Close

Web of Science
Page 1 (Records 1 -- 1)
[1]

Print

Record 1 of 1

Title: Proinflammatory Effect of Carbon-Based Nanomaterials: In Vitro Study on Stimulation of Inflammasome NLRP3 via Destabilisation of Lysosomes

Author(s): Svadlakova, T (Svadlakova, Tereza); Hubatka, F (Hubatka, Frantisek); Knotigova, PT (Knotigova, Pavlina Turanek); Kulich, P (Kulich, Pavel); Masek, J (Masek, Josef); Kotoucek, J (Kotoucek, Jan); Macak, J (Macak, Jan); Motola, M (Motola, Martin); Kalbac, M (Kalbac, Martin); Kolackova, M (Kolackova, Martina); Vankova, R (Vankova, Radka); Vicherkova, P (Vicherkova, Petra); Malkova, A (Malkova, Andrea); Simeckova, P (Simeckova, Pavlina); Volkov, Y (Volkov, Yuri); Prina-Mello, A (Prina-Mello, Adriele); Kratochvilova, I (Kratochvilova, Irena); Fiala, Z (Fiala, Zdenek); Raska, M (Raska, Milan); Krejsek, J (Krejsek, Jan); Turanek, J (Turanek, Jaroslav)

Source: NANOMATERIALS **Volume:** 10 **Issue:** 3 **Article Number:** 418 **DOI:** 10.3390/nano10030418 **Published:** MAR 2020

Times Cited in Web of Science Core Collection: 2

Total Times Cited: 2

Usage Count (Last 180 days): 5

Usage Count (Since 2013): 7

Cited Reference Count: 59

Abstract: Carbon-based nanomaterials (C-BNM) have recently attracted an increased attention as the materials with potential applications in industry and medicine. Bioresistance and proinflammatory potential of C-BNM is the main obstacle for their medicinal application which was documented in vivo and in vitro. However, there are still limited data especially on graphene derivatives such as graphene platelets (GP). In this work, we compared multi-walled carbon nanotubes (MWCNT) and two different types of pristine GP in their potential to activate inflammasome NLRP3 (The nod-like receptor family pyrin domain containing 3) in vitro. Our study is focused on exposure of THP-1/THP1-null cells and peripheral blood monocytes to C-BNM as representative models of canonical and alternative pathways, respectively. Although all nanomaterials were extensively accumulated in the cytoplasm, increasing doses of all C-BNM did not lead to cell death. We observed direct activation of NLRP3 via destabilization of lysosomes and release of cathepsin B into cytoplasm only in the case of MWCNTs. Direct activation of NLRP3 by both GP was statistically insignificant but could be induced by synergic action with muramyl dipeptide (MDP), as a representative molecule of the family of pathogen-associated molecular patterns (PAMPs). This study demonstrates a possible proinflammatory potential of GP and MWCNT acting through NLRP3 activation.

Accession Number: WOS:000526090400018

PubMed ID: 32120988

Language: English

Document Type: Article

Author Keywords: graphene platelets; carbon nanotubes; inflammasome NLRP3; cathepsin B; macrophages; THP-1

KeyWords Plus: FUNCTIONALIZED GRAPHENE OXIDE; PRISTINE GRAPHENE; OXIDATIVE STRESS; NANOPLATELETS; NANOTUBES; TOXICITY; RELEASE; SINGLE; SYSTEM; INFLAMMOGENICITY

Addresses: [Svadlakova, Tereza; Kolackova, Martina; Vankova, Radka; Vicherkova, Petra; Krejsek, Jan] Charles Univ Prague, Univ Hosp Hradec Kralove, Inst Clin Immunol & Allergol, Hradec Kralove 50005, Czech Republic.
[Svadlakova, Tereza; Kolackova, Martina; Vankova, Radka; Vicherkova, Petra; Krejsek, Jan] Charles Univ Prague, Fac Med Hradec Kralove, Hradec Kralove 50005, Czech Republic.
[Svadlakova, Tereza; Malkova, Andrea; Fiala, Zdenek] Charles Univ Prague, Fac Med Hradec Kralove, Inst Hyg & Prevent Med, Hradec Kralove 50003, Czech Republic.
[Hubatka, Frantisek; Knotigova, Pavlina Turanek; Kulich, Pavel; Masek, Josef; Kotoucek, Jan; Simeckova, Pavlina; Raska, Milan; Turanek, Jaroslav] Vet Res Inst, Brno 62100, Czech Republic.
[Macak, Jan; Motola, Martin] Univ Pardubice, Fac Chem Technol, Ctr Mat & Nanotechnol, Pardubice 53002, Czech Republic.
[Kalbac, Martin] Czech Acad Sci, J Heyrovsky Inst Phys Chem, Prague 18223, Czech Republic.
[Volkov, Yuri; Prina-Mello, Adriele] Trinity Coll Dublin, TTMI, Dept Clin Med, Dublin D08 W9RT, Ireland.
[Volkov, Yuri] First Moscow State Sechenov Med Univ, Dept Histol Cytol & Embryol, Moscow 119992, Russia.
[Kratochvilova, Irena] Czech Acad Sci, Inst Phys, Prague 18200, Czech Republic.
[Raska, Milan] Palacky Univ Olomouc, Fac Med & Dent, Dept Immunol, Olomouc 77515, Czech Republic.
[Raska, Milan] Palacky Univ Olomouc, Fac Med & Dent, Inst Mol & Translat Med, Olomouc 77515, Czech Republic.

