Vasculogenesis is the process of new blood vessel formation that generates one of the first functional systems in a forming embryo. It is a dynamic process that involves changes of endothelial cells to form blood vessels, which happens concomitant with the embryo development. The own way of endothelial cells clusters selfish organize became the system ideal to study following the evolution of patterns. In order to quantify this phenomenon we use the video microcopy to obtain a movie following the vessels emergence in an embryo. We extracted embryos from chicken eggs at stage 12 HH that lay in a dish with culture medium made of agar and albumin. During the experiments, the samples are placed in a microscope incubator to control the environment at 370C degrees and 60% of humidity. A continuous movie monitoring the vessel’s growth for a period of 15 hours is made. To follow changes in the vasculogenesis patterns a rectangular region on area opaca was selected, as showed in the Fig.1. In that region were made measurements during time of fractal dimension, area and amount of clusters. The fractal dimension measured following the vessels growths increases until it reaches saturation. In the beginning of the process with just a few clusters with a random spatial distribution, the fractal dimension measured is (Df= 1, 52 ± 0, 06) a value close to results obtained for cluster-cluster interactions. This clusters self-organize to create a polygonal network. In the end of the process when the network is assembled the value measured is (Df= 1, 72 ± 0, 06) a value close to results reported for a directed percolation process in 2D. That is according with the dynamic of the process, as reported in literature after the onset of circulation the cells move collectively. With the other parameters like the number and maximum area of the clusters we can describe the aggregates dynamics. The number of cells aggregates grows as a Gaussian function, which after reaching a maximum value it decreases indicating that coalescence prevails in the system. From the maximum area of aggregates we can identify the percolation of primary plexus; there is phase transition of a non-connected region to all the regions connected. In this work, we show that sequences of interactions between cell aggregates promote the connections to build the complete vessels network, and obtain statistical parameters that can describe the vasculogenesis process.

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Fig. 1: The rectangle selected on area opaca of embryo at stage HH-12 is followed in time to obtain the vessels emergence. The picture in the right side shows the selected area at: 0 hours, 7 hours and 14 hours.