



محاضرة رئيسية Plenary Lecture II

أبحاث وبراءة اختراع عن

فائدة حبة البركة الفعالة في عدة أمراض

Protective Roles of Black Seed, Thymoquinone
Nanoformulations: Potential Nanonutraceuticals in
Human Diseases

Shaker A. Mousa, PhD, MBA, FACC, FACB

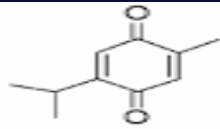
Professor of Pharmacology, Chairman of The Pharmaceutical Research
Institute at Albany College of Pharmacy and Health Sciences



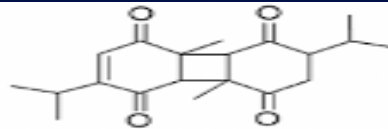
Outlines & Objectives

- **Bioactive Compounds derived from Nigella Sativa,**
- **Documented Utilities of Nigella Sativa/ TQ,**
- **Survey of Issued 10 US Patents, Years 2000 -2020 -**
Review Compositions and Utilities,
- **Nano-Nigella Sativa/Nano –TQs:** Potential Impact of
Nano-Assembly and Products Developments,
- **Summary**
- **Selected References from our Work**

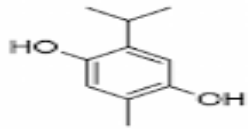
Bioactive Compounds in *Nigella Sativa* (Black Seed)