Corresponding Address: Krejsek, J (corresponding author), Charles Univ Prague, Univ Hosp Hradec Kralove, Inst Clin Immunol & Allergol, Hradec Kralove 50005, Czech Republic.
Krejsek, J (corresponding author), Charles Univ Prague, Fac Med Hradec Kralove, Hradec Kralove 50005, Czech Republic.
Turanek, J (corresponding author), Vet Res Inst, Brno 62100, Czech Republic.

E-mail Addresses: svadlakovat@lfhk.cuni.cz; hubatka@vri.cz; knotigova@vri.cz; kulich@vri.cz; masek@vri.cz; kotoucek@vri.cz; Jan.Macak@upce.cz; martin.motola@upce.cz; martin.kalbac@jh-inst.cas.cz; kolackovam@lfhk.cuni.cz; vankovr@lfhk.cuni.cz; petraavicherkova@gmail.com; Malka8AR@lfhk.cuni.cz; simeckova@vri.cz; yvolkov@tcd.ie; prinamea@tcd.ie; krat@fzu.cz; fiala@lfhk.cuni.cz; milan.raska@upol.cz; jan.krejsek@fnhk.cz; turanek@vri.cz

Author Identifiers:

Author	Web of Science ResearcherID	ORCID Number
Kratochvilova, I.	G-5571-2014	0000-0002-6633-9432
Simeckova, Pavlina	AAU-7971-2020	
Motola, Martin	AAC-6860-2019	0000-0001-7394-9944
Svadlakova, Tereza	E-5562-2017	0000-0002-1581-5531
Prina-Mello, Adriele		0000-0002-4371-2214
Masek, Josef	B-3734-2015	0000-0001-6788-8487

Publisher: MDPI

Publisher Address: ST ALBAN-ANLAGE 66, CH-4052 BASEL, SWITZERLAND

Web of Science Categories: Nanoscience & Nanotechnology; Materials Science, Multidisciplinary

Research Areas: Science & Technology - Other Topics; Materials Science

IDS Number: LD5SO

eISSN: 2079-4991

29-char Source Abbrev.: NANOMATERIALS-BASEL

ISO Source Abbrev.: Nanomaterials
Source Item Page Count: 18

Funding:

Funding Agency	Grant Number
Ministry of Education, Youth and Sports of the Czech Republic	CZ.02.1.01/0.0/0.0/15_003/0000495 CZ.02.1.01/0.0/0.0/17_048/0007421 CZ.02.1.01/0.0/0.0/16_013/0001829 CZ.02.1.01/0.0/0.0/16_013/0001821 CZ.02.1.01/0.0/0.0/16_019/0000760
European Union-European Structural and Investments Funds	CZ.02.1.01/0.0/0.0/15_003/0000495 CZ.02.1.01/0.0/0.0/17_048/0007421 CZ.02.1.01/0.0/0.0/16_013/0001829 CZ.02.1.01/0.0/0.0/16_013/0001821 CZ.02.1.01/0.0/0.0/16_019/0000760
Ministry of Education, Youth and Sports of the Czech Republic "SAFMAT"	LM 2015088
Ministry of Agriculture of the Czech Republic	RO0518
Project Centre of Excellence for Nanotoxicology CENATOX	GAP503/12/G147
Charles University, Faculty of Medicine in Hradec Kralove: project PROGRES	Q40/10 Q40/09

This work was supported by the Ministry of Education, Youth and Sports of the Czech Republic and The European Union-European Structural and Investments Funds in the frame of Operational Programme Research Development and Education-projects "FIT" (project no. CZ.02.1.01/0.0/0.0/15_003/0000495), "NANOBIO" (project no. CZ.02.1.01/0.0/0.0/17_048/0007421), "Modernization and upgrade of CEMNAT infrastructure" (project no. CZ.02.1.01/0.0/0.0/16_013/0001829), "Pro-NanoEnviCz" (project no. CZ.02.1.01/0.0/0.0/16_013/0001821), and "SOLID21" (project no. CZ.02.1.01/0.0/0.0/16_019/0000760), the Ministry of Education, Youth and Sports of the Czech Republic "SAFMAT" LM 2015088 and by the Ministry of Agriculture of the Czech Republic under the project RO0518, Project Centre of Excellence for Nanotoxicology CENATOX GAP503/12/G147. This work was also funded by the institutional support from Charles University, Faculty of Medicine in Hradec Kralove: project PROGRES Q40/10 and Q40/09.

Open Access: DOAJ Gold, Green Published
Output Date: 2020-11-09