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Fenbendazole and Cancer: At Least 12 Anti-Cancer Mechanisms of Action. Not Approved by FDA. Cheap. Safe. Kills Aggressive Cancers. Why No Clinical Trials?

Nine research papers reviewed.

By Dr. William Makis
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COVID Intel

Region: USA
Theme: Science and Medicine

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Papers and Articles Reviewed:

- 2023 Jun – Movahedi et al – Repurposing anti-parasite benzimidazole drugs as selective anti-cancer chemotherapeutics
- 2023 Apr – Chi-Son Chang et al – Anti-cancer effect of fenbendazole-incorporated PLGA nanoparticles in ovarian cancer
- 2023 Mar – Semkova et al – Redox-mediated Anticancer Activity of Anti-parasitic Drug Fenbendazole in Triple-negative Breast Cancer Cells
- 2023 Mar – Haebeen Jung et al – Differential cytotoxic effects of fenbendazole on mouse lymphoma EL-4 cells and spleen cells
- 2022 Sep – Deokbae Park et al – Anti-cancer effects of fenbendazole on 5-fluorouracil-resistant colorectal cancer cells
- 2022 Jan – Li-wen Ren et al – Benzimidazoles induce concurrent apoptosis and pyroptosis of human glioblastoma cells via arresting cell cycle
- 2020 Aug – Deok-Soo Son et al – The Antitumor Potentials of Benzimidazole Anthelmintics as Repurposing Drugs
- 2020 Jun – Yong Han et al – Involvement of reactive oxygen species in the anti-cancer activity of fenbendazole, a benzimidazole anthelmintic (leukemia)
- 2018 Aug – Dogra et al – Fenbendazole acts as a moderate microtubule destabilizing agent and causes cancer cell death by modulating multiple cellular pathways

2023 Jun – Movahedi et al – Repurposing anti-parasite benzimidazole drugs as selective anti-cancer chemotherapeutics

- Benzimidazole drugs (including Fenbendazole) have widely been used as anti-helminth agents in both human and/or livestock since the 1960s
- These drugs have rapidly become more popular than previous medications due to superiority in terms of efficacy, toxicity and application
- Benzimidazole drugs are considered as non-toxic anti-helminth agents in humans and livestock. Acute toxicities are rarely reported for these drugs.
- Neither chronic adverse effects in dogs and rats treated with very high dosages, nor irritation, carcinogenicity or teratogenicity in treated rats and rabbits have been observed
- Two major mechanisms of action:
- 1. antimitotic activity (inhibition of tubulin polymerization by binding to tubulin sites of rapidly dividing cells (leads to cell cycle arrest)
- 2. disrupt cell metabolic processes by inducing oxidative stress
- Result: induce apoptosis (cell death) of rapidly proliferating parasites and cancer cells!

