Clinical Obstetrics, Gynecology and Reproductive Medicine

Mini Review

Electron tunneling in microtubules: A model explaining both mendelian genetics and quantum computing memory

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A simple structural model for microtubules, with stacked disulfide bonds along its axis explains both informational and structural functions for microtubules.

1) Stacked disulfide bonds allows for the delocalization of the common electron orbital down the whole length of the microtubules.

2) This sulfhydryl electron delocalization is a tunneling phenomena and it is temperature independent. The delocalization is regulated as a Josephson junction with Cooper pairs of electrons [1-3].

3) Each microtubule is composed of thirteen microfibrils which are the molecules with the stacked sulfhydryls which allow for temperature independent electron tunneling down its length.

There are two dramatic consequences of this model:

Mitochondria can channel electrons from the centriole to the kinetochore to allow for chromosome movement that is both temperature and mass load independent. This allows for all chromosomes to divide at the same velocity This velocity is independent of chromosome size and temperature. It is a tunneling phenomena and not a biochemical reactions, per se. Chromosomes moving at the same speed will not create anaploid embryos. This model for microtubule tunneling also predicts the independent and random assortment of Mendelian genes as explained by the Boveri-Sutton hypothesis. Electron tunneling from the centriole to the kinetochore is the driving electro chemistry for chromosomes to move at the same velocity. One can imagine different length subway trains on different tracks, with the third rail carrying the tunneling electrons. The tracks unravel behind each train as they all move towards the converging station (centriole) at the same velocity independent of the number of subway cars on each track. This model is in contradiction of a push or pull microtubule model of chromosome movement. It explains why all chromosomes move independent of mass and size together. This is a physical necessity to explain the Boveri-Sutton hypothesis which in turn explains the independent and random assortment of Mendelian genes by placing them on chromosomes which move and sort at the same uniform velocity independent of size or mass. Without this uniformity of chromosome mobility, genes following Mendelian genetics could not exist.

Microtubules as an informational molecule:

Microtubules have been proposed to act as quantum computational molecules. They have also been proposed to act as discrete on-off bit computation molecules [4-8]. My model of the microtubule can be understood with both contexts of computation. The main difference between my models is that I propose the tunneling of sulfhydryl electrons regulated as in a Josephson junction, and using paired Cooper electrons. No one has proposed sulfhydryl stacking and thereby sulfhydryl tunneling. Since the microtubule can consist of 13 on/off microfilaments this would be the simplest model in the discrete computation case. It would have 2**13 bits of information for each microtubule. In a quantum computation model of the microtubules, each microfilament can be in a state where each Cooper electron pair is in superposition between all the other microfilaments. Each tunneling pair can be "phased", thereby creating more computational power. In addition, the Cooper pairs will have the square of the number of quantum states available to each electron creating even more computational power. The translation of the final state only depends on the interaction of the microfilament at its membrane junction where the local environment will receive the electrons. The membrane surface would then be the final computational state. This allows "memory" to be dissociative throughout the microtubule matrix in the brain [9-11].

Mitochondria, will be pumping electrons through these channels, to activate the "computation", much like they activate chromosome division in both meiosis and mitosis. This model is easily tested as sulfhydryls can be doped in a random manner by mercury and/or gold. The phenomena discussed above would then be characterized by a Poisson type inhibition. Alternatively, one can develop a functional cell-free mitotic apparatus, where chromosomes can be moved by the addition of external factors and mitochondria. This system can then be tested directly for temperature independence and tunneling of electrons.

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