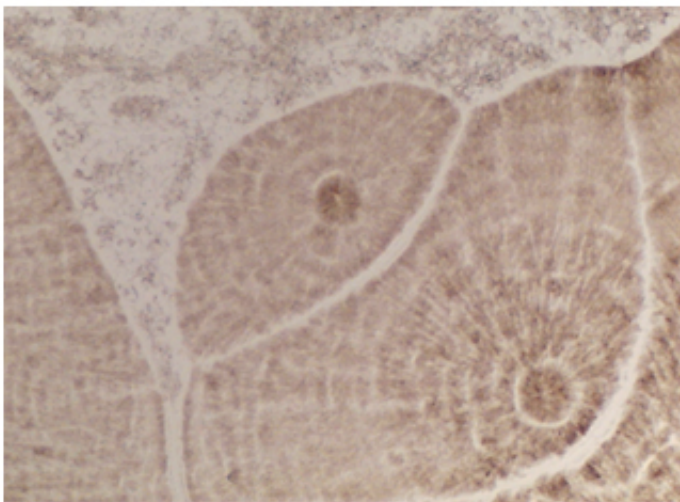
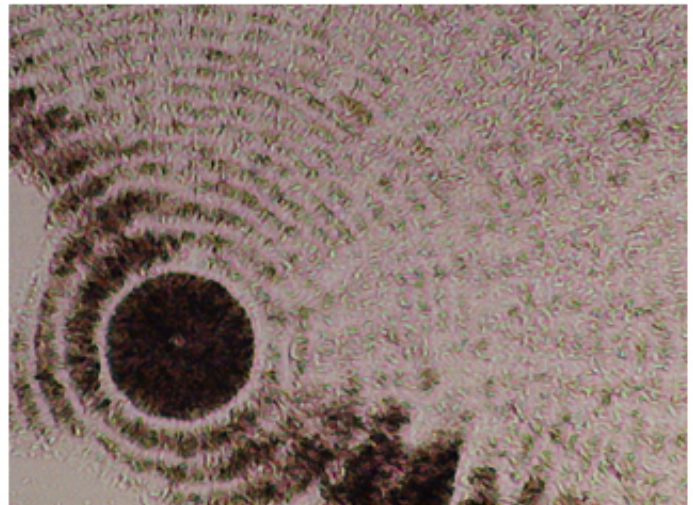
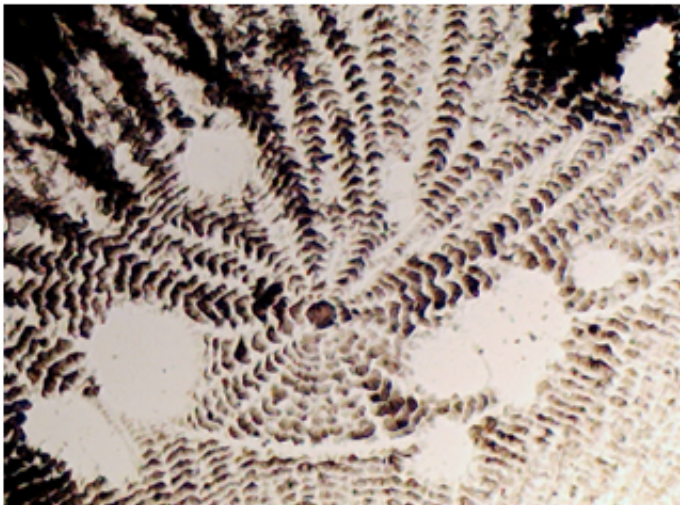


A cancers addiction to glutamine affects the whole body and could lead to complex skin rashes

Signs or symptoms far from the vicinity of a developing cancer in the body can give clues of its presence (paraneoplastic syndromes). The skin can offer visible markers of abnormal metabolic activity caused by tumourigenesis, in the form of circular or wave-like rashes, such as that typically found with erythema gyratum repens (EGR). This particular rash sometimes appears in the early diagnosis of lung cancer and is little understood.

A cancer alters the glutamine chemical reactions inside the body for the purpose of aiding its rapid growth of cells and its function. Of the amino acids in the body, glutamine is the most abundant; required for production of many essential biological molecules. Therefore, the cancer becomes a kind of glutamine pump, potentially maximising glutamine concentration in the blood stream, and beginning a process of skeletal muscle (where quantities of glutamine are stored) deterioration when there is a low level of glucose.



Top and bottom left: Self-assembled formations of glutamine resemble the skin rashes of erythema gyratum repens, which presents itself as a side-effect in some cases of tumourigenesis. Bottom right: Cancer relies upon the metabolism of glutamine. Nanoparticles, encapsulating drugs to regulate metabolic activity in cancer cells, may be the most effective way of targeting abnormal cellular growth given the evidence of systemic wide harvesting of glutamine in the body.

Thus, our recent study, published in *Medical Hypotheses* in 2015, shows the self-assembly of rings of glutamine in an aqueous medium at levels of concentration higher than that associated with healthy biological functionality. We demonstrate the unique ring patterns and tidal-like patterns that emerge and suggest that the pumping of glutamine causes the skin conditions associated with EGR and tumourigenesis. Elevated levels of glutamine in the blood stream are suggested to cause these skin inflammations. Thus, specially designed drugs that control glutamine metabolism can be designed to slow or arrest the development of tumour growth. However, with the understanding that the whole body is affected by the glutamine cycle, one needs to be careful in maintaining concentrations that do not damage healthy cellular energy pathways. Therefore, regulation of the tumours addiction to glutamine may be most efficiently employed using micro- or nano-particles to deliver localised control.

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Publication

[Self-assembled multi-ring formations of glutamine and a possible link to erythema gyratum repens.](#)

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