EPA-IUF MCRADA #1515-23

MATERIALS COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT

This Materials Cooperative Research and Development Agreement ("Materials CRADA" or "Agreement") is entered into by and between the IUF – Leibniz Research Institute for Environmental Medicine gGmbH ("the IUF" or "Collaborator"), a German non-profit company with a principal place of business at Auf'm Hennekamp 50, 40225 Düsseldorf, Germany, and the United States Environmental Protection Agency ("EPA") Center for Computational Toxicology and Exposure (CCTE), under the authority of Title 15, United States Code §§ 3710a-3710d (commonly known as the Federal Technology Transfer Act of 1986).

1. Research Material. CCTE agrees to transfer to the Collaborator the following (the "Research Material"):

   Operating protocols, R-scripts and other information required for IUF to replicate EPA assays in their laboratory.

   This Materials CRADA involves no other exchange of personnel or resources.

2. Human Subjects Research Ethics and Oversight. The Research Material does not involve specimens or data derived or collected from human subjects and therefore does not need review and approval by the Human Subjects Research Review Official (HSSRO).

3. Dual Use Research of Concern (DURC). The DURC Internal Review Entity (IRE) has determined that this research does not meet the DURC definition and that no additional review and oversight under the *USG Policy for Institutional Oversight of DURC* are required. The Principal Investigator (PI) must report to the IRE any results or changes in the research such that one or more of the 7 experimental effects of concern may apply, or if the PI feels that the research may be DURC.

4. No Transfer. Collaborator's investigator agrees to retain control over this Research Material and further agrees not to transfer the Research Material to other people not under his/her direct supervision without advance written approval of CCTE. When the Research Project is completed, the Research Material will be returned to the CCTE or disposed, if directed by CCTE, to the extent such destruction is permitted by law. CCTE reserves the right to distribute the Research Material to others and to use it for its own purposes.

5. Proprietary Information. The Collaborator shall place a proprietary notice on all information that it delivers to CCTE under this Agreement which it asserts is Proprietary Information of the Collaborator. CCTE agrees that: (1) any information designated as Proprietary Information which is furnished by the Collaborator to CCTE under this Agreement; (2) any information

obtained by either party during the performance of this Materials CRADA that would be claimed as Proprietary Information had it been submitted by the Collaborator; or (3) any information furnished by the Collaborator in contemplation of this Agreement shall be treated as Proprietary Information and will be used by CCTE only for the purpose of carrying out this Agreement or for Government purposes. Information designated as Proprietary Information shall not be disclosed, copied, reproduced or otherwise made available in any form whatsoever to any other person, firm, corporation, partnership, association or other entity without consent of the Collaborator, except as such information may be subject to disclosure under the Freedom of Information Act (5 U.S.C. § 552) and EPA's regulations at 40 C.F.R. Part 2, or as required to be disclosed by other statutes. CCTE agrees to use its best efforts to protect the information designated as Proprietary Information from unauthorized disclosure. The Collaborator agrees that CCTE is not liable for the disclosure of Proprietary Information which, after notice to and consultation with the Collaborator, EPA determines may not lawfully be withheld or which a court of competent jurisdiction requires to be disclosed. If no claim of confidentiality accompanies information at the time of submittal and a reasonable person would not have reason to believe such information was proprietary or of a confidential nature, then the information may be made public with no further notice to the Collaborator.

6. No Warranty. The Research Material is provided as a service to the research community. IT IS BEING SUPPLIED TO THE RECIPIENT WITH NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. CCTE makes no representations that the use of the Research Material will not infringe any patent or proprietary rights of third parties. CCTE shall not be liable for any claims or damages arising from the Collaborator's use of the Research Material; however, no indemnification is provided or intended.

7. Intellectual Property. CCTE and the Collaborator believe that no Subject Inventions or Computer Software will be created during the work specified in this Agreement. Should it appear that any activity of this Agreement might involve the creation of Subject Inventions or Computer Software, CCTE and the Collaborator will negotiate a standard CRADA in good faith. The standard CRADA will assign responsibilities for obtaining patents or other intellectual property rights pertaining to the Subject Inventions or Computer Software and will provide for appropriate allocation of any patent or intellectual property rights resulting from those Subject Inventions or Computer Software. For the purposes of this section, "Subject Invention" means any invention, conceived or first actually reduced to practice in the performance of this Agreement, and "Computer Software" means computer software, computer programs, computer data bases, and documentation thereof developed in whole or in part under this Agreement.

8. Disputes. Any dispute arising under this Agreement which cannot be readily resolved shall be submitted jointly to the signatories of this Agreement. A joint decision of the signatories or their designees shall be the disposition of such dispute. If the signatories are unable to jointly resolve a dispute within a reasonable period of time after submission of the dispute for

resolution, the matter shall be submitted by EPA to the Administrator of EPA or the Administrator's designee for resolution.

9. Severability. The illegality or invalidity of any provisions of this Materials CRADA shall not impair, affect, or invalidate the other provisions of this Materials CRADA.

10. Assignment. Neither this Materials CRADA nor any rights or obligations of any party hereunder shall be assigned or otherwise transferred by either party without the prior written consent of the other party.

