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Title: Ex vivo Culture of Human Placental Explants for the Study of Viral Transmission Across the Maternal-Fetal Interface

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Author Questionnaire

1. We have marked your project as author-provided footage, meaning you film the video yourself and provide JoVE with the footage to edit. JoVE will not send the videographer. Please confirm that this is correct.

✓ Correct

2. Interview statements: Which interview statement filming option is the most appropriate for your group? **Please select one.**

☒ Interviewees self-record interview statements. JoVE can provide support for this option.

3. Proposed interview filming date: Please indicate the proposed date that your group will self-film interviews: **01/27/2026**

When you are ready to submit your video files, please contact our Content Manager, [Utkarsh Khare](#).

Current Protocol Length

Number of Steps: 10

Number of Shots: 21

Introduction

INTRODUCTION:

~~REQUIRED: Summarize your research focus and the main questions it aims to answer.~~

- 1.1. **Cécile Malnou:** Our research focuses on how viral replication takes place in human placental tissues, to decipher the mechanisms of vertical transmission.
 - 1.1.1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera.

~~Describe the research gap or limitation in existing methods and how this protocol addresses them.~~

- 1.2. **Cécile Malnou:** Our protocol addresses the lack of physiologically relevant, long-term human placental models to study gestation-dependent viral replication and transmission.
 - 1.2.1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera.

CONCLUSION:

~~What does this protocol allow researchers to study or measure?~~

- 1.3. **Cécile Malnou:** Our protocol preserves placental tissue architecture and cell interactions, allowing long-term study of viral replication and tissue responses.
 - 1.3.1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera.

NOTE: This file might be slated as 1.5 due to incorrect numbering in shotlist

~~Describe the most important consideration or challenge when performing this protocol.~~

- 1.4. **Cécile Malnou:** The current challenges include donor variability, limited manipulability of complex tissue, short sample availability, and risk of microbial contamination.
 - 1.4.1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera.

NOTE: This file might be slated as 1.6 due to incorrect numbering in shotlist

~~How can future studies build on this work? Describe the questions or research directions that can be investigated next.~~

- 1.5. **Cécile Malnou:** Future research will focus on studying emerging viruses, their impact on pregnant women, and testing antiviral strategies to prevent vertical transmission.

- 1.5.1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera.

NOTE: This file might be slated as 1.7 due to incorrect numbering in shotlist

Ethics Title Card

This research has been approved by the Institutional Review Board (IRB) at Germethèque Toulouse

NOTE: Protocol drafted from footage

Demonstrator: H  l  ne Martin

- 2.6. Place one sponge into each well, counting 9 explants per sponge [1]. Then place the 6-well plate with the sponges overnight in the incubator at 37 degrees Celsius and 5 percent carbon dioxide [2].

- 2.6.1. LAB MEDIA: MARTIN DOI10.3791-69525 vid3 02:37-02:50
- 2.6.2. LAB MEDIA: MARTIN DOI10.3791-69525 vid4 00:03 – 00:17
- 2.7. The next day, put sterile PBS into each well of a new sterile 6-well plate to fill three-quarters of the volume [1].
 - 2.7.1. LAB MEDIA: MARTIN DOI10.3791-69525 vid5 02:02 – 02:12
- 2.8. Place a sterile strainer in the first well [1] and, using sterile forceps, transfer all the explants from a given condition to the strainer [2]. Gently mix with the forceps and shake the strainer for about 10 seconds so that all the explants are in contact with the PBS [3].
 - 2.8.1. LAB MEDIA: MARTIN DOI10.3791-69525 vid5 03:22-03:27
 - 2.8.2. LAB MEDIA: MARTIN DOI10.3791-69525 vid5 03:40 – 03:55
 - 2.8.3. LAB MEDIA: MARTIN DOI10.3791-69525 vid5 04:40 – 05:01
- 2.9. Now, manually move the strainer to the second well of the plate [1] and repeat the washing procedure [2]. Continue moving the strainer until the sixth well [3].
 - 2.9.1. LAB MEDIA: MARTIN DOI10.3791-69525 vid5 05:02 – 05:07
 - 2.9.2. LAB MEDIA: MARTIN DOI10.3791-69525 vid5 05:08-05:15
 - 2.9.3. LAB MEDIA: MARTIN DOI10.3791-69525 vid5 07:40-07:50
- 2.10. After the last wash, use forceps to place the explants one by one on the sponge [1], positioning 9 explants per sponge [2].
 - 2.10.1. LAB MEDIA: MARTIN DOI10.3791-69525 vid5 09:00-09:20
 - 2.10.2. LAB MEDIA: MARTIN DOI10.3791-69525 vid5 12:28-12:33