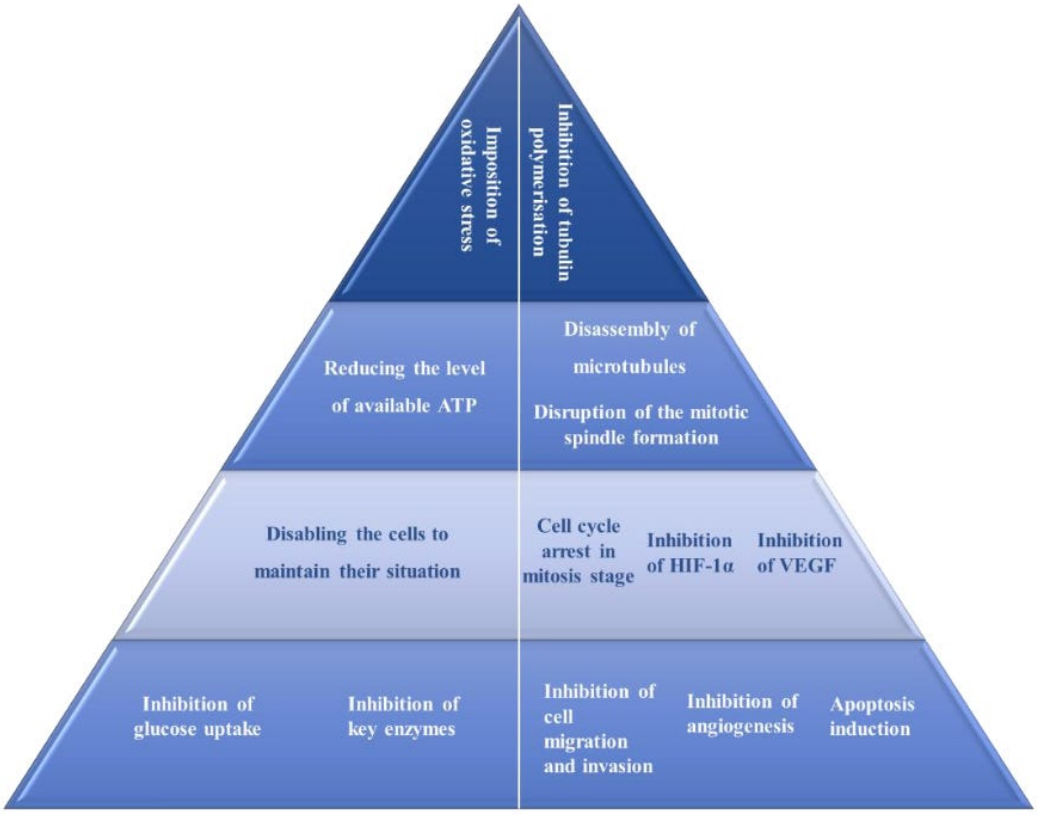

Figure 2. The schematic mechanisms of actions of benzimidazole drugs.

- These drugs inhibit tumor proliferation and growth
- many new benzimidazole derivatives have been developed for the treatment of cancers such as colon cancer, breast cancer, lung cancer, chondrosarcoma and leukemia
- Furthermore, new benzimidazole derivatives have demonstrated high capability for overcoming drug resistance
- benzimidazole drugs exhibit anti-metastatic effect through inhibiting cell

migration and invasion
- benzimidazole drugs also suppress telomerase reverse transcriptase (TERT) expression, whose activation is associated with metastasis
- benzimidazole drugs are potent in targeting cancer stem cells and preventing tumor recurrence.
- benzimidazole drugs are also found to prevent the radiation-induced transformation of cancer cells into radiation-resistant cells, and furthermore sensitize some drug-resistant cells.
- Clinical trials are ongoing for cancer therapy with benzimidazole drugs.
    - For example, clinical study of mebendazole as adjuvant treatment for colon cancer is in Phase 3 (NCT03925662)
    - and mebendazole in combination with other antiprotozoal agents including albendazole for neoplasm therapy is in Phase 2 (NCT02366884).
    - Three Phase 1 clinical trials are also ongoing for mebendazole and brain tumors (NCT02644291, NCT01729260, NCT0183787862).
- THERE ARE NO CLINICAL TRIALS WITH FENBENDAZOLE
- low water solubility of benzimidazole drugs impedes their clinical applications
- nano-formulations are being created to improve bioavailability
- benzimidazole drugs are also being combined with other chemotherapeutics, such as paclitaxel, trametinib, gemcitabine and methoxyestradiol, to enhance the anti-cancer treatment efficacy.
- benzimidazole drugs have also sensitized tumor cells to radiation therapy

2023 Apr – Chi-Son Chang et al – Anti-cancer effect of fenbendazole-incorporated PLGA nanoparticles in ovarian cancer

- ovarian cancer is the deadliest gynecological cancer
- nanoparticles deliver poorly soluble drugs
- fenbendazole, an anti-parasitic drug was examined due to its anti-cancer effects: ability to interfere with microtubule polymerization, block cell cycle progression, increase p53 protein stability and induce apoptosis.
- However, fenbendazole has low water solubility and poor bioavailability which are major obstacles to its clinical application as an anti-cancer agent
- Nanoparticles were loaded with fenbendazole to increase bioavailability
- Results: natural form of fenbendazole significantly decreased cell proliferation of both chemosensitive and chemoresistant ovarian cancer cells
- But in vivo (xenograft mouse models), only the nanoparticle fenbendazole formulation showed anticancer effects.

