

Nanomedicine – Reality will trump hype!

James F Leary*

Department of Nanomedicine, Purdue University, USA

Any new technology undergoes the usual expectation curve from hype to reality, the so-called “Gartner’s Hype Cycle” my own version is shown in Figure 1.

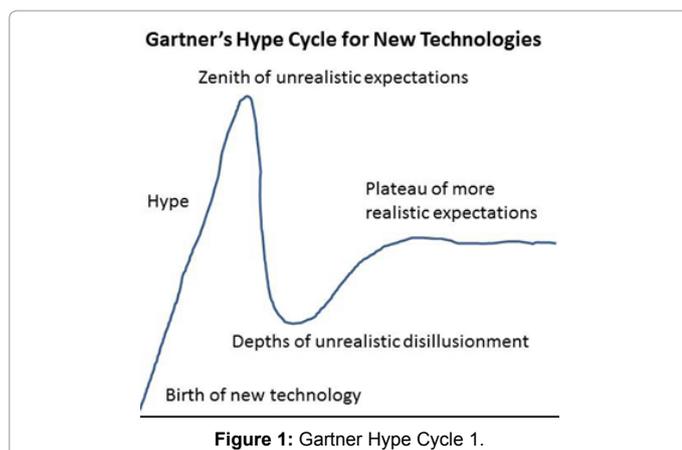
The sharp rise in expectations is usually driven in a hype process by people underestimating both the technical and non-technical (e.g. economic, societal, political) forces at work. The sharp downward part of the cycle is usually driven by practitioners of previous technologies, having vested interests, who are hoping it will fail. But realities ultimately trump both hype and unfair criticisms, because they are driven by a variety of real factors that don’t care about either enthusiasm of its proponents or criticisms of its enemies.

Nanomedicine, while going through a somewhat painful adolescence, is driven by a variety of mostly favorable factors – a “perfect storm” of realities. The current model of untargeted blockbuster drugs will continue to fail because it is not compatible with the genomes of enough people to prevent the eventual tragic outcomes in a small but significant number of patients. Personal genomics, once the costs lower to a few thousand dollars per person and once enough information about adverse reactions to types of genomes is known, will not only pay for itself in terms of favorable patient outcomes that will avoid not only the small numbers of deaths but also the much greater problem of patient compliance due to bad side effects of the drug. However, personal genomics only solves part of the problem. It still makes little sense to delivery large amounts (perhaps ten times or more of what should be needed) of drugs systemically when nanomedicine provides tools to decrease total patient exposure by a combination of increasing drug circulation time and providing at least partial targeting to diseased cells, while increasing local drug delivery to the cells of interest. Pharmaceutical companies do not have a “drug” problem; they have a “drug delivery” problem. If they concentrate their efforts on the drug delivery part of the problem, they are highly likely to experience a new “pharmaceutical renaissance”.

Targeted drug delivery, even if it is imperfect, will help close the remaining gap. Nanomedicine plays a key role in this process. Even partial targeting, along with “stealth approaches” (e.g. pegylation) to improve circulation time, should allow reduction of overall patient dose

which should lead to a huge decrease in side effects. By re-packaging drugs that have already been FDA approved, new “combo” drug-devices could allow for 10-year extensions to patent lives (which can also be periodically improved for still more combo patent extensions. This would allow for pharmaceutical companies to sell old drugs in new and improved packages, something of benefit to both patients and pharmaceutical companies. Smart pharmaceutical companies are beginning to do this already with very simple packaging methods. More advanced nanomedicine techniques will provide for very sophisticated and effective targeted drug delivery methods.

I suggest that naysayers, instead of just dismissing all nanomedicine approaches, instead provide useful suggestions for improvement to bring the technology into the range of “realistic expectations”. It is easy to negatively criticize something but much more useful to provide constructive criticism that will provide improved drug delivery for us all doctors, patients and pharmaceutical companies.



*Corresponding author: James F Leary, Department of Nanomedicine, Purdue University, USA, Tel: 765-494-7280; Fax: 765-496-6443; E-mail: jfleary@purdue.edu

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