Thymoquinone

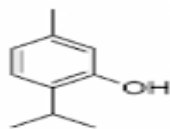


Dithymoquinone



Thymohydroquinone

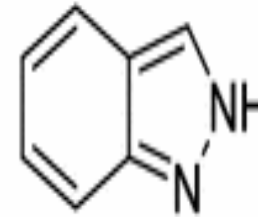
TQ



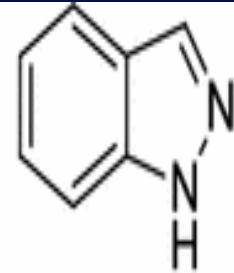
Thymol



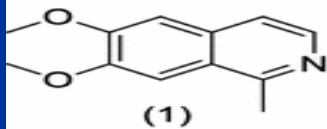
1H-pyrazole



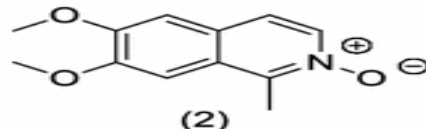
2H-indazole



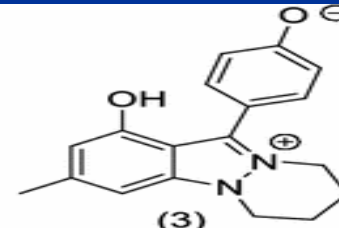
1H-indazole



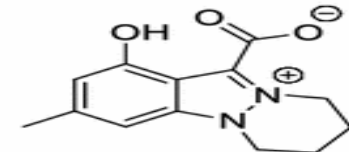
