

INTRODUCING CRYSTALLIZATION BACKWARD SUCTION TRAPPING LIPIDS AND DEBRIS AS PROPOSED ADDITIONAL FACTOR IN THE GENESIS OF CORONARY ARTERY DISEASE



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ABSTRACT

Coronary artery disease progression involves a slow process of abnormal accumulation of lipid deposits to the inner walls of the arteries followed by an immune system response. It is known that an increase in lipid concentration could trigger cholesterol crystals deposition, thus starting a vicious cycle that could also progress into intra-arterial plaque formation, the hallmark of mature atheromas.

The purpose of this manuscript is to introduce a proposed mechanism for the genesis of coronary artery disease; whereby the actual act of lipids crystallization starts a cycle demonstrated to induce additional crystallization via dehydration. Experiments demonstrate for the first time via images and video-recordings showing that when the onset crystallization occurs near the tissue ($\cong 1$ mm) a dehydration triggered backward hydrodynamic suction or vacuum ensues with enough force to withdraw lipid molecules from human tissue; these molecules are shown to adhere to the crystals.

DEFINITION OF TERMS

Absorption: The transfer of the energy of a wave to matter as the wave passes through it... if all the energy is lost, the medium is said to be opaque, ie: Crystallization.

Anisotropy: The property of substances to exhibit variations in physical properties along different molecular axes. It is seen in crystals, liquid crystals and, less commonly, in liquids. Analogy would be selecting direction of wood grain when cutting.

BEMR: Acronym for Bioelectromagnetic Radiation.

DBS: Acronym for "Dominant Backward Suction". The most clinically relevant wave to date filling the coronary arteries. It causes a marked increase in coronary flow velocity observed at the start of diastole. Also observed in vitro at onset of crystallization, for details link to: <https://youtu.be/IJgoozrRyrk> Or scan QR Code



Electromagnetic Radiation: Defined as how matter typically electrons bound in atoms takes up a photon's energy — and so transforms electromagnetic energy into internal energy of the absorber. Example is the full absorption of electromagnetic radiation as internal energy by K_3Fe .

K_3Fe : Short version for Potassium Ferricyanide crystals with formula $K_3Fe(CN)_6$. CSA # 13746-66-2.

Macrophage: Large phagocytic cell found in stationary form in the tissues or as a mobile white blood cell.

Nucleation: Nucleation, the initial process that occurs in the formation of a crystal from a solution.

SSP: Acronym for Single Slide Preparation, where a plucked in toto (follicle and shaft) human hair is placed on a glass slide and covered by a solution of diluted K_3Fe crystals.

PREAMBLE:

The bridging field of Bioelectromagnetic Radiation is herein presented as a tool for the scientific explanation of the genesis of coronary artery disease.

1. INTRODUCTION

Our manuscript introduces via *in vitro* experiments the presence of a dominant backward suction (DBS) occurring during the onset of crystallization of Potassium Ferricyanide (K_3Fe) attracting tissue particles from a human hair follicle or miniorgan [1] on a glass slide covered by K_3Fe in solution. This hydrodynamic DBS phenomenon had also been detected *in vivo* and reported to be present at the start of diastole during diastole as blood flows into the human coronary arteries [2]. The process of intracoronary lipids crystallization occurs in two major steps, the first is nucleation also defined as the appearance of a crystalline phase of a supersaturated solvent; the second is known as crystal growth, which is the increase in the size of particles and leads to a crystal state [3] Images and video recordings are introduced demonstrating for the first time via an *in vitro* simulation of lipids crystallization. The data shows via images and video-recordings that when the onset crystallization occurs near tissue ($\cong 1\text{ mm}$) a dehydration triggered DBS or vacuum ensues with enough hydrodynamic force to withdraw lipid molecules from human tissue; these molecules are shown to adhere to the crystals.

