

PhenoSys Activity Monitor for Individual Activity Tracking of Group-Housed Animals

Enhanced Physical Activity in Dark and Light Phase in a Group-Housed Rat Knockout Model

Setup

A PhenoSys RFID-based Activity Monitor was placed underneath a standard Type IV cage to automatically record individual activity of group-housed rats. The Activity Monitor consists of 15 RFID-readers that cover the entire ground area of the cage.



PhenoSys Activity Monitor with 5x3 RFID-reader matrix.

Experimental Procedure

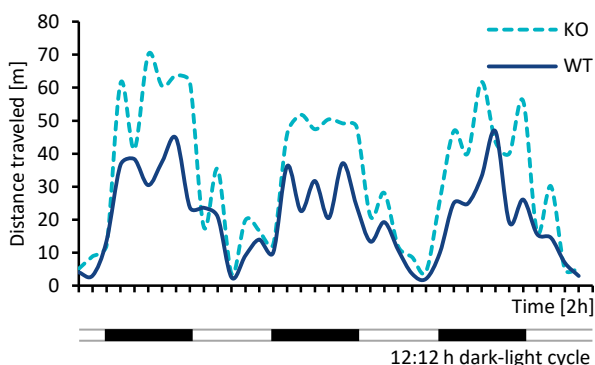
Young female rats with a genetic knockout of a synaptic protein were used for this pilot study. A wildtype, a heterozygous and a complete knockout were housed as a group in the Activity Monitor cage for 7 days. The animals carried passive, subcutaneous RFID-transponders for identification. RFID-readers continuously detect transponders in their vicinity and therefore track the location of any rat over time.

DateTime	RFID	Animal	Reader	Duration
11/21/2016 08:40:32.351	0415C477C0	#3 (KO)	R15	1648
11/21/2016 08:40:32.992	0415C483DD	#1 (WT)	R14	0
11/21/2016 08:40:33.032	0415C48813	#3 (KO)	R4	1159
11/21/2016 08:40:34.097	046369DB88	#2 (HET)	R13	1668
11/21/2016 08:40:35.836	0415C483DD	#1 (WT)	R15	1718
11/21/2016 08:40:35.972	046369DB88	#2 (HET)	R10	3290
11/21/2016 08:40:37.533	0415C483DD	#1 (WT)	R12	0
11/21/2016 08:40:38.201	0415C483DD	#1 (WT)	R13	14881
11/21/2016 08:40:40.380	046369DB88	#2 (HET)	R15	0
11/21/2016 08:40:41.002	0415C483DD	#1 (WT)	R10	0
11/21/2016 08:40:41.943	0415C477C0	#3 (KO)	R4	2813
11/21/2016 08:40:42.929	0415C477C0	#3 (KO)	R7	514
11/21/2016 08:40:43.637	0415C483DD	#1 (WT)	R10	566

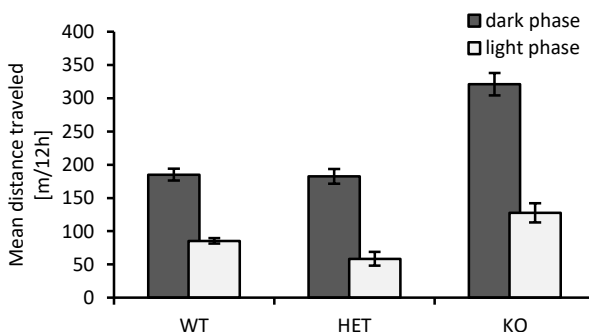
Primary data of PhenoSys Activity Monitor. The readers detect the unique ten digit RFID-code of the transponder of an individual. The time point and the duration [ms] of the read interval is recorded. (A duration of „0“ equals a minimal read.)

Results

The position data of individual animals was used to calculate the distance covered by each rat. The plot of distance travelled over days represents the circadian activity pattern for each individual. The data from this pilot experiment reveals for the knockout rat during the dark phase a 73% longer distance travelled. During the light phase the distance is still 50% longer than in the wild type rat. The phenotype of the heterozygous animal seems to be unaffected.



Day/night activity pattern. Dark and light phases are indicated by black and white bars. Animals show high activity during the dark phase and reduced activity with the onset of the light phase.



Quantification of distance travelled. (Data are mean values over 7 days and SEM)

Conclusion

The PhenoSys Activity Monitor is an effective method to detect activity parameters in rodents. It has the unique advantage over conventional methods that animals can be group housed while data is collected automatically and continuously for each individual.