(1)
Nigellamicine



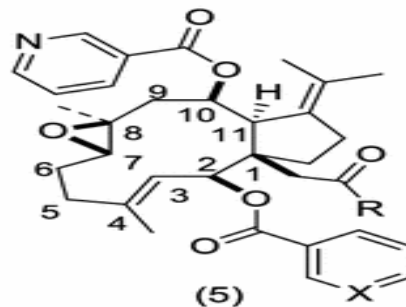
(2)
Nigellamicine N-Oxide



(3)
Nigellidine



(4)
Nigellicine



(5)
Nigellamines

A₁: (5a) R = Ph, X = CH

A₂: (5b) R = Ph, X = N

A₃: (5c) R = n-C₅H₁₁, X = N

A₄: (5d) R = n-C₃H₇, X = N

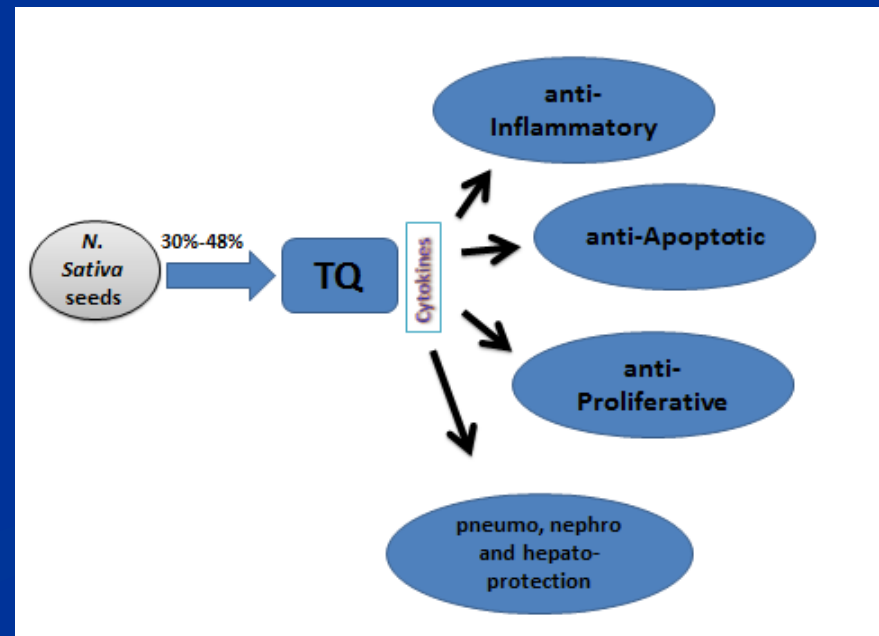
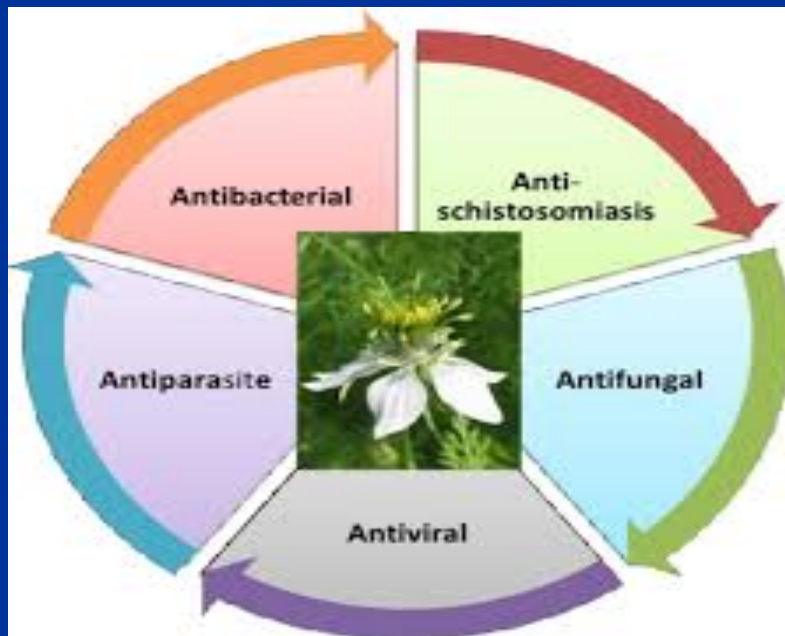
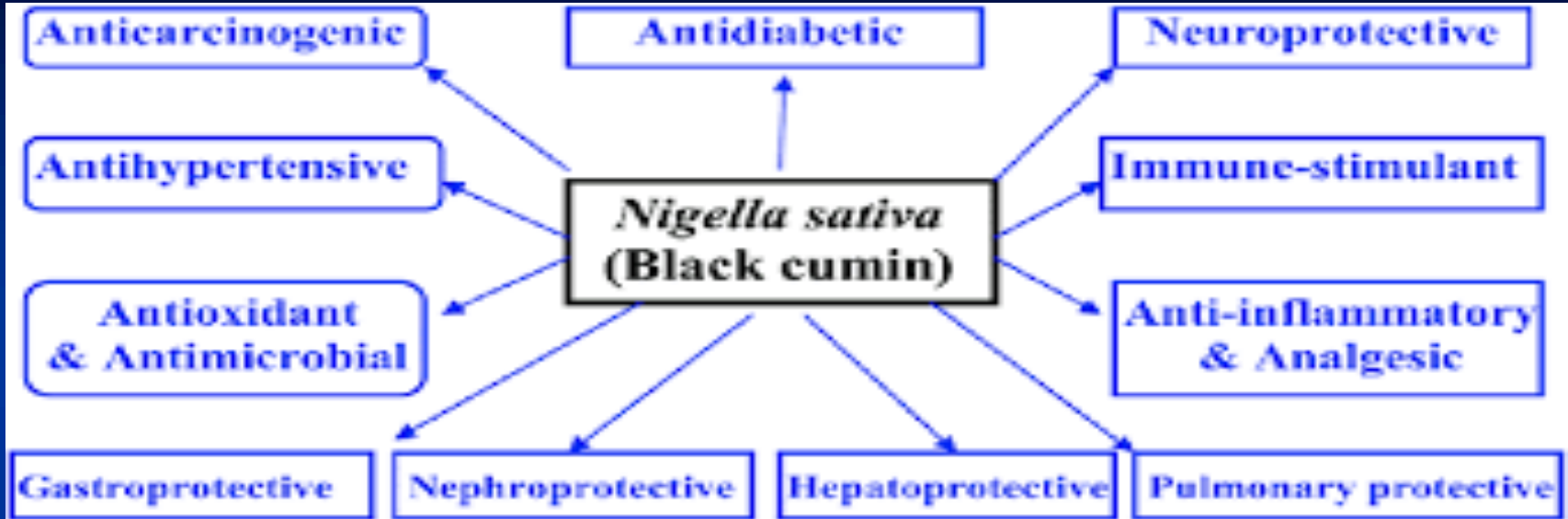
A₅: (5e) R = PhCH₂, X = N

