

Magnetic resonance imaging of soaking and cooking of bean

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Water in seeds of legumes plays an important role in physiological and chemical processes important in the cooking processes, such as protein and starch gelatinization. Most of the legumes used for human food require hydration before cooking to cut down on the amount of cooking time. Magnetic resonance imaging (MRI) was used to determine the level of hydration and changes during cooking of Cranberry bean. To observe the hydration processes the 3D RARE imaging technique was used. Dry bean was inserted into a tube filled with water and hydration was dynamically imaged by the 3D RARE single shoot imaging sequence with 64 spin echoes of the echo time 1.64 ms every 30 minutes for 12 hours. The images show changes of water distribution in bean at different times. Water enters the bean mainly through micropyle and first fills the void between cotyledons. Changes in a bean seed during the cooking process were followed by spin-spin relaxation time (T_2) and by diffusion constant (D) mapping in 3D. The bean was first soaked for 12 hours and then taken out of water and placed into a glass tube for MRI measurements. After the measurements the bean was immersed in water and cooked for 40 minutes. When it was done it was placed into the glass tube again and the MRI measurements were repeated. 3D RARE experiments for T_2 and diffusion constant mapping during cooking are in progress. In the figure below T_2 maps of one single slice out of a 3D set (slice thickness, 0.6 mm; FOV = 20 mm) of soaked and cooked bean are shown.