2. MATERIALS AND METHODS

2.1. MATERIALS

- 1) Potassium Ferricyanide Crystal. $K_3Fe(CN)_6$.
CSA # 13746-66-2.
- 2) Hair Follicles plucked via tweezers from author's scalp
- 3) Microscope glass slides: 25x75x1mm thickness. Pearl Cat. No. 7101
- 4) Water purity confirmed by hand held electrical fields detector manufactured by Lishtot Detection LTD, Israel. For details link to: <https://www.lishtot.com/TDP1.html>
- 5) Room relative humidity monitored by an ACU-RITE sensor model # 01536-RX.
- 6) Digital Video Microscope Celestron II model # 44341, California, USA.
- 7) Images downloaded to an Apple Computer MacBook Pro Photo Application.

2.2. METHODS

2.2.1. PREPARING THE SOLUTION

Commercially available bottled water was tested for impurities via a handheld electrical fields sensor (Lishtot Sensor). A solution was prepared by diluting $\cong 2$ grams of Potassium Ferricyanide (K_3Fe) crystals in 2 ml of the

previously tested for impurities bottled spring water. The solution placed inside a 6-inch 4 mm OD glass tube and withdrawn as needed via pipette.

2.2.2. THE SINGLE SIDE PREPARATION (SSP)

The SSP is an open-air technique where freshly plucked *in toto* human hairs were placed on a clean 25x75x1mm glass slide; and covered by drops of K_3Fe in solution; the liquid was then allowed to evaporate. Prior to evaporation, the drops were gently touched by a wooden toothpick and dispersed as to cover the follicle and shaft (Fig.1). After the hair sample stops drifting and stabilizes, a clean wooden toothpick was used to gently shepherd the hair sample away from the drop edges. As evaporation starts, images and video recordings are made and stored.

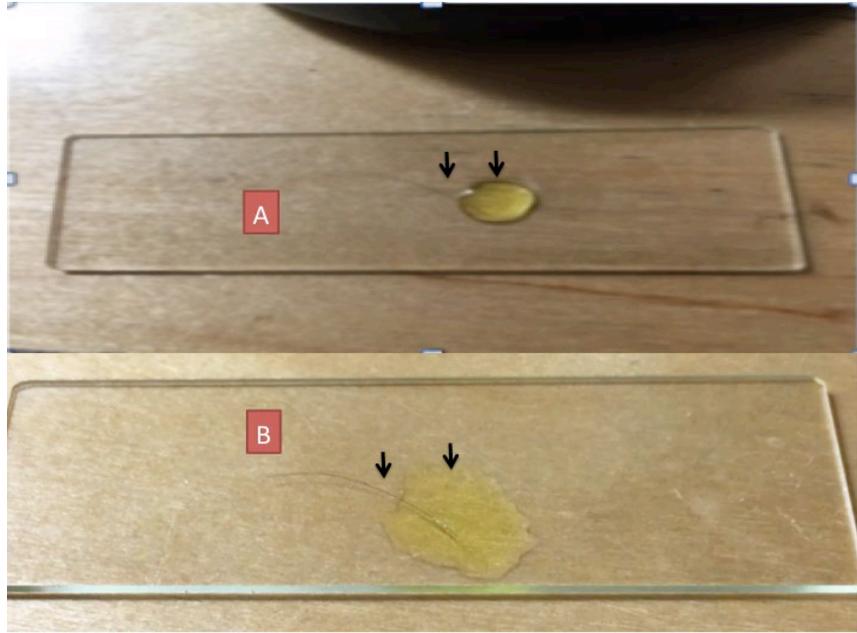


Figure 1: A: Scalp hair on glass slide covered by drop of (Potassium Ferricyanide) covering mainly the hair follicle. B: Same hair. Now the K_3Fe drop surface tension disturbed via wooden toothpick now covering follicle and shaft.

