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Thesis Title	**Tracing the pathway of the neuroblasts from the subventricular zone to the olfactory bulb in the adult mice brains**			
Year	**2015**			
Abstract	Unique neural stem cells have been found in the main neurogenic regions of the adult brain, these regions called neurogenic niches, the larger of which is the subventricular zone (SVZ) of the lateral ventricle. Adult neurogenesis is referred to the process in which neuronal stem cells, and their progeny the neuroblasts; generate new neurons in physiological and pathologic conditions. The study of this process and the tracing of its consequences are beneficial in describing the precursors of neurons and its migration through restricted territory in the adult mammalians brains. **Aims of study** To identify the neuroblasts, along the wall of the lateral ventricle, the SVZ, in the adult mouse brain and to trace them from the SVZ to the OB along the special pathway, the Rostral Migratory Stream (RMS), using routine stains the Hematoxylin and Eosin (H and E) and immunohistochemical staining with antidoublecortin antibody, the specific marker of the neuroblasts. **Materials and methods** The study have been executed at the animal house of College of Medicine \ Baghdad University; by collecting and breeding 36 male and female mice			

(Micromys minutus), 4 of them were neonates used for demonstrating positive control for the antibody, and the other 32 were adults (> 60 days old), seven of them were used for pilot study. The other 25 were used for proper study. They were perfused intracardially by paraformaldehyde solution with a mini-pump apparatus that has been constructed locally for this purpose then harvesting their brains immediately. After dissecting the brains coronally or sagittaly they were fixed for 20 hours in the same fixative used for the perfusion. Processing had been done by dehydrating in ascended grades of ethanol alcohol and clearing in chloroform then embedding in paraffin. Sectioning had been done with microtome; deparaffinization by xylene and rehydration with descended grades of ethanol alcohol then staining by H and E. For the immunohistochemical staining, the primary antibody “antidoublecortin antibody” was diluted to (1/1000) and incubated with the tissue for 2 hours at 30 C°. Incubation with the secondary antibody lasted for 1 hour. Application of DAB was the final step. Visualization had been done with a light microscope.

Results

At the coronal plane through the lateral ventricle "1 mm anterior to bregma", identification of the SVZ had been done. By the ordinary staining "H and E", the zone appeared as an aggregate of cells next to the ependymal layer. With the immunohistochemical staining, clusters of cells were proved to be the neuroblasts by staining positive for the antidoublecortin antibody; though groups of surrounding cells did not express the signal of this marker but apparently interspersed among the clusters of the neuroblasts. The neuroblasts were traced sagittaly from the SVZ and they have been found to be engaged in a committed pathway called RMS, began from the anterior tip of the lateral ventricle and ended at the core of the OB. The neuroblasts in the RMS oriented tangentially parallel to the brain surface and scaffolded each other forming what seemed to be a chain-like strip

of cells which were elongated with dark spindle shaped nuclei and surrounded intimately by another cells, polymorphic in shape and did not take the signal of the antidoublecortin antibody. Distinct morphology of the chain had been encountered grossly from its emergence site till its termination point. It was forming a sigmoidal shape stream that could be divided as a whole into four distinct parts; infundibulum, vertical limb, elbow and horizontal limb. Furthermore, the neuroblasts took different morphological features along the stream. They changed from spindle shaped-nuclei cells in the infundibulum and the vertical limb to oval or irregular-shaped nuclei cells in the elbow and to more spherical-shaped nuclei in the horizontal limb. The RMS might change the mode of the migration near its rostral pole from the tangential parallel mode to the radial scattered mode by which the neuroblasts entered the olfactory bulb. In addition, the neuroblasts in the RMS revealed mitotic activity and increase their number near the termination of the stream.

Conclusions

We conclude that: 1. The antidoublecortin antibody is a convenient reproducible way to identify the neuroblasts in the SVZ and the RMS in the adult mice brains. 2. The neuroblasts, after their production, had a tendency to arrange themselves in chains from the SVZ to the OB through the RMS. 3. Neuroblasts change their nuclei shapes from elongated spindle shape in the first two parts of the RMS to polymorphic shapes at the last two parts of the stream. 4. Neuroblasts showed mitosis near the termination of the RMS. 5. This special arrangement, along with the persistent active mitosis in the stream, is distinct criteria of the neuroblasts in their pathway from SVZ to the OB.