11. Notices. All notices pertaining to or required by this Agreement shall be in writing and shall be signed by an authorized representative and shall be delivered by hand (including private courier mail service) or sent by certified mail, return receipt requested, with postage prepaid, addressed as follows:

(a) If to the Collaborator:

Ellen Fritsche
Scientific Managing Director
Auf'm Hennekamp 50, 40225 Düsseldorf, Germany
+492113389389
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With a copy to:

Alexander Beaucamp
Legal and Financial Manager
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+492113389392
alexander.beaucamp@iuf-duesseldorf.de

(b) If to CCTE:

Russell Thomas
U.S. EPA Center for Computational Toxicology and Exposure (CCTE)
109 T.W. Alexander (MD-D-143-02)
Research Triangle Park, NC 27711
919.541.5776
thomas.russell@epa.gov

With a copy to:

Samantha Plishka

Extramural Management Analyst
U.S. EPA Center for Computational Toxicology and Exposure (CCTE)
109 T.W. Alexander (MD-B-205-01)
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AND

Kathleen Graham
Manager
Federal Technology Transfer Act Program
1595 Wynkoop St.
Denver, CO 80202-1129
Telephone: (303) 312-6137
Email: graham.kathleen@epa.gov

Either party may change the contact information set out above by notice given to the other party in the manner set forth above.

12. No Endorsement. By entering into this Materials CRADA, CCTE does not directly or indirectly endorse any product or service provided, or to be provided, whether directly or indirectly related to either this Materials CRADA or to any patent or other intellectual property license or agreement which is related to this Materials CRADA. The Collaborator shall not in any way state or imply that this Materials CRADA is an endorsement by the U.S. Government or any of its organizational units or employees of any such product or service.

13. Termination. Either the CCTE or the Collaborator may unilaterally terminate this entire Agreement at any time by giving written notice to the other party at least thirty (30) calendar days prior to the desired termination date.

14. Entire Agreement. This Materials CRADA constitutes the entire agreement between the parties and supersedes any prior understanding or written or oral agreement.

15. Governing Law. This Materials CRADA shall be construed in accordance with United States law as applied by the Federal courts in the District of Columbia.

16. Power and Authority. The undersigned expressly certify and affirm that the contents of any respective statements made or reflected in this Materials CRADA are truthful and accurate and that the signatories hereto have the authority to bind their respective organizations to this Agreement.

17. Effective Date. This Materials CRADA shall be effective upon execution by the parties when

the last signatory has signed the Agreement.

18. Duration. The term of this Materials CRADA is twenty-four (24) months from execution.

19. The provisions of Articles 3, 4, 5, 6, 7, 8, 9, and 15 shall survive the termination of this Materials CRADA.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their duly authorized representatives as follows:

For CCTE:

[redacted]

Date _____

For the Collaborator:

[redacted]

Date _____

APPENDIX A

RESEARCH PLAN

Transfer of microelectrode array network formation assay (MEA_NFA) to IUF

1) EPA will provide Operating Protocols for primary cortical culture, dosing and recording from microelectrode arrays (MEAs) as well as R-scripts for data analysis and technical support to the outside lab.

2) To demonstrate competency of receiving laboratory. The following will be completed in two phases. Primary cultures or cortical neurons from newborn (0-24 hr) Long-Evans rats will be used for the assays, if possible. As an alternative, commercially available frozen rat cortical primary cells or freshly prepared primary cells from another rat species may be used.

    a. Phase I. Testing Assay positive (5) and negative (1) control chemicals
        i. Positives: Bis-1; Loperamide; Mevastatin; Sodium Orthovanadate; Domoic Acid
        ii. Negatives: glyphosate, amoxicillin

    b. Phase II. Test a set of 18 chemicals with different chemistries and activity in MEAs will be tested. 12 positives and 6 negatives from list 1 below will be tested, depending on availability and resources for testing.

3) Other support

    a. EPA will assist with data analysis by providing R-scripts for Network Formation Assay (NFA) assay and fitting data in ToxCast Pipeline (tcpl).

    b. EPA will provide supply lists for reagents and other consumables used for the assay.

4) The current EPA NFA protocol begins dosing at Post-natal day (PND) 0, two hours after plating cells at 150,000 cells/25 µL drop. Preliminary experiments may be conducted with frozen cortical neurons to determine an equivalent density/age.

5) Concentration ranges to be tested will begin at 30 µM, and decrease in ½ log increments (e.g. 30, 10, 3, 1 µM, etc). Compounds will be tested in triplicate (technical replicates) on separate plates. Further details can be found in the Operating Protocols that will be provided.

6) Recordings of activity will be made on at least day in vitro (DIV) 5, 7, 9 and 12 (or the

equivalent thereof for frozen cells), and the endpoints listed in Table 1 will be determined using scripts provided by EPA. In addition, on DIV 12 (or the last day of the assay) cytotoxicity will be determined using lactate dehydrogenase (LDH), Cell Titer Blue or an equivalent cytotoxicity assay. Further details can be found in the Operating Protocols that will be provided.

List 1 Candidate chemicals for testing.

Positives:
methylmercury, Emamectin, Haloperidol, PBDE-47, Deltamethrin, Cypermethrin, Permethrin, Tamoxifen, Aldrin, Dieldrin, Kepone, t-retinoic acid, Diazepam, Malathion, Chlorpyrifos; D-glucitol (negative); Hexachlorophene, Rotenone.

Negatives:
d-glucitol, acetylsalicylic acid, folic acid (Martin et al., 2022 not-favorable), saccharin, propylene glycol, sodium benzoate, dinotefuran, D-mannitol, glycerol, ibuprofen, L-ascorbic acid.