3. RESULTS

Solute crystallization is mainly classified as homogeneous (Fig 2 + video) or heterogeneous (Fig 3 + video) [3] care was taken to show in control experiments the dynamics via video recordings in both types as the Potassium Ferricyanide or K_3Fe solution crystallizes. An example of K_3Fe homogeneous crystallization is when no foreign particles are present in the liquid, ie: Ice formation in clouds. In heterogeneous crystallization, impurities such as dust particles could trigger a regional temporary nucleation process. In homogeneous situations, unimpeded crystallization occurs.

3.1. THE FULL ABSORPTION OF BIOELECTROMAGNETIC RADIATION (BEMR) BY K_3Fe

The crystallography paramagnetic anisotropy of K_3Fe was introduced in 1969 [4] and later demonstrated to fully absorb electromagnetic radiation [5]. Our experiments document the above mentioned “full electromagnetic absorption” property of K_3Fe , this manifested in crystals deposition in a semicircular pattern. It occurs within the BEMR reaches of the hair follicle previously determined to be $\cong 3$ mm [6] (Fig 4). As of recent, human blood tissue has been documented to be a BEMR emitter; and demonstrated to increase K_3Fe crystals adhering to a hair follicle.

3.2. CONTROL EXPERIMENTS SHOWING TYPES OF K_3Fe CRYSTALLIZATION

Homogeneous (Fig. 2)



Figure 2: Example of unimpeded or “homogeneous” crystallization advance of Potassium Ferricyanide in solution in the absence of an interfering foreign particle or opposing magnetic field. Black Arrow: Pointing at forward crystals motion. For additional detail, please link to: <https://youtu.be/frYJfZWajWs> Or scan QR Code in left upper corner of image.

Heterogeneous (Fig. 3)



Figure 3: Example of impeded crystallization advance (heterogeneous). Selected frame showing foreign unidentified particles triggering crystallization nucleation and slowing the unimpeded K_3Fe crystals advance. Black Arrows: Foreign particles. Orange Arrow: Nucleation slowing crystals advance.

For additional details link to URL https://youtu.be/P7KyQ_5HH0A Or scan QR Code in left upper corner of image.

3.3. HAIR FOLLICLES BEMR TRIGGERING DILUTED K_3Fe NUCLEATION AND CRYSTALLIZATION IN A SEMICIRCULAR PATTERN DELAYING CRYSTALLIZATION ADVANCE

When the K_3Fe is evaporating and a hair follicle BEMR is detected, nucleation ensues thus starting an impeded crystallization pattern of crystals formation. This process slows the crystallization advance (Fig 4 + video). The range of the hair follicle BEMFs triggering nucleation in K_3Fe had been previously determined to be $\cong 3$ mm.

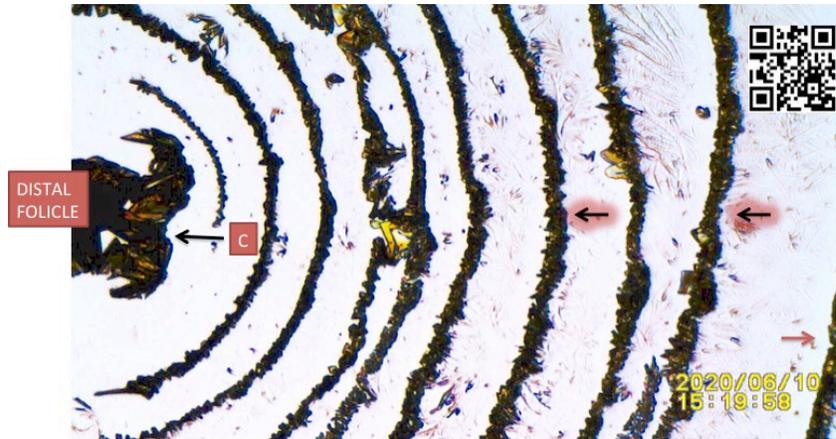


Figure 4: Human scalp hair SSP K_3Fe showing crystallization semicircles reflecting human hair bioelectromagnetic waves triggering nucleation and crystallization.