2023 Mar – Semkova et al – Redox-mediated Anticancer Activity of Anti-parasitic Drug Fenbendazole in Triple-negative Breast Cancer Cells

- fenbendazole was tested on triple negative breast cancer cells, three different types including a highly metastatic type
- Results: the highly metastatic breast cancer cells were more vulnerable to fenbendazole induced oxidative stress

2023 Mar – Haebeen Jung et al – Differential cytotoxic effects of fenbendazole on mouse lymphoma EL-4 cells and spleen cells

- fenbendazole was tested on a mouse lymphoma cell line vs normal spleen cells
- purpose of this study was to investigate the cytotoxic effects of fenbendazole on normal cells of the spleen, which is a major reservoir of immune cells
- fenbendazole increased cell death of lymphoma cells but not of normal spleen cells
- fenbendazole induced reactive oxygen species in lymphoma cells but not normal spleen cells
- fenbendazole induced G2/M cell cycle arrest in lymphoma cells, not spleen cells
- Conclusion: fenbendazole has anticancer effects on lymphoma cells but minimal toxicity on normal spleen cells.

2022 Sep – Deokbae Park et al – Anti-cancer effects of fenbendazole on 5-fluorouracil-resistant colorectal cancer cells

- Benzimidazole anthelmintic agents have been recently repurposed to overcome cancers resistant to conventional therapies.
- fenbendazole was tested on chemo resistant colorectal cancer cells
- Results: fenbendazole significantly induces apoptosis as well as cell cycle arrest at G2/M phase on both colorectal cells and chemo resistant colorectal cancer cells.
- Benzimidazole is historically known to bind beta-tubulin, disrupt microtubules,and arrest cell division
- Benzimidazole is also known to activate p53 and p21 but decrease mutant p53 expression
- in colorectal cancer cells: fenbendazole is presumed to activate p53-mediated apoptosis by increasing p53 expression(!), and partly necrosis, autophagy and ferroptosis
- in chemo-resistant colorectal cancer cells: fenbendazole triggers apoptosis without affecting p53 expression, apoptosis was partly induced by Beclin-1, and further augmented by ferroptosis
- 6 mechanisms of action: (cell cycle arrest G2/M, activate p53-mediated apoptosis, autophagy, necroptosis, ferroptosis, Beclin-1 mediated apoptosis)

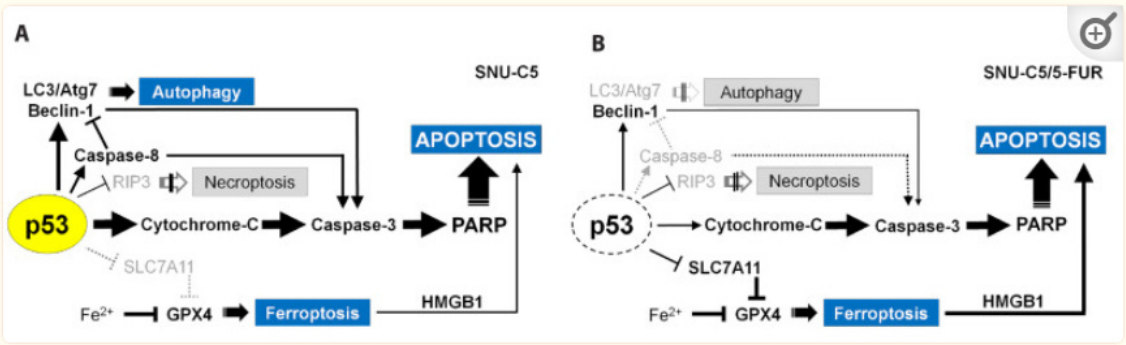

Fig. 8

Schematic representation of cell death pathways in colorectal cancer (CRC) cells following fenbendazole treatment.

Fenbendazole induces G2/M arrest and apoptosis in both (A) 5-FU-sensitive SNU-C5 and (B) 5-FU-resistant SNU-C5 (SNU-C5/5-FUR) CRC cells. In SNU-C5 cells, fenbendazole is presumed to activate p53-mediated apoptosis by increasing p53 expression. In SNU-C5/5-FUR cells, fenbendazole triggers apoptosis without affecting p53 expression, whereas fenbendazole enhances ferroptosis by inhibiting the expression of GPX4 and SLC7A11. Therefore, although fenbendazole has anti-cancer effects on both 5-FU-sensitive and resistant CRC cells, the mechanism of action appears to be different. That is, fenbendazole promotes cell death by activating p53-

