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PROJECT TYPE	ERC Consolidator Grant (FP7)
TITLE	The endodermis – unraveling the function of an ancient barrier
ACRONYM	ENDOFUN
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BUDGET	1 985 443 €

Beyond their role in water supply, plant roots possess the amazing ability to forage the soil for mineral nutrients and to supply them to the photosynthetic parts of the plant. Photosynthesis is a complex process that requires supply of elements such as Magnesium, Copper, Iron, Sulfur or Manganese in just the right amounts. Therefore, plant roots can be conceptualised as “everted guts”, fulfilling the same role for the plant as the gut does for animals. Yet, instead of internalising the cellular surfaces for uptake, the root exposes them, literally weaving them into the environment of the soil. Furthering the analogy to animal guts, the root also defends itself against pathogenic microbes, while at the same time recruiting a mixture of microbial communities – the microbiome - to assist it in its workings.

Central to the accomplishment of these tasks is a specialised root cell layer, the endodermis, which possesses ring-like, hydrophobic cell wall impregnations that are coordinated across the entire cell layer and form a supracellular net that seals the inner, water and nutrient-transporting vasculature from the outer cell layers, exposed to the soil. This so-called “Casparian strip” network therefore resembles the network of tight junctions in our gut epithelium and has evolved in order to balance the need for nutrient uptake with that of protection from environmental stresses.

The aim of the ENDOFUN project is to use our previously obtained insights into the mechanisms of endodermal differentiation and Casparian strip formation and to use them to understand endodermal functionality - based on experimental manipulations and measurements, instead of comparative descriptions and conjecture. Eventually, we hope that our work will lead to a much improved understanding of root function and assist us in answering urgent questions, such as how plants manage - or fail to cope with - drought, salinity, poor and degraded soils, as well as a plethora of soil-borne diseases.