Structures of alkaloids isolated
from *Nigella sativa* L.

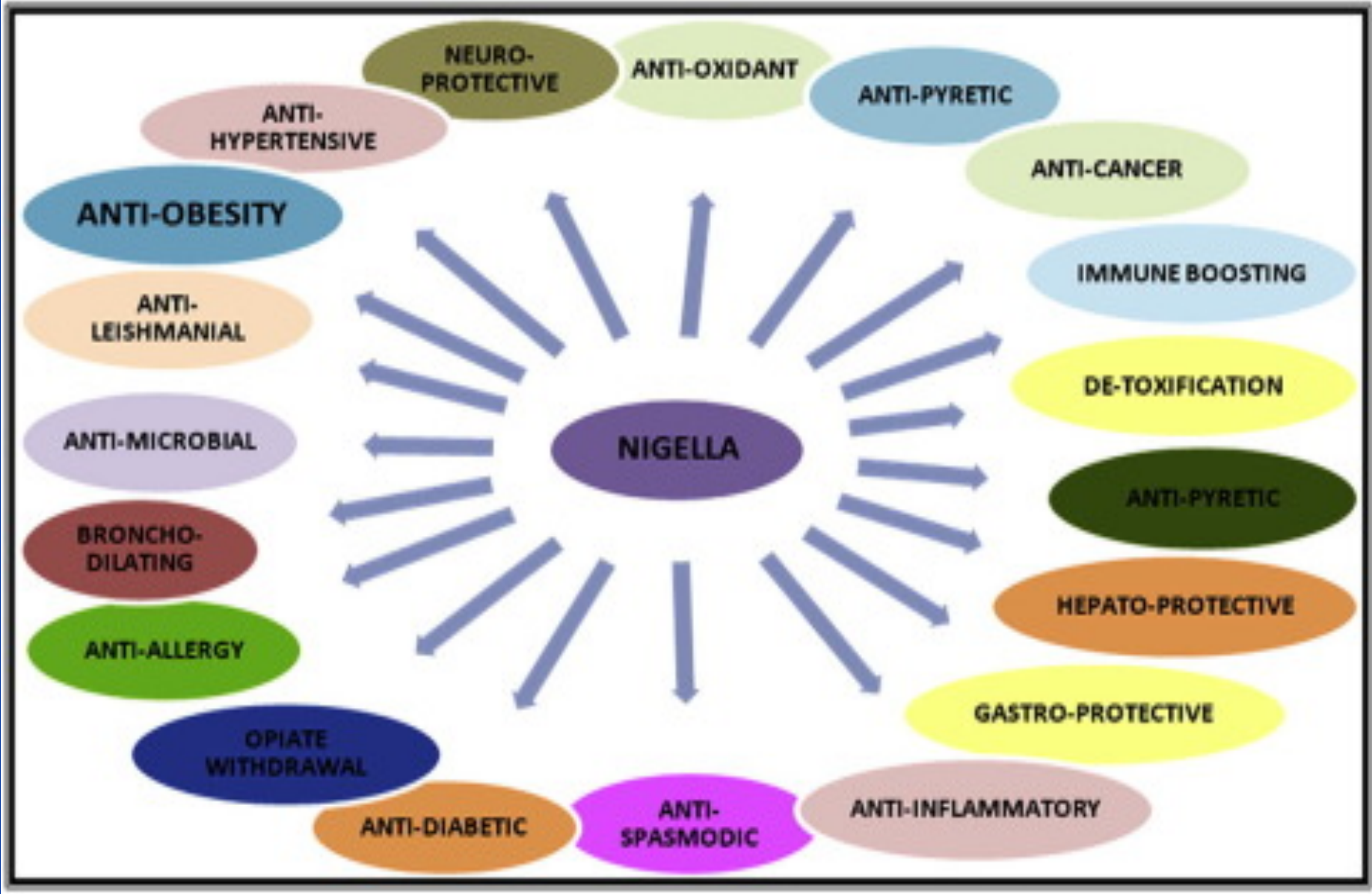
Khan & Afzal: Chemical composition of *Nigella sativa*:
Part 2 Recent advances. *Inflammopharmacology*

volume 24, pages 67–79 (2016)

Documented Utilities of *Nigella Sativa*/ TQ



Documented Utilities of Nigella Sativa/ TQ –Cont.



US Patents: Nigella Sativa/ TQ

- Salem, et al. *Thymoquinone* derivatives for treatment of cancer. US Patent 10,501,428; 2019, United Arab Emirate, Al Ain Univ. [TQ Derivatives in Cancer]
- Madhavamenon, et al. Composition of nigella sativa seeds to treat anxiety, stress and sleep disorders with significant memory enhancement properties and a process for producing the same. US Patent 10,485,837; 2019 - AKAY FLAVOURS & AROMATICS PVT, LTD (Kerala, IN). [CO2 Black Cumin Extract - Oil or powder form for CNS Disorders]
- DuBourdieu, et al. Oral delivery compositions for treating atopic dermatitis disorders in mammals. US Patent 10,406,232; 2019 - VETS PLUS, INC. (Menomonie, WI). [Ceramide, Omega 3/6 fatty acids, Black Seed Extract in soft Dough oral delivery]
- Ibrahim. Dentifrice compositions containing extracts of Nigella sativa and related methods. US Patent 10,004,676; 2018 - Health and Natural Beauty USA Corp. (New Brunswick, NJ).

US Patents: Nigella Sativa/ TQ- Cont.

