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Recombinant prion protein (recPrP) adsorption on soil aggregates

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Since environmental concern have been addressed upon the fate of prion in soil and its potential dissemination of scrapie infectious agent, a good knowledge of the mechanisms of prion retention by soil is important for controlling infectivity dissemination. Among the investigations carried out on prion adsorption in soil, some considered only clays or other selected constituents and only a few were conducted on the whole soil. In our experiment we used undisturbed soil aggregates as a simplified soil constituent model at laboratory scale. For this reason a technique that allows the assessment of recPrP adsorption on natural undisturbed soil aggregates was developed.

Aggregates of 0.5-1 mm in size, collected from the surface horizon of two different soils (sandy and loamy soil) were placed in Pasteur pipettes. Successively, the aggregates were wetted and controlled for their integrity. A recPrP (ARQ variant, full length) solution was passed through the aggregates at a slow constant flux . The concentrations and amounts of protein to be used for the treatments were the such to saturate the soil aggregates as estimated by preliminary adsorption isotherms of recPrP determined in batch experiments on powered samples.

The percolates from the aggregates were analysed for the presence of recPrP by colorimetric analysis (Lowry test). The aggregates-recPrP complexes were analysed by spectroscopic techniques such as FTIR-PAS (photoacoustic) after air-drying.

The adsorption of recPrP on undisturbed aggregates was greater in the loamy than

in sandy soil and the maximal adsorbed amounts were as high as 90% (loamy soil) and 50% (sandy soil) of the added amount. A greater adsorption of the loamy soil aggregates was expected because this soil has a higher content of clay and organic matter than the aggregates of sandy soil. On the other hand, the adsorption of sandy soil was relatively greater than that expected in this type of soil, probably due to the intrinsic nature of soil constituents (i.e. presence of small amount of a clay but with high specific surface area).

These findings may have relevance for assessing the mobility and bioavailability of the infectious agent in soil environments.