C: Heavy crystallization caused by BSW near the follicle, Highlighted black arrows: Pointing at K_3Fe crystals delineating the hair follicle bioelectromagnetic waves. Red Arrow: (Bottom right) Pointing at hair follicle magnetic reach as expressed by crystallization.

For additional details link to : <https://youtu.be/o1u5mHopdeo>

Or Scan QR Code in right upper corner of figure.

NOTE: In Figure 4 above, the thicker crystallization highlighted by letter C is due to the Backward Suction phenomenon attracting tissue particles. This attraction only occurs near the hair follicle area as shown in (Fig. 5 + video) below.

Example of DBS in Gray Hairs

The example below, clearly shows a DBS seen during nucleation. This documents the attraction of two different types of particles from a human miniorgan (hair follicle), one type was identified via optical microscopy as lipid molecules; the other theorized to be melanin granules. As a matter of interest to readers of this manuscript the hair follicle had been found to have “circulatory lipoproteins (LDL and HDL) present in the capillary loop of the DP (dermal papilla)” [5] or the most distal area of the follicle as shown in Figure 5 below.

Additionally, hair follicles are usually covered by sebum, the lipid molecules observed being withdrawn during crystallization could also be part of secretion from sebaceous glands. Regardless of the lipid origin a DBS is documented.



Figure 5: Black hair. Selected frame from video recording showing, F: Follicle. Black Arrows: Crystallization caused by hair follicle bioelectromagnetic radiation. Highlighted Orange Arrow: Pointing at lipid particles undergoing backwards motion due to “Backward Suction” caused by crystallization.

For details link to URL <https://youtu.be/8jRFBJec06c> Or scan QR Code in left upper corner of image

Recommended to advance video towards 01:44” to appreciate stronger suction as crystallization nears follicle.

3.4. DEMONSTRATION OF DBS ATTRACTING LIPID PARTICLES AND UNIDENTIFIED MATERIAL IN GRAY HAIRS

This is better displayed due to the smaller number of particles attracted in gray hairs (Figure 6 below).

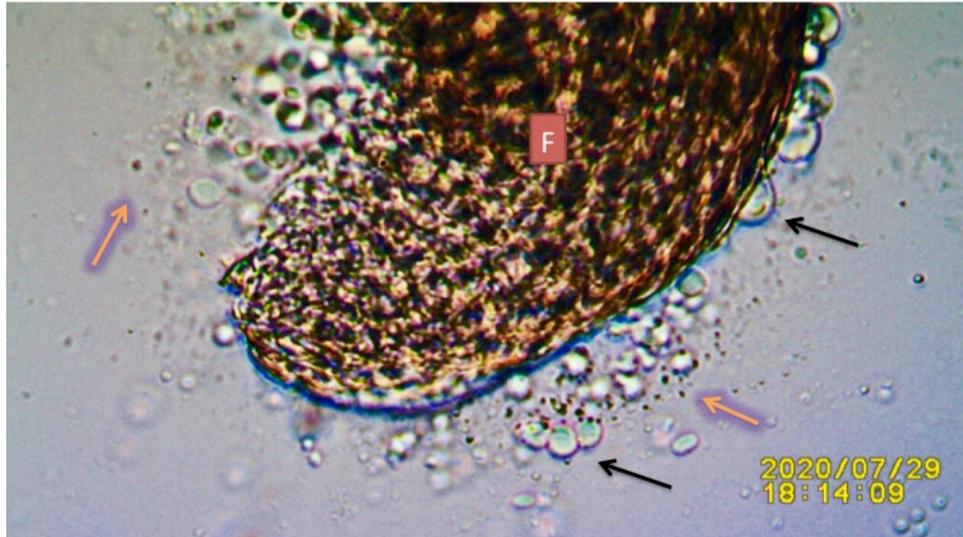


Figure 6: Gray hair follicle in K_3Fe crystals in solution showing two distinct particles types. F; Follicle. Black Arrows: Lipid droplets. Highlighted Orange Arrows