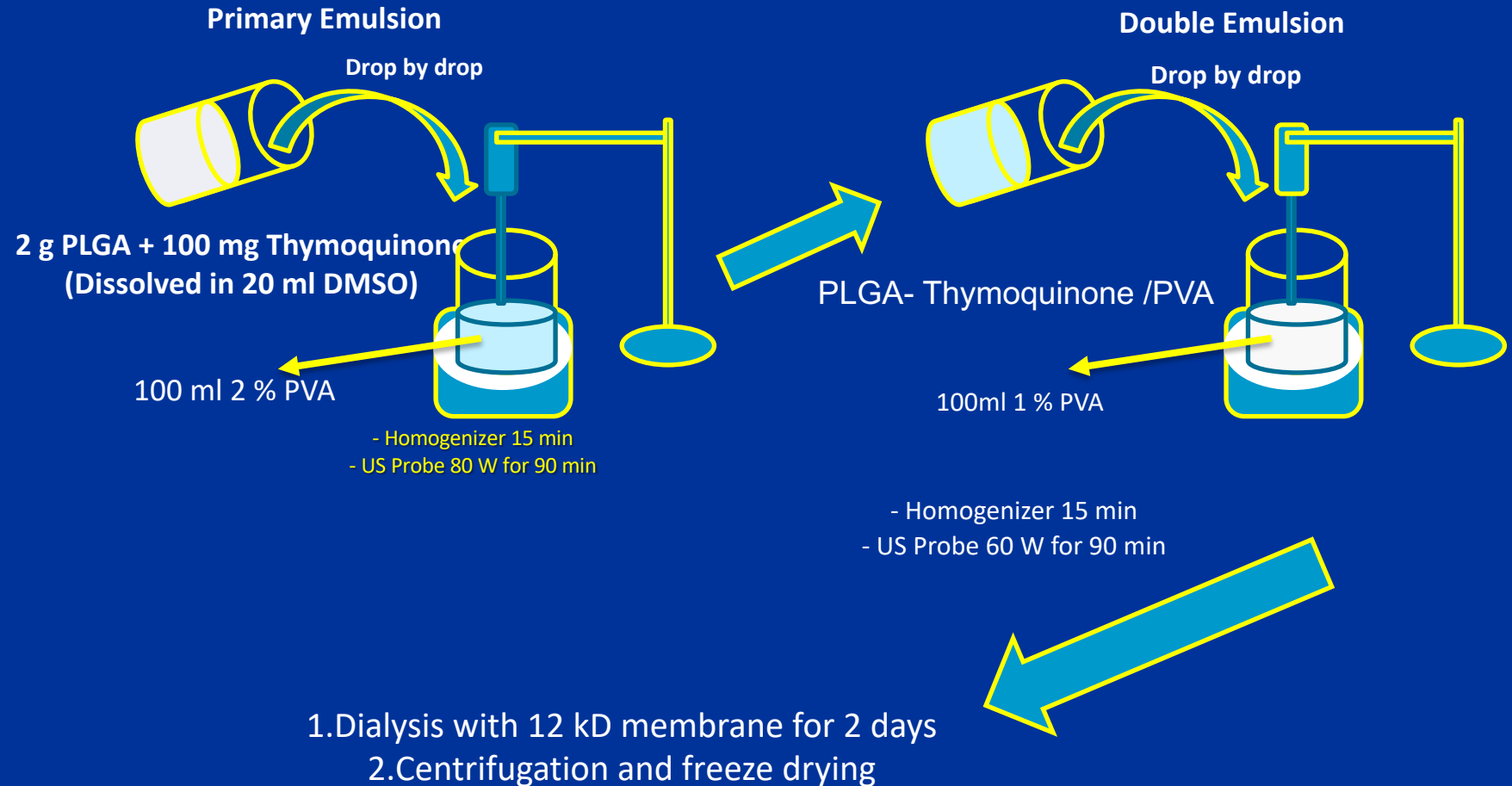
- Babish, et al. Compositions from Nigella sativa – Anti-Inflammatory, US Patent 9,180,155, 2015 - Bio Nexus, Ltd (Ithaca, NY). [**Black Seed Powder CO2 Extracts, Fractions TQ/Di-TQ production in Obesity Weight Loss, Diabetes, Anti-Oxidant**]
- Alzahrani, et al. Natural compositions and methods of promoting wound healing. US Patent 8,703,205; 2014. KSA [**Honey, Myrrh, Black seed in Wound Healing: Foot Ulcer, Diabetic, and Infection**]
- Pacioretty, et al. Formulations containing thymoquinone for urinary health. US Patent 8,029,831, 2011 - Bionexus, Ltd. (Ithaca, NY). [**TQ, Cranberry fruit, Methionine for Low Urinary Tract Disorders – anti-inflammatory/pain, anti-microbial,..**]
- Greene, et al. Anti-microbial composition and methods of use thereof, US Patent 7,258,878; 2007 - Kimberly-Clark Worldwide, Inc. (Neenah, WI). [**For Yeast and Fungal Infection**]
- Crooks, et al. Use of the naturally-occurring quinones thymoquinone and dithymoquinone as antineoplastic and cytotoxic agents, US Patent 6,218,434; 2001. University of Kentucky Research Foundation. [**TQ/Di-TQ in cancer & cancer Resistance**]