2022 Jan – Li-wen Ren et al – Benzimidazoles induce concurrent apoptosis and pyroptosis of human glioblastoma cells via arresting cell cycle

- fenbendazole was tested against glioblastoma cancer cells
- 1. fenbendazole dose-dependently suppressed DNA synthesis
- 2. fenbendazole inhibited cell migration and invasion of GBM cells
- 3. fenbendazole also dose-dependently induced the GBM cell cycle arrest at the G_2/M phase via the P53/P21/cyclin B1 pathway.
- 4. fenbendazole triggered pyroptosis of GBM cells (pyroptosis is a form of programmed cell death) through the NF-κB/NLRP3/GSDMD pathway
- 5. fenbendazole induced mitochondria-dependent apoptosis of GBM cells
- 6. flubendazole inhibited tumor growth of glioblastoma in vivo in a dose dependent manner (in a nude mouse U87 cell xenograft model)
- Conclusion: “Taken together, our results demonstrated that benzimidazoles might be promising candidates for the treatment of GBM.”

2020 Aug – Deok-Soo Son et al – The Antitumor Potentials of Benzimidazole Anthelmintics as Repurposing Drugs

- Benzimidazole anthelmintics have broad-spectrum action to remove parasites both in human and veterinary medicine
- Due to their low cost and high efficacy, benzimidazole anthelmintics have been used throughout the world since their introduction in the 1960s
- Benzimidazole anthelmintics are well-tolerated without severe side effects, and their decades of use provide a basis for safety in humans.
- Benzimidazole anthelmintics selectively bind to β-tubulin of parasitic worms, causing their immobilization and death
- In addition to being antiparasitic agents, benzimidazole anthelmintics are known to exert anticancer activities which are summarized (also see image at start of

article):

- disrupts microtubule polymerization
- inhibits cancer cell viability
- inhibits cancer cell migration and invasion
- induces apoptosis and autophagy
- increased cell cycle (G2/M) arrest
- induces differentiation and senescence
- inhibits angiogenesis
- reduces colony formation and inhibits stem-ness in cancer cells
- inhibits drug resistance and sensitize cells to conventional chemo
- blocks glucose transport and impairs glucose utilization

- Benzimidazole anthelmintics have been shown to inhibit cell viability in a variety of cancer cell lines, appearing as a promising medication:
  - breast cancer
  - leukemia
  - glioma & glioblastoma
  - lung cancer
  - hepatocellular carcinoma
  - rhabdomyosarcoma
  - medulloblastoma
  - urothelial cancer

2020 Jun – Yong Han et al – Involvement of reactive oxygen species in the anti-cancer activity of fenbendazole, a benzimidazole anthelmintic (leukemia)

- In this study, we investigated whether Fenbendazole has anti-cancer activity in HL-60 cells, a human leukemia cell line
- fenbendazole significantly decreased the metabolic activity of leukemia cells
- fenbendazole decreased the mitochondrial membrane potential of leukemia cells in a concentration-dependent manner
- fenbendazole increased apoptosis and necrosis of leukemia cells
- Conclusion: fenbendazole exerts anti-cancer activity against leukemia cells, in part, via ROS production (reactive oxygen species)

2018 Aug – Dogra et al – Fenbendazole acts as a moderate microtubule destabilizing agent and causes cancer cell death by modulating multiple cellular pathways

- Fenbendazole is known to have a high safety margin and most species tolerate it very well
- Fenbendazole targets microtubules in human NSCLC Lung cancer cells
- Fenbendazole treatment results in early G2/M block accompanied by cell death
- Tumour cell lines with wild-type p53 show enhanced sensitivity to Fenbendazole induced apoptosis
- Inhibition of glucose uptake by Fenbendazole sensitizes cancer cells to undergo apoptosis
- Fenbendazole effectively inhibits colony formation of human NSCLC Lung Cancer cells in culture
- In Vivo: Fenbendazole suppresses tumor growth
- Fenbendazole possesses a unique ability to induce p53 to a considerably high level (!)

- Conclusion: Altogether, our findings show microtubule disruption, p53 stabilization and interference with glucose metabolism as collective underlying mechanisms of Fenbendazole induced preferential elimination of cancer cells both *in vitro* and *in vivo*.

My Take…

Ivermectin is FDA approved.

