

# Etiology of the Toxaemias of Pregnancy

R. W. MACLELLAN, B.A., '38

IT is a recognized fact that the human ovum is a parasite in its relation to the maternal organism. It is the intention here to show that under certain circumstances, the parasite may be benign and under other circumstances, it may prove highly malignant.

A normal pregnancy has been described as a harmonious symbiosis (living-together). A previously delicate girl during a completely normal gestation frequently develops wonderful health. On the other hand, a healthy woman who develops a toxaemia of pregnancy, may be invalided for a long time.

The collection of diseases that is somewhat loosely called "the toxaemias of pregnancy" includes the following:

1. MAJOR—eclampsia, pernicious or toxic vomiting, accidental haemorrhage or abruptio placentae, acute yellow atrophy, and major mental disturbances, i.e. puerperal insanity.

2. MINOR—herpes, pruritus, ptyalism or sialorrhoea (hyper-secretion of saliva), and minor mental disturbances.

On first glancing at the above list, these diseases would appear to differ greatly in their causation, BUT, remember that they all have this in common, that they appear in previously healthy women.

Many, many theories have been advanced to explain the etiology of the toxaemias, but the point that nearly all fail to cover is that there is no primary defect in the woman, i.e. the disease occurs solely as a result of this particular pregnancy. A woman may have eclampsia during her first pregnancy, be perfectly healthy during the second, and again have eclampsia during the third, and so on. This, in fact, is the usual story of toxic cases, and points to a difference in harmony between the maternal protoplasm and different ova.

Veit and Schmorl have demonstrated syncytial cells from the foetal coverings circulating in the maternal blood stream. They concluded that toxaemias were due to these cells. BUT, the same cells have been demonstrated in the blood of normal pregnant women.

The theory that lack of consanguinity between mother and foetus might explain the toxaemias, has also been advanced. McQuarrie found 70% incompatible in a series of toxaemic cases, as opposed to 11.4% incompatible in a control group of normal cases. The objection to this theory was stated by C. O. Maland to be the lack of intermingling of foetal and maternal blood.

In 1926, my father, Dr. E. K. Maclellan, suggested a correlation between the above two theories, for the following reasons:—

If the blood of one individual is incompatible with that of another, it is reasonable to assume that all other protoplasm in the body may be in-

compatible (cf. analogy of skin grafting). Syncytial cells are foetal in origin, and therefore, when maternal and foetal protoplasm are compatible, merely act as minute foreign bodies and are non-toxic. On the other hand, these cells, in the absence of consanguinity, may reasonably be supposed to be toxic.

The pathology of eclampsia and other toxaemias is strikingly similar to that found after transfusion of blood from an incompatible donor. The same five phenomena occur, viz.: widespread haemolysis, thrombosis, haemagglutination, endotheliolysis and neurotoxicosis. Since the pathology is so similar, is it not natural to expect similar etiology?

The correlation of these theories explains why there need be no intermingling of foetal and maternal blood. It also accounts for eclampsia with a hydatidiform mole. Post-partum eclampsia can be explained by assuming that a certain amount of chorionic tissue remains in utero.

For several years, the writer has been interested in this correlation theory, and, last winter, made this suggestion: that toxaemia should rarely, if ever, occur, when the mother is a universal recipient, Group I (AB), or when the foetus is a universal donor, Group 4 (O). The following table shows the cases in which toxaemia would be likely to develop:

If blood of mother is	And blood of father is	Then blood of child will be
1 (AB)	1 (AB)	1 (AB), 2 (A), 3 (B).
	2 (A)	1 (AB), 2 (A), 3 (B).
	3 (B)	1 (AB), 2 (A), 3 (B).
	4 (O)	2 (A), 3 (B).
2 (A)	1 (AB)	1 (AB), 2 (A), 3 (B).
	2 (A)	2 (A), 4 (O).
	3 (B)	1 (AB), 2 (A), 3 (B), 4 (O).
	4 (O)	2 (A), 4 (O).
3 (B)	1 (AB)	1 (AB), 2 (A), 3 (B).
	2 (A)	1 (AB), 2 (A), 3 (B), 4 (O).
	3 (B)	3 (B), 4 (O).
	4 (O)	3 (B), 4 (O).
4 (O)	1 (AB)	2 (A), 3 (B).
	2 (A)	2 (A), 4 (O).
	3 (B)	3 (B), 4 (O).
	4 (O)	4 (O).

If this theory be true, the mother will be a potential toxaemic in cases where the blood grouping of the child is not compatible, i.e., in those cases printed in **heavy type**.

This table is merely a different arrangement of that in Todd and Sanford. The grouping systems of both Moss and Landsteiner have been used. This theory will account for all cases, except those where antagonism in the protoplasm is due to sub-groups within the main groups themselves.

The particular value of determining the etiology of the toxæmias lies in the fact that prevention would be easy with known etiology. For example, if this theory be correct, by ascertaining the blood groupings of both parents, it would be known whether toxæmia might occur. Then, if the classical symptoms, e. g., headache and malaise, were to appear, a careful supervision would be at once instituted. Maternal mortality from the toxæmias approaches 25% of all maternal deaths, and this figure, under the supervision which would follow blood typing, would be minimized; likewise, the foetal mortality could be markedly reduced.

From a scientific standpoint, also, determination of the true etiology of the toxæmias of pregnancy might rank with the more important discoveries in medicine, as well as being of great scientific interest.

#### REFERENCES

- Maland, C. O., Amer. Journ. Obs. and Gyn, 446, Sept. 1925.  
 Maclellan, E. K., Can. Med. Journ., 16, 292-3, 1926.

#### DID YOU KNOW?—

That the name mumps comes from an old English word "to mump" meaning "to sulk", originating, no doubt, from the patient's appearance.

That the first medical man in Canada is believed to have been Daniel Hay, Surgeon-Apothecary, who was with Sieur de Mont's colonists, 1604 to 1613, at Port Royal, now Annapolis, N. S.

That the canines were called "eye-teeth" because Galen (A.D. 131) believed them to be supplied by the same nerve as the eye.

That Sir Arthur Conan Doyle, famous novelist and spiritualist was a physician, an M.D. from Edinburgh University.

That the first hospital in America was erected in 1524 by Cortés in the City of Mexico, and is still in existence.

That a professor at a leading medical college used to tell his classes regularly that to cure colds, one should put the patient to bed hanging his hat on the bedpost, and give him plenty of whiskey. When he sees two hats he is getting better.

That the word "alcohol" meant originally an impalpable powder, Arabic "al" and "kohl". The present day application is of comparatively recent date.

That Pott's fracture was described by Percival Pott, an English surgeon after he had experienced this type of fracture in a fall from a horse.