Nano-Nigella Sativa/Nano -TQs

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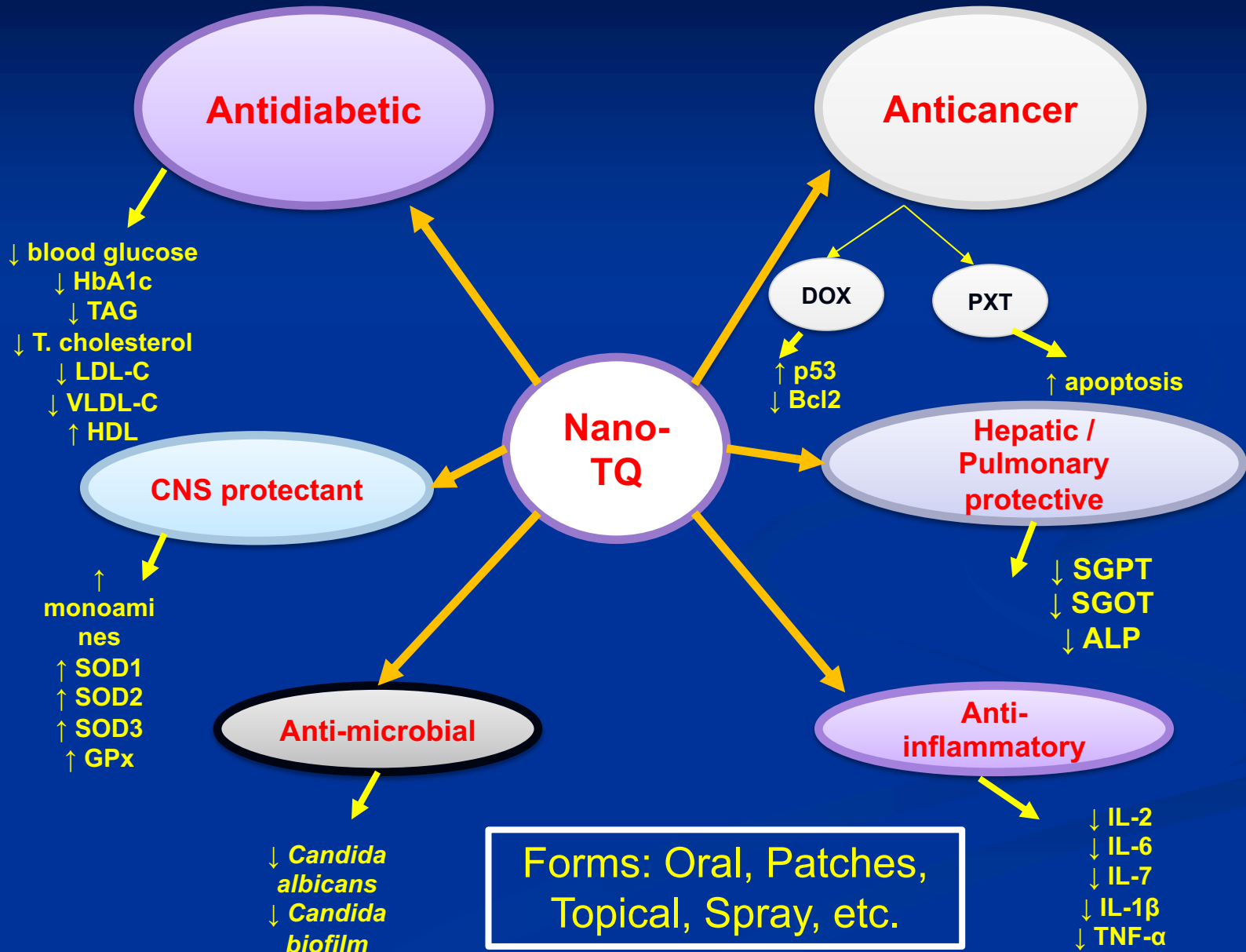
**Potential Impact of Nano-Assembly
and Products Developments**

