Let Y be a smooth complex projective variety of dimension $N+1$ endowed with a very ample invertible sheaf $\mathcal{O}(1)$, let $d \in \mathbb{N}^*$, let $\mathcal{V}^d \subset \mathrm{H}^0(Y, \mathcal{O}(d))$ be the locus of smooth hypersurfaces of class $c_1(\mathcal{O}(d))$, let $F \in \mathcal{V}^d$ and let $j_F : X_F \to Y$ denote the closed embedding. By Lefschetz theory the monodromy action of $\pi_1(\mathcal{V}^d, F)$ on $\mathrm{H}^N(X_F, \mathbb{C})/j^*\mathrm{H}^N(Y, \mathbb{C})$ is irreducible. Let $W \subset Y$ be a closed subscheme and let $\mathcal{V}^d(W) \subset \mathcal{V}^d$ be the space of smooth hypersurfaces containing W. We show that if the ideal of W is spanned in degree small with respect to d then for all $F \in \mathcal{V}^d(W)$ the monodromy action of $\pi_1(\mathcal{V}^d(W), F)$ is irreducible on the orthogonal (for the cup-product) of the projections on $\mathrm{H}^N(X_F, \mathbb{C})/j^*\mathrm{H}^N(Y, \mathbb{C})$ of the classes of N-dimensionnal irreducible components of W. The proof is essentially topological ; difficulties arise from the fact that W may have any singularities.