

Are There Gender Differences in the Behavioural Responses in the Olfactory Bulbectomy Model of Depression?

A consistently reported finding in epidemiological studies is a greater prevalence of females to depression. The cause of this gender difference in the rate of depression is not fully understood although it is believed that females have a biological predisposition to the disease as well as being more likely to suffer from negative life events that may cause depressive episodes. In pre-clinical behavioural research, female subjects are rarely used due to the belief that their behaviour is more variable than that of males. This means that animal models of depression have mostly been validated in male animals which is not representative of the clinical scenario. The aim of this study was to determine if there are any gender differences in behavioural profile in a commonly used animal model of depression, namely the olfactory bulbectomized (OBX) rat model.

Following OBX or sham surgery, male and female Sprague-Dawley rats were given a 3 week recovery period before testing began; testing consisted of the open field test (OFT) and elevated plus maze (EPM) which both took place 21 days post-surgery, forced swim test (FST) which took place 28 days post-surgery and the Morris water maze (MWM) which took place 24-28 days post-surgery; n= 14-15 per group. The principle results are summarized in the table below.

	OFT	EPM	MWM
	Inner Zone Duration (s)	Open Arm Entries	Duration in SW Quadrant (s)
Male Sham	60±19	2±1	50±13
Male OB	22±13***	5±3*	34±5**
Female Sham	69±28	4±3	39±3*
Female OB	22±13***	4±4	32±9
OB Effect	F ₍₁₎ =71.08	F ₍₁₎ =5.13	F ₍₁₎ =12.85
Sex Effect			F ₍₁₎ =5.08
OB*Sex Effect			

Table 1. Results expressed as mean±SD. *p<0.05; **p<0.01; ***p<0.001 vs corresponding sham group.

Significant OB-related changes were found in the OFT with OBX animals regardless of gender moving significantly more than the controls in the first minute of the test, whilst in the EPM with OBX male animals entering the 4 arms significantly more than their control counterparts. In the MWM, there was a significant OB-related reduction in time spent in the target quadrant in male animals, as well as female sham-operated animals. There were no OB or gender-related differences in the FST behaviour.

It can be concluded that in behavioural tests that have a significant locomotor component, the magnitude of the OB-related deficit is equivalent between male and female rats. The cognitive differences between the genders in the MWM calls into question the utility of this test for assessing OB-related effects.