where $se$ is the size of the $SE$, $x_{se}^{(q)}$ is the gray-level of the $q$-th pixel of $I_T$ when the image is decomposed row by row and $R$ and $C$ correspond to the size of the image. Then, the data vector $Z$ can be written as follows:

$$Z = [x_{3	imes3}, x_{5	imes5}, x_{7	imes7}]^T$$

(17)

For data vector $Z$, two proposed clustering techniques are then applied to obtain a label for each pattern belonging to each cluster of the partition of feature space, where only one cluster corresponds to MCs, which generally appear in a group of just a few patterns (pixels), and the remaining clusters correspond to normal (healthy) tissue.

The initial conditions and results for each proposed clustering technique are presented below.

5.2.2 Segmentation by $k$-means

The initial conditions for this approach are as follows:

- Cluster number: 2 to 4.
- Prototypes: initialized as random values.
- Distance measure: Euclidean distance function.

Fig. 3 shows segmented ROI images with different cluster values obtained after applying the proposed $k$-means algorithm to the data vector $Z$. 

![Fig. 2](image-url)  

(a) Original ROI images. (b) ROI images processed by the top-hat transform.