Fenbendazole is NOT approved for human use by Food and Drug Administration (FDA) and European Medicines Agency (EMA). It is available as a veterinary medication.

Fenbendazole is part of a larger group of drugs known as benzimidazoles, which are anthelmintic drugs (i.e., drugs that kill parasitic worms). Another benzimidazole is mebendazole, which can be prescribed to humans with certain parasitic infections.

Mebendazole (Vermox) is FDA approved for human use, but it's significantly more expensive.

Why is Fenbendazole so popular? The Story of Joe Tippens and his terminal Stage 4 Small Cell Lung Cancer.

Click here to view the video

Joe Tippens Cancer Protocol

- Fenbendazole 222mg per day with food (originally 3 days on, 4 days off)
- Curcumin 600mg per day
- CBD Oil: 25mg sublingually per day
- Vitamin E: 800IU per day

Dr. Tom Rogers MD (Performance Medicine – Knoxville, TN) Suggests Several Protocols utilizing Fenbendazole which are interesting:

ACTIVE CANCER TREATMENT – For active cancer, take one capsule of Fenbendazole (444 mg) daily. Some people recommend you take one day off a week. *Note: I think I would just take Sundays off. Again, you're not supposed to develop a tolerance to this, but taking a little break is probably a good idea. To improve the protocol* , take CBD oil (25mg) 1-2 drops every night before sleep. *To strengthen the protocol* take Curcumin (600mg) twice a day with food. *To support the liver*, take Milk Thistle (250mg) twice a day with food. Note: Fenbendazole should be taken with or after a meal to improve absorption.

COMPLEMENTARY CANCER TREATMENT – Take one capsule of Fenbendazole (222mg) every day, once a day after a fatty meal; Curcumin (600mg) one capsule, two times a day after breakfast and lunch; CBD oil (25mg) 1-2 drops under the tongue every day before sleep.

CANCER RELAPSE PREVENTION – Taking Fenbendazole for active cancer and cancer relapse prevention, take one capsule (222 mg) three times a week, once a day after a fatty meal.In addition, take Curcumin (600mg) one capsule/two times a day after breakfast and lunch, Milk Thistle, and CBD Oil (25mg) 1-2 drops under the tongue everyday before going to sleep. *Note: Have your doctor follow and check liver and kidney function tests. It's easy, cheap, and you can get this at any doctor's office.*

CANCER PREVENTION (prophylactic) – Those that have had genetic tests and know they're really prone to getting cancer can take Fenbendazole prophylactically. Take one capsule (222 mg) 3 times a week, once a day after a fatty meal. Then no Fenbendazole for four days. Repeat for 10 weeks and then take 10 weeks off; Curcumin (600 mg) one capsule two times a day after breakfast and lunch; CBD oil (25mg) 1-2 drops under the tongue every day before sleep. Continue that regimen indefinitely.

My Thoughts

Fenbendazole is not that controversial when you consider the scientific evidence objectively.

Fenbendazole has at least 12 proven anti-cancer mechanisms in vitro and in vivo:

- disrupts microtubule polymerization (major mechanism)
- induces cell cycle (G2/M) arrest
- blocks glucose transport and impairs glucose utilization by cancer cells (major)
- increases p53 tumor suppressor levels (major)
- inhibits cancer cell viability (mTOR)
- inhibits cancer cell migration and invasion (EMT pathway)
- induces apoptosis
- induces autophagy
- induces pyroptosis and necrosis
- induces differentiation and senescence
- inhibits tumor angiogenesis
- reduces colony formation and inhibits stem-ness in cancer cells
- inhibits drug resistance and sensitizes cells to conventional chemo as well as radiation therapy

A very similar drug in the same family as Fenbendazole is FDA approved: Mebendazole, and it is in several Clinical Trials right now for brain cancers and colon cancers.

So why are there no Fenbendazole Clinical Trials for Cancer?

The answer seems rather obvious: it's very cheap, it's safe and it seems to be very effective.

Fenbendazole is not going to make anyone rich, and in cancer treatments, that is a non-starter.

What about COVID-19 mRNA Vaccine Induced Turbo Cancers?

