

Book Review: Tetyana Obukhanych, PhD immunologist.

Melanie's Marvelous Measles by Stephanie Messenger's (children's book)

A children's book presenting an unconventional view of a childhood disease has, in a short time after its publication, stirred the wrath of the faceless medical establishment.

Pro-vaccine public opinion has branded the book as scientifically flawed and dangerous.

The information in the book has not been given a fair review by any expert familiar with immunologic theory and research, devoid of mind-clouding emotionality.

The purpose of this review is to provide the analysis of the book's main suggestions and to establish whether they have any basis on scientific grounds.

Melanie's Marvelous Measles portrays a hypothetical children's book scenario comprised of the following:

- two vaccinated school-age children get measles;
- the experience of measles in these children mirrors the quality of their daily nutrition prior to disease;
- an unvaccinated child, whose family knows the value of proper nutrition and shuns vaccination due to adverse effects experienced by an older sibling, does not develop any measles symptoms despite visiting her friend during illness;
- vegetable sources of vitamin A are suggested to prevent or speed up the recovery from measles;
- having measles in childhood is suggested to be beneficial due to building the immunity from disease.

Perhaps for some, the most unbelievable feature of the story would be the occurrence of measles in vaccinated children.

❖ Can vaccinated individuals get measles?

Yes, vaccinated individuals can get measles in real life.

This fact might be surprising to those unfamiliar with immunologic research in animals and epidemiologic data on measles and other infectious disease outbreaks.

Numerous outbreaks of infectious diseases, measles (1-3) and other (4-7), have been documented in communities with high vaccination coverage and involving anywhere from 20% to 80% of fully vaccinated individuals.

The reason for such a significant contribution of fully vaccinated individuals to outbreaks is *not* random vaccine failures, but a predicted limited duration of protection conferred by any vaccine against the corresponding disease.

Research in animals had demonstrated that injection of inactivated virus (and most vaccines are made of **attenuated or inactivated viruses**) was capable of achieving only short duration of protection, during which the serum taken from such animals had virus-neutralizing properties.

In contrast, inoculation of research animals with full-potency wild virus (such as those encountered naturally) led to long-lived protective capacity of the serum measured by virus neutralization test (8).

These findings suggest that a vaccinated person can, upon exposure, succumb to measles (or any other viral disease deemed to be vaccine-preventable) after the vaccine's short-lasting protective effect wanes.

This is in contrast to permanent immunity developed after exposure to natural virus. This point is well illustrated and discussed in *Melanie's Marvelous Measles*.

This brings up the next question.

- ❖ If vaccination against measles gives only short-lasting protection, and previously vaccinated children might get measles anyway (as correctly depicted in the book), **might vitamin A have any role in modulating the experience of measles?**

Vitamin A (retinoids) is a necessary partner of a crucial natural anti-viral messenger called *interferon* (9). Interferon is produced by cells of the innate immune system called *macrophages* within hours of them detecting a virus in the body (10).

One of the known interferon's anti-viral functions is to provide a molecular signal to other cells that makes them become resistant to viral entry.

However, the message of interferon gets through to those cells, including neurons, only in presence of vitamin A.

The crucial role of interferon-secreting macrophages in modulating the course of a viral infection is exemplified in a research experiment, in which mice were depleted of macrophages and infected with a vesicular stomatitis virus, which normally poses no danger of disease to humans or animals. Yet, mice depleted of macrophages succumbed to fatal neuro-invasion by this virus (11).

This experiment allows us to infer that if the action of interferon is so important in making a difference between subclinical versus deadly outcome of a viral infection, then vitamin A deficiency *at the time of exposure* to the virus would make interferon action suboptimal and would negatively affect the course of any viral infection in which interferon is normally involved, measles or some other (12).

This would also suggest that attempting to correct any pre-existing vitamin A deficiency only after the onset of disease symptoms (two or three weeks after exposure) is not likely

to ensure a mild or subclinical course of the disease, since the action of interferon is required within hours of viral exposure.

Nevertheless, analysis of placebo-controlled clinical trials of vitamin A administration in severe measles revealed that a high dose of vitamin A taken on two consecutive days after the measles diagnosis was still beneficial by reducing croup, overall mortality, and pneumonia-specific mortality (13).

A quote from *Melanie's Marvelous Measles*,

“I read that if your body has plenty of vitamin A you won't get measles, and if you have measles, eating fruit and vegetables high in vitamin A are helpful for healing.”

is therefore in line with scientific knowledge.

It should be noted, however, that fruit and vegetables do not contain vitamin A *per se* (retinoids), but rather beta-carotene, which can be converted to real vitamin A by the liver. It is **retinoids**, not beta-carotene, that play a direct role in the above-described anti-viral protection in partnership with interferon.