Nigella Sativa - Thymoquinone Nanoformulation



Double emulsion methods

Nano & Enhanced Utilities of Nigella Sativa/ TQ



Summary

- ❑ Evidence Based Complimentary and Alternative Medicines Investigations documented what is already Known more then 1,400 Years ago as Cited by our beloved Prophet Mohamed [PBU], *Mercy for Mankind*
- ❑ Nigella Sativa (Black Cumin) and derived products demonstrated the best natural remedy in wide ranges of illness globally by Muslim and Non-Muslim Scientists,
- ❑ Based on Patent Searches, Novel Nano-Assembly of various bioactive Compounds derived from Nigella Sativa and whole Nigella Sativa extracts to be used in different forms represent product lines for various illnesses

Selected References by our team

- Shahein SA, Aboul-Enein AM, Higazy IM, Abou-Elella F, Lojkowski W, Ahmed ER, Mousa SA, AbouAitah K. Targeted anticancer potential against glioma cells of thymoquinone delivered by mesoporous silica core-shell nanoformulations with pH-dependent release. *Int J Nanomedicine.* 2019 Jul 19;14: 5503-5526.
- Atta MS, El-Far AH, Farrag FA, Abdel-Daim MM, Al Jaouni SK, Mousa SA. Thymoquinone Attenuates Cardiomyopathy in Streptozotocin-Treated Diabetic Rats. *Oxid Med Cell Longev.* 2018 Oct 30; 2018: 7845681.
- El-Far AH, Al Jaouni SK, Li W, Mousa SA. Protective Roles of Thymoquinone Nanoformulations: Potential Nano nutraceuticals in Human Diseases. *Nutrients.* 2018 Sep 25; 10(10). pii: E1369.
- Atta MS, Almadaly EA, El-Far AH, Saleh RM, Assar DH, Al Jaouni SK, Mousa SA. Thymoquinone Defeats Diabetes-Induced Testicular Damage in Rats Targeting Antioxidant, Inflammatory and Aromatase Expression. *Int J Mol Sci.* 2017 Apr 27;18(5). pii: E919.
- Muralidharan-Chari V, Kim J, Abuawad A, Naem M, Cui H, Mousa SA. Thymoquinone Modulates Blood Coagulation in Vitro via Its Effects on Inflammatory and Coagulation Pathways. *Int J Mol Sci.* 2016 Mar 30; 17(4):474.

thank you

tusind tak
謝謝 dakujem vám
ありがとうございます

ngiyabonga

dziękuję

merci

baie dankie

धन्यवाद molte grazie

suksema

danke

gracias

takk

obrigada

obrigado

gràcies

tänan

dank u

teşekkür ederim

شكرا

tack så mycket

teşekkür edire

mahalo