Fenbendazole shows in vitro and/or in vivo activity against these cancers:

- breast cancer (including triple negative breast cancer – which is seen in COVID-19 mRNA Vaccinated individuals with Turbo Cancer)
- lymphomas (these are the most common COVID-19 mRNA Vaccine Turbo Cancers and there is more evidence for Fenbendazole with Lymphomas than with Ivermectin)
- leukemias (most aggressive COVID-19 mRNA Vaccine Turbo Cancers)
- glioblastomas and gliomas (extremely aggressive COVID-19 mRNA Vaccine Turbo Cancers)
- lung cancer (NSCLC) (strong signal for COVID-19 mRNA Vaccine Turbo Cancers)
- hepatocellular carcinoma (signal for COVID-19 mRNA Vaccine Turbo Cancers)
- rhabdomyosarcomas (possible signal for COVID-19 mRNA Vaccine Turbo Cancers, sarcomas in general are on the rise)
- ovarian cancers
- urothelial cancers

Conclusion

Although the anti-parasitic Fenbendazole is not FDA approved for human use, there is extensive evidence of anti-cancer effects in the published literature, both in vitro and in vivo, and this is not a controversial medication, as it has been made out to be.

Fenbendazole has an excellent safety profile and its close relative, Mebendazole is FDA approved, and it's undergoing several Clinical Trials for Cancer Treatments in the US right now, including colon cancers and brain cancers.

I believe that it is a reasonable hypothesis that COVID-19 mRNA Vaccine Turbo Cancer patients could benefit significantly from either Mebendazole or Fenbendazole and I would love to see urgent clinical trials with both.

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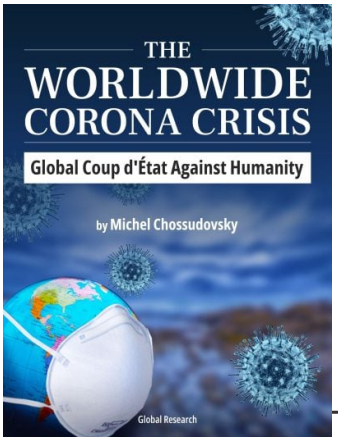
Dr. William Makis is a Canadian physician with expertise in Radiology, Oncology and Immunology. Governor General's Medal, University of Toronto Scholar. Author of 100+ peer-reviewed medical publications.



The Worldwide Corona Crisis, Global Coup d'Etat Against Humanity

by Michel Chossudovsky

Michel Chossudovsky reviews in detail how this insidious project "destroys people's lives". He provides a comprehensive analysis of everything you need to know about the "pandemic" — from the medical dimensions to the economic and social repercussions, political underpinnings, and mental and psychological impacts.

"My objective as an author is to inform people worldwide and refute the official narrative which has been used as a justification to destabilize the economic and social fabric of entire countries, followed by the imposition of the "deadly" COVID-19 "vaccine". This crisis affects humanity in its entirety: almost 8 billion people. We stand in solidarity with our fellow human beings and our children worldwide. Truth is a powerful instrument."

Reviews

This is an in-depth resource of great interest if it is the wider perspective you are motivated to understand a little better, the author is very knowledgeable about geopolitics and this comes out in the way Covid is contextualized. —Dr. Mike Yeadon

In this war against humanity in which we find ourselves, in this singular, irregular and massive assault against liberty and the goodness of people, Chossudovsky's book is a rock upon which to sustain our fight. –Dr. Emanuel Garcia

In fifteen concise science-based chapters, Michel traces the false covid pandemic, explaining how a PCR test, producing up to 97% proven false positives, combined with a relentless 24/7 fear campaign, was able to create a worldwide panic-laden "plandemic"; that this plandemic would never have been possible without the infamous DNA-modifying Polymerase Chain Reaction test – which to this day is being pushed on a majority of innocent people who have no clue. His conclusions are evidenced by renown scientists. —Peter Koenig

Professor Chossudovsky exposes the truth that "there is no causal relationship between the virus and economic variables." In other words, it was not COVID-19 but, rather, the deliberate implementation of the illogical, scientifically baseless lockdowns that caused the shutdown of the global economy. –David Skripac

A reading of Chossudovsky's book provides a comprehensive lesson in how there is a global coup d'état under way called "The Great Reset" that if not resisted and defeated by freedom

loving people everywhere will result in a dystopian future not yet imagined. Pass on this free gift from Professor Chossudovsky before it's too late. You will not find so much valuable information and analysis in one place. –Edward Curtin

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