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Short communication

The Global Pregnancy Collaboration (CoLab) Biobank of rare placentas

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ABSTRACT

Many adverse pregnancy outcomes are the result of placental disorders. It has been difficult to decipher the root cause of many of these disorders due to an overlap in identifiable placental pathology and pregnancy outcomes. The reason for this confusion may be related to the lack of an appropriate control placenta. An ideal control placenta that is not related to adverse pregnancy outcomes is rare. We propose our pooled database at the Global Pregnancy Collaboration (CoLab) could be a solution for researchers.

1. Introduction

The Global Pregnancy Collaboration, CoLab, is a multi-center and international collaboration among scientists and institutions which works to improve the health of mothers and their infants by facilitating harmonized perinatal data and biosample sharing as well as collaborative research. This sharing is accomplished by informing member centers of the request for samples through a presentation by the investigators. Individual centers decide on whether they are interested in collaborating or sharing. With this approach we have provided samples for over 20 studies worldwide (https://pregnancycolab.tghn.org) In preliminary communications all centers are willing to share rare placentas.

Many adverse pregnancy outcomes including preeclampsia, spontaneous preterm birth, fetal growth restriction (FGR), abruptio placenta, stillbirth and recurrent abortion appear to have their origin in placental abnormalities/dysfunction [1]. This may be due to alterations in early placental development leading to altered placental perfusion and endoplasmic reticular and oxidative stress [2–4] or later disorders in which the placenta outgrows its own blood supply prematurely [5]. However, the major dilemma is the lack of clear and consistent differences in placental pathology, which leads to these alternate outcomes [6–10]. For example, FGR, preeclampsia and preterm birth all share placental changes associated with abnormal implantation but only preeclampsia results in a maternal syndrome [10–12].

One major problem hindering our ability to decipher the root causes in the placenta is the lack of appropriate controls for comparison of disease with normal pregnancy [5]. Current research has demonstrated that the placentas in term preeclampsia without FGR closely resemble normotensive control placentas. Early onset preeclampsia placentas differ greatly from term controls but share many findings with "preterm controls". However, these "preterm control placentas" are almost never normal but, rather, are placentas from spontaneous preterm births [1]. Placentas from normal term pregnancies or spontaneous preterm births are not appropriate controls. They either result in comparing an immature with a mature placenta or comparing an abnormal placenta from a preeclamptic pregnancy with a "control placenta" from another placental disorder. Even the physiological challenges of labor result in placental changes [13], which requires unraveling the changes due to labor from the changes due to disease. The fatal flaw of most studies to date is that the ideal control placenta should be from gestational age-matched pregnancies that have not labored and are not diagnosed with disorders known to affect placental morphology. Currently, there is a clear need for access to control placentas that are not associated with these clinical features.

2. Methods

Criteria for preterm control placentas include an age matched placenta delivered preterm for conditions not associated with placental dysfunction. Examples of clinical conditions that may serve as appropriate placental controls include preterm delivery for: maternal trauma,

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maternal illness, fetal malformations or congenital disorders and maternal cancer. Among these, the placentas of most clear-cut value are likely the rarest placentas, those from normal pregnancies associated with trauma.

Although, we have highlighted preeclampsia, this issue is relevant to study of the other placental mediated disorders. Further, rare placental disorders or placental findings with rare maternal diseases or emerging maternal diseases (i.e., Covid 19) require many more cases than any one center can acquire to allow investigators to determine pertinent morphological changes.

3. Discussion

The problem researchers face is that a preterm placenta that is not delivered due to placental related disorders or that is associated with an infrequent or emerging fetal or maternal condition is rare and thus large data banks are required to identify these few cases. Internationally, few institutions have a placental registry cataloguing such cases. Placental tissue banks and databases are expensive to design and maintain and data sets are often difficult or impossible to merge for meta-analysis.

CoLab has created a general inventory of placental tissue samples that is online in our website, https://pregnancycolab.tghn.org/. This database in addition to storing records for the placental tissue bank includes information from each pregnancy associated with the placenta such as cord blood, maternal and fetal DNA. As of 2021, there are 40 centers across the world participating in CoLab's tissue bank, with over 14,000 placental samples. We propose that through our network at CoLab, we can leverage our member tissue banks, our connections through our hub and spoke infrastructure and use our database as a central access point for rare placentas. Within this resource, a registry of rare placentas is being developed. This registry will include controls for comparison to placentas associated with preeclampsia and preterm birth. We propose this database could be queried by outside institutions and members of CoLab. It is likely that other types of rare placentas will also be identified that could serve as a valuable resource for investigators. CoLab welcomes queries from all scientists through our website listed above and uses an unbiased and transparent process to respond to requests for samples and data. CoLab requires a small charge, unique to each request, to cover database administrative work and the requested processing or delivery of samples.

In addition to placentas that are currently available, we can poll our membership to be alert for the occurrence of specific rare placentas, requested by researchers for their studies, in a prospective manner. Modest charges would be necessary to support this effort but would not be charged if CoLab cannot satisfy the investigators request. For more information contact the CoLab data manager, Ms. Kasey Blount (blountke2@mwri.magee.edu).

Declaration of competing interest

None.

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