

## MR evaluation in patients with congenital dysosmia

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**Objective** To study the MR imaging findings of congenital dysosmia.

**Methods** Forty-seven patients with congenital dysosmia and 21 age-matched normal volunteers underwent MRI examination. Among the 47 patients, patients with Kallmann syndrome accounted for 83.0% and patients with isolated dysosmia for 17.0%. The features of congenital malformation were recorded. The volume of olfactory bulbs, depth of olfactory sulci and diameters of pituitary gland and stalk were measured and compared.

**Results** All the patients had abnormal findings in olfactory bulbs and tracts. No abnormal features were found in cortex except for a malacia lesion in inferior frontal lobe in 1 case. The patterns of congenital malformation of olfactory bulbs and tracts included dysplasia of olfactory bulbs and tracts, olfactory bulb hypoplasia with dysplasia of olfactory tract, olfactory bulb dysplasia with existent olfactory tract and olfactory bulb hypoplasia with existent olfactory tract. The imaging findings may be asymmetric in bilateral sides. Patients with dysplasia of olfactory bulbs and tracts accounted for 79.5% of all the patients with Kallmann syndrome. The ratio of dysplasia of olfactory bulbs and tracts in Kallmann syndrome was higher than that in isolated dysosmia ( $P=0.008$ ). And the olfactory bulbs' volume of patients with Kallmann syndrome was smaller than that of patients with isolated dysosmia ( $P=0.007$ ). The olfactory sulci were hypoplastic in congenital dysosmic patients. The sulci were shallower in congenital dysosmic patients than those in volunteers ( $P=0.000$ ). The pituitary gland was smaller and the stalk was thinner in patients with Kallmann syndrome than volunteers ( $P=0.000$  and  $0.000$ ).

**Conclusions** MR can readily depict the malformation of olfactory bulbs and tracts in congenital dysosmic patients. Dysplasia or hypoplasia of olfactory bulbs, tracts and sulci can be demonstrated. And dysplasia of olfactory bulbs and tracts is the most common findings in Kallmann syndrome, but hypoplasia is the most common findings in isolated dysosmia. Patients with Kallmann syndrome have smaller pituitary gland and thinner stalk, which may be related with the endocrine abnormalities. MR imaging is valuable for clinical diagnosis and treatment.

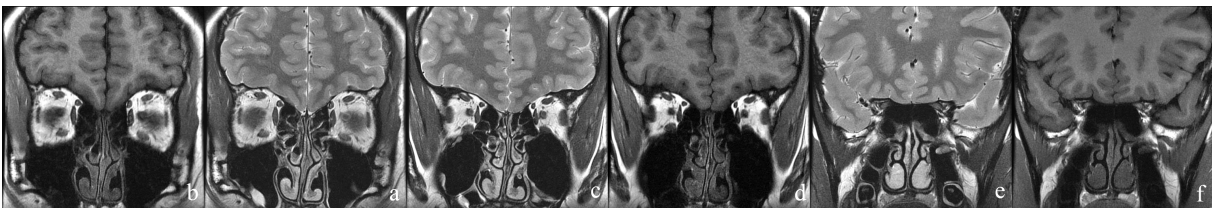


Fig 1 Coronal T1 and T2WIs show dysplasia of olfactory bulbs, tracts and sulci.

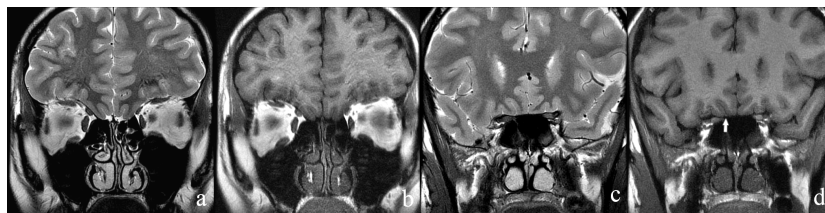


Fig 2 Dysplasia of bilateral olfactory bulbs and left tracts is demonstrated. White arrow indicates the existent right olfactory tract. The posterior part of left olfactory sulcus is hypoplastic.

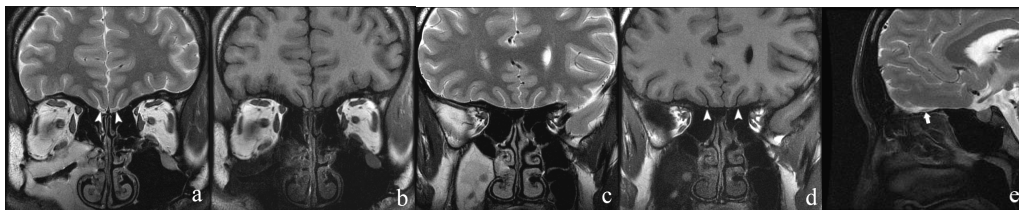


Fig 3 (a-d) Coronal T2 and T1WIs show the existence of bilateral olfactory bulbs and tracts. But sagittal T2WI (e) shows that the olfactory bulb is small. And the bulbs' volume is less than half of the average in normal volunteers. So this is a case of hypoplastic olfactory bulbs with existence of olfactory tracts.