Results

3. Results

- 3.1. Placental tissue integrity was visually assessed before dissection to exclude non-trophoblastic structures and blood clots prior to explant preparation [1]. Placental explants were successfully cultured on gelatin sponges at the air-liquid interface after dissection [2].
 - 3.1.1. LAB MEDIA: Figure 2B.
 - 3.1.2. LAB MEDIA: Figure 2C.
- 3.2. Beta-human chorionic gonadotropin secretion decreased during the culture period but did not preclude the proper viability and integrity of the tissue [1].
 - 3.2.1. LAB MEDIA: Figure 3A. *Video editor: Highlight the paired data points showing beta-human chorionic gonadotropin levels at measure 1 and measure 2.*
- 3.3. Placental cytoarchitecture was preserved during culture, with placental alkaline phosphatase [1], cytokeratin 7 [2], and vimentin expression detected in both first- and third-trimester explants [3].
 - 3.3.1. LAB MEDIA: Figure 3B. *Video editor: Highlight the PLAP panels for first- and third-trimester explants.*
 - 3.3.2. LAB MEDIA: Figure 3B. *Video editor: Highlight CK7 panels for first- and third-trimester explants.*
 - 3.3.3. LAB MEDIA: Figure 3B. *Video editor: Highlight the VIM panels for first- and third-trimester explants.*
- 3.4. No apoptotic signal was detected in untreated placental explants [1], in contrast to the DNase I (*D-N-Ase-One*) –treated positive control [2].
 - 3.4.1. LAB MEDIA: Figure 3C. *Video editor: Show the untreated tissue panels with minimal fluorescent signal.*
 - 3.4.2. LAB MEDIA: Figure 3C. *Video editor: Show the DNase I–treated positive control panel with strong signal.*
- 3.5. Human cytomegalovirus replication was detected in histoculture supernatants, with viral titers varying between placental donors [1]. Human cytomegalovirus proteins were detected in infected placental explants by immunohistochemistry [2].
 - 3.5.1. LAB MEDIA: Figure 4A. *Video editor: Highlight the scatter plot*

- 3.5.2. LAB MEDIA: Figure 4B. *Video editor: Highlight the HCMV image*
- 3.6. Zika (*Zee-ka*) virus replication in placental explants varied between donors, with some samples showing limited permissiveness [1].
 - 3.6.1. LAB MEDIA: Figure 4C. *Video editor: Highlight the individual curves*
- 3.7. USUV (*You-suv*) viral transcripts were detected in both first- and third-trimester placental explants, with donor-dependent variability [1].
 - 3.7.1. LAB MEDIA: Figure 4D. *Video editor: Highlight the USUV panel in both 1st and 3rd trimester panels*

Pronunciation Guide:

Ex vivo

Pronunciation link: <https://www.merriam-webster.com/dictionary/ex%20vivo>

IPA: /ˌɛks ˈviːvʊ/

Phonetic Spelling: eks·vee·voh

Placental

Pronunciation link: <https://www.merriam-webster.com/dictionary/placental>

IPA: /pləˈsɛn.təl/

Phonetic Spelling: pluh·sen·tuhl

Explants

Pronunciation link: <https://www.merriam-webster.com/dictionary/explant>

IPA: /ˈɛks.plænt/

Phonetic Spelling: eks·plant

Maternal-Fetal

Pronunciation link: <https://www.merriam-webster.com/dictionary/maternal-fetal>

IPA: /məˈtɜːr.nəl ˈfiː.təl/

Phonetic Spelling: muh·tur·nuhl·fee·tuhl

Interface

Pronunciation link: <https://www.merriam-webster.com/dictionary/interface>

IPA: /ˈɪn.təˌfeɪs/

Phonetic Spelling: in·ter·fays

Transmission

Pronunciation link: <https://www.merriam-webster.com/dictionary/transmission>

IPA: /trænzˈmɪʃ.ən/

Phonetic Spelling: tranz·mih·shun

Replication

Pronunciation link: <https://www.merriam-webster.com/dictionary/replication>

IPA: /ˌrɛp.lɪˈkeɪ.ʃən/

Phonetic Spelling: rep·luh·kay·shun

Physiologically

Pronunciation link: <https://www.merriam-webster.com/dictionary/physiologically>

IPA: /ˌfɪz.i.əˈlɑː.dʒɪ.kəl.i/

Phonetic Spelling: fiz·ee·uh·lah·ji·kuh·lee

Gestation-dependent

Pronunciation link: <https://www.merriam-webster.com/dictionary/gestation>

IPA: /dʒɛˈsteɪ.ʃən dɪˈpɛn.dənt/

Phonetic Spelling: jeh·stay·shun·dih·pen·duhnt

Architecture

Pronunciation link: <https://www.merriam-webster.com/dictionary/architecture>

IPA: /ˈɑːr.kɪˌtɛk.tʃə/

Phonetic Spelling: ar·kuh·tek·chur

Microbial

Pronunciation link: <https://www.merriam-webster.com/dictionary/microbial>

IPA: /maɪˈkroʊ.bi.əl/

Phonetic Spelling: my·kroh·bee·uhl

Contamination

Pronunciation link: <https://www.merriam-webster.com/dictionary/contamination>

IPA: /kənˌtæm.əˈneɪ.ʃən/

Phonetic Spelling: kuhn·tam·uh·nay·shun

Antiviral

Pronunciation link: <https://www.merriam-webster.com/dictionary/antiviral>

IPA: /ˌæn.tiˈvaɪ.rəl/

Phonetic Spelling: an·tee·vy·ruhl

Institutional Review Board (IRB)

Pronunciation link: <https://www.merriam-webster.com/dictionary/institutional%20review%20board>

IPA: /ˌɪn.stɪˈtuː.ʃən.əl rɪˈvjuː bɔːrd/

Phonetic Spelling: in·stuh·too·shuh·nuhl·rih·vyoo·bord

Germethèque

Pronunciation link: No confirmed link found

IPA: /ʒɛʁ.me.tek/ (French origin)

Phonetic Spelling: zhair·meh·tek

Gelatin

Pronunciation link: <https://www.merriam-webster.com/dictionary/gelatin>

IPA: /'dʒɛl.ə.tɪn/

Phonetic Spelling: jel-uh-tin

Phosphate

Pronunciation link: <https://www.merriam-webster.com/dictionary/phosphate>

IPA: /'fɑːs.fert/

Phonetic Spelling: faas-fayt

Incubator

Pronunciation link: <https://www.merriam-webster.com/dictionary/incubator>

IPA: /'ɪŋ.kju.beɪ.tər/

Phonetic Spelling: ing-kyoo-bay-tur

Cytokeratin

Pronunciation link: <https://www.merriam-webster.com/dictionary/cytokeratin>

IPA: /,saɪ.təʊ'keɪ.ə.tɪn/

Phonetic Spelling: sy-toh-keh-ruh-tin

Vimentin

Pronunciation link: <https://www.merriam-webster.com/dictionary/vimentin>

IPA: /vɪ'mɛn.tɪn/

Phonetic Spelling: vih-men-tin

Immunohistochemistry

Pronunciation link: <https://www.merriam-webster.com/dictionary/immunohistochemistry>

IPA: /ɪ'mjuː.nəʊ'his.təʊ'keɪ.mɪ.stri/

Phonetic Spelling: ih-myoo-noh-his-toh-keh-mih-stree

Cytomegalovirus

Pronunciation link: <https://www.merriam-webster.com/dictionary/cytomegalovirus>

IPA: /,saɪ.təʊ'mɛg.ə.loʊ.vai.rəs/

Phonetic Spelling: sy-toh-meh-guh-loh-vy-ruhs

Histoculture

Pronunciation link: No confirmed link found

IPA: /'hɪs.təʊ.kʌl.tʃə/

Phonetic Spelling: his-toh-kul-chur

Supernatant

Pronunciation link: <https://www.merriam-webster.com/dictionary/supernatant>

IPA: /'su:.pə,nei.tənt/

Phonetic Spelling: soo·per·nay·tuht

Permissiveness

Pronunciation link: <https://www.merriam-webster.com/dictionary/permissive>

IPA: /pə'mɪ.sɪv.nəs/

Phonetic Spelling: pur·mih·siv·nuhs

Trimester

Pronunciation link: <https://www.merriam-webster.com/dictionary/trimester>

IPA: /traɪ'mɛs.tə/

Phonetic Spelling: try·mes·tur

DNase

Pronunciation link: <https://www.merriam-webster.com/dictionary/DNase>

IPA: /'diː.ɛn.eɪz/

Phonetic Spelling: dee·en·ayz

Apoptotic

Pronunciation link: <https://www.merriam-webster.com/dictionary/apoptotic>

IPA: /,eɪ.pə'pʰɑː.tɪk/

Phonetic Spelling: ay·pahp·tah·tik

Viability

Pronunciation link: <https://www.merriam-webster.com/dictionary/viability>

IPA: /,vaɪ.ə'bɪ.lə.ti/

Phonetic Spelling: vy·uh·bil·uh·tee

Cytoarchitecture

Pronunciation link: <https://www.merriam-webster.com/dictionary/cytoarchitecture>

IPA: /,saɪ.təʊ'ɑːr.kɪ.tɛk.tʃə/

Phonetic Spelling: sy·toh·ar·kuh·tek·chur