

**Clinical Image**

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# Construction of Minimal Connected Network with Proteins Affected By Expression of the Rol B Plant Oncogene



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## Abstract

In this paper, a construction of minimal connected network with proteins, affected by expression of the rol B plant oncogene, is making, using concept of connectivity components. In this paper, Arabidopsis protein signaling network G affected by expression of the rol B plant oncogene, is considered. Biochemists experimentally defined in the network G the set  $U_0$  of proteins, which tested the effect of the rolB plant oncogene [1].

## Clinical Image

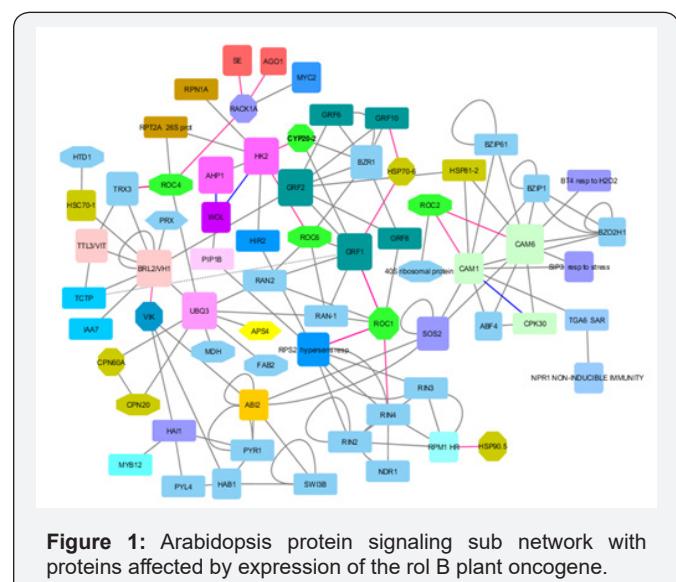
All these proteins are marked with octagons on Figure 1. A problem is to define in the network G connected sub network

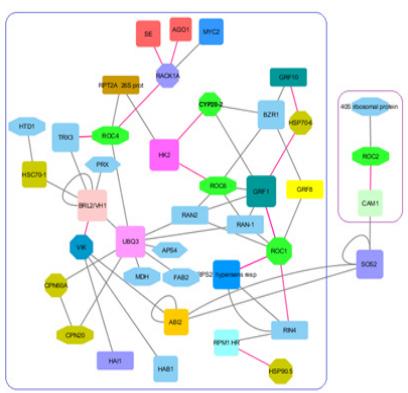
$G_*$  with minimal number of proteins including the set of proteins  $U_0$  and their nearest neighbors. To solve this problem we calculated minimal ways lengths from proteins, which are not describing by octagons to proteins described by octagons, using Dijkstra algorithm [2]. It is showing that there is the set

$U_1$  of 21 proteins with minimal distance 1 to the set  $U_0$ , and they are nearest neighbors of proteins described by octagons on Figure 1. So all, these proteins are to be included to the sub

network  $G_*$  also. In the network G, there are the set  $U_2$  of 26 proteins, which have minimal distance 2 to the set  $U_0$  and the set  $U_3$  of three proteins, which have minimal distance 3 to the set  $U_0$ . So total number of proteins in the graph G equals 50. To construct the connected sub network  $G_*$ , including the sets  $U_0, U_1$  with minimal number of proteins, we consider the graph  $G_1$  with proteins from the sets  $U_0, U_1$  and edges

between them. The graph  $G_1$  has two connectivity components  $G_1^1, G_1^2$ . To connect them it is enough to include in the network  $G_*$  additionally to the sets  $U_0, U_1$  only the single protein SOS2.





**Figure 2:** Sub network  $G^*$  of protein network  $G$ .

In Figure 2 describe the network  $G_*$  the subnetworks  $G_1^1, G_1^2$  are surrounded by blue and lilac rectangles corresponding.

Total number of the graph  $G_*$  proteins equals 22, not 50 as in the network  $G$ . Therefore, main part of proteins of the sets

$U_2, U_3$ , play in the network  $G$  a role of provinces not a role of a connective tissue. This solution is not general for considered mathematical problem, which is N-P problem. Nevertheless, a specific of considered network  $G$  allows to construct the sub

network  $G_*$  and to make meaningful interpretation of obtained result using only Cytoscape representation of the network  $G$ .

## References

1. Bulgakov VP, Yu V, Bulgakov DV, Veremeichik GN, Yu NS. The rol B plant oncogene exerts its oncogenic properties by modulating the abundance of chaperones. Scientific Reports.
2. Dijkstra EW (1959) A note on two problems in connection with graphs, Numerische Mathematik 1(1): 269-271.



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