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Mathematical Problems in Cancer Research

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At least three fundamental problems in cancer research led to creating certain mathematical models. Some of them provide significant conclusions which, if they were well-founded, should determine the general directions of further research.

For example the sensational Bad Luck Theory report [1] two years ago stated that about 2/3 cancers are unpreventable, based on correlation between number of stem cells divisions and lifetime cancer risk. This result would mean that early detection and treatment are more effective than primary prevention (vaccination, altering lifestyle, environmental control), which could influence funding distribution. Unfortunately (or maybe fortunately) their model does not stand up to mathematical scrutiny. The theory was criticized severely but the authors develop it further and have many followers.

For some reason many respected cancer specialists develop mathematical models without professional mathematical assistance which results in a lot of mistakes and makes their models useless. One can find a probability equal to 3.2, the certainty that life ends after ten years if the death probability per year is 0.1, and many other interesting statements in prestigious cancer research journals.

Unfortunately the cancer research community doesn't have a habit of rejection the incorrect solutions which is a necessary part of applying mathematics in any domain. Neither the general public nor the decision makers are interested or competent in mathematical details and get information about cancer research advancements from mass media, which share weakly founded or unfounded results. Thus examining the mathematical correctness of existing models in order to avoid further mistakes is of key importance.

The talk will be focused on fatal mathematical mistakes in cancer mathematical models. Also the new model will be presented which describes immunity as a random function of age, heredity, lifestyle and environment.

References

[1] Tomasetti C. and Vogelstein B., Variation in cancer risk among tissues can be explained by the number of stem cell divisions. Science, 347 (6217), 2015, 78–81.