Therefore, the sources of real vitamin A, such as milk/butter from grass-fed cows (i.e., cows on pasture, not in feedlot) or high quality cod liver oil, might be necessary in daily nutrition in addition to fruit and vegetables for the purposes of building up vitamin A reserves.

❖ Finally, **is there any important long-term benefit of having measles in childhood?**

Yes, there is.

The most significant benefit is for girls (mothers-to-be), who by having measles in their own childhood and acquiring permanent immunity from the disease themselves, would also furnish this immunity to their offspring due to passive immunity transfer via the placenta and breastfeeding.

The ability of passive immunity transfer to their babies would be absent in those mothers who, having been born after the childhood measles vaccination campaign had been introduced, have not had a chance to experience measles themselves (14, 15).

The reason why infants are so vulnerable to measles without maternal immuno-protection is that their immune system is not capable of producing high levels of interferon (16).

Paradoxically, infants born decades after mass vaccination has been on the way in their country have much higher chances of contracting measles during sporadic (imported) outbreaks of a nearly eliminated disease, compared to infants born in the pre-vaccination era when the incidence of childhood measles was consistently high and affecting older age groups, ages one to fifteen (17). This is because, despite early exposure to measles,

those infants were under the shield of robust maternal immuno-protection for the first year of life even when not breastfed, and breastfeeding would prolong their protection.

Such natural maternal protection is now systematically eliminated over the span of generations in many countries around the world. This is done by preventing exposure to measles in healthy children who would have withstood the disease without complications and would have developed immunity to protect their own very young offspring, who are not eligible for getting the measles vaccine before the age of one. If naturally acquired immunity were preserved, we would not have to fear infant measles mortality, as we do now.

Melanie's Marvelous Measles concludes that “for most children it is a good thing to get measles, many wise people believe measles make the body stronger and more mature for the future.”

It is not difficult to see why this makes sense, once we understand the irreplaceability of naturally acquired immunity in preventing measles in (very young) infants of the next generation, in whom it would surely be deadly.

Indeed, according to the representatives of the medical establishment and public health, measles *can be* a deadly disease. This statement is entirely correct and factual.

In addition to making it more prevalent in (young) infants via mass vaccination of the generation of their mothers, there are in fact a couple of other factors that might increase the risk of disease complications from measles infection in older children and adults. These factors include:

a) neglecting to screen for and promptly correct any sub-clinical vitamin A (retinoid) deficiencies in the population;

b) using anti-fever medications to suppress disease symptoms, which are known to increase secondary complications from measles in particular (18) as well as to exacerbate an existing bacterial infection (19).

The clear and loud statement to the frightened public *that measles can be deadly* could very well be a self-fulfilling prophecy, when the individual and cross-generational requirements of the proper function of the immune system are not met or interfered with iatrogenically.

In summary, *Melanie's Marvelous Measles*, although understandably oversimplified and exaggerated to suit a child's level of understanding, provides a valid representation of vaccination reality.

For those parents who have already chosen a holistic approach to health, the book can serve as a way of introducing the concepts of immunity and vaccination to their young children.

If, in addition, the book succeeds to alert other unsuspecting parents to the fact that vaccination does not guarantee protection from disease and inspires them to pay more attention to the nutrition required for optimal function of the immune system, that would indeed be marvelous.

About the Reviewer: Tetyana Obukhanych, PhD had pursued her graduate education and research training in the field of Immunology in leading biomedical institutions in the US, including The Rockefeller University, Harvard Medical School, and Stanford University. She is the author of e-book Vaccine Illusion (<https://sites.google.com/site/vaccineillusion/>), which informs parents and health care professionals about immunologic impact of vaccination. Her views are based on her independent and impartial analysis of immunologic theory and facts. She has no ties to vaccine industry or professional societies with vested interests in promoting vaccination.

Disclaimer: Scientific information provided in this review is for education purposes only and is not intended as medical advice.

References

1. Nkowane, B.M., S.W. Bart, W.A. Orenstein, and M. Baltier. 1987. Measles outbreak in a vaccinated school population: epidemiology, chains of transmission and the role of vaccine failures. *Am J Public Health* 77:434-438.
2. Boulianne, N., G. De Serres, B. Duval, J.R. Joly, F. Meyer, P. Dery, M. Alary, D. Le Henaff, and N. Theriault. 1991. [Major measles epidemic in the region of Quebec despite a 99% vaccine coverage]. *Can J Public Health* 82:189-190.
3. De Serres, G., F. Markowski, E. Toth, M. Landry, D. Auger, M. Mercier, P. Belanger, B. Turmel, H. Arruda, N. Boulianne, B.J. Ward, and D.M. Skowronski. 2012. The largest measles epidemic in North America in a decade--Quebec, Canada, 2011: Contribution of susceptibility, serendipity and super-spreading events on elimination. *J Infect Dis*
4. Lee, B.R., S.L. Feaver, C.A. Miller, C.W. Hedberg, and K.R. Ehresmann. 2004. An elementary school outbreak of varicella attributed to vaccine failure: policy implications. *J Infect Dis* 190:477-483.
5. Lopez, A.S., D. Guris, L. Zimmerman, L. Gladden, T. Moore, D.T. Haselow, V.N. Loparev, D.S. Schmid, A.O. Jumaan, and S.L. Snow. 2006. One dose of varicella vaccine does not prevent school outbreaks: is it time for a second dose? *Pediatrics* 117:e1070-1077.
6. Dayan, G.H., M.P. Quinlisk, A.A. Parker, A.E. Barskey, M.L. Harris, J.M. Schwartz, K. Hunt, C.G. Finley, D.P. Leschinsky, A.L. O'Keefe, J. Clayton, L.K. Kightlinger, E.G. Dietle, J. Berg, C.L. Kenyon, S.T. Goldstein, S.K. Stokley, S.B. Redd, P.A. Rota, J. Rota, D. Bi, S.W. Roush, C.B. Bridges, T.A. Santibanez, U. Parashar, W.J. Bellini, and J.F. Seward. 2008. Recent resurgence of mumps in the United States. *N Engl J Med* 358:1580-1589.
7. Witt, M.A., P.H. Katz, and D.J. Witt. 2012. Unexpectedly limited durability of immunity following acellular pertussis vaccination in preadolescents in a North American outbreak. *Clin Infect Dis* 54:1730-1735.
8. Ochsenbein, A.F., D.D. Pinschewer, S. Sierro, E. Horvath, H. Hengartner, and R.M. Zinkernagel. 2000. Protective long-term antibody memory by antigen-driven and T help-dependent differentiation of long-lived memory B cells to short-lived plasma cells independent of secondary lymphoid organs. *Proc Natl Acad Sci U S A* 97:13263-13268.
9. Trottier, C., M. Colombo, K.K. Mann, W.H. Miller, Jr., and B.J. Ward. 2009. Retinoids inhibit measles virus through a type I IFN-dependent bystander effect. *FASEB J* 23:3203-3212.
10. Moseman, E.A., M. Iannacone, L. Bosurgi, E. Tonti, N. Chevrier, A. Tumanov, Y.X. Fu, N. Hacohen, and U.H. von Andrian. 2012. B cell maintenance of subcapsular sinus macrophages protects against a fatal viral infection independent of adaptive immunity. *Immunity* 36:415-426.
11. Iannacone, M., E.A. Moseman, E. Tonti, L. Bosurgi, T. Junt, S.E. Henrickson, S.P. Whelan, L.G. Guidotti, and U.H. von Andrian. 2010. Subcapsular sinus macrophages prevent CNS invasion on peripheral infection with a neurotropic virus. *Nature* 465:1079-1083.

12. Chen, S., Y. Yang, X. Yan, J. Chen, H. Yu, and W. Wang. 2012. Influence of vitamin A status on the antiviral immunity of children with hand, foot and mouth disease. *Clin Nutr* 31:543-548.
13. Huiming, Y., W. Chaomin, and M. Meng. 2005. Vitamin A for treating measles in children. *Cochrane Database Syst Rev* CD001479.
14. Papania, M., A.L. Baughman, S. Lee, J.E. Cheek, W. Atkinson, S.C. Redd, K. Spitalny, L. Finelli, and L. Markowitz. 1999. Increased susceptibility to measles in infants in the United States. *Pediatrics* 104:e59.
15. Bale, C., M.L. Garly, C. Martins, J. Nielsen, H. Whittle, and P. Aaby. 2011. Risk factors for measles in young infants in an urban African area with high measles vaccination coverage. *Pediatr Infect Dis J* 30:689-693.
16. Wilson, C.B., J. Westall, L. Johnston, D.B. Lewis, S.K. Dower, and A.R. Alpert. 1986. Decreased production of interferon-gamma by human neonatal cells. Intrinsic and regulatory deficiencies. *J Clin Invest* 77:860-867.
17. Langmuir, A.D., D.A. Henderson, R.E. Serfling, and I.L. Sherman. 1962. The importance of measles as a health problem. *Am J Public Health Nations Health* 52(2)Suppl:1-4.
18. Ahmady, A.S., and A.R. Samadi. 1981. The adverse effects of antipyretics in measles. *Indian Pediatr* 18:49-52.
19. Sugimura, T., T. Fujimoto, H. Motoyama, T. Maruoka, S. Korematu, Y. Asakuno, and H. Hayakawa. 1994. Risks of antipyretics in young children with fever due to infectious disease. *Acta Paediatr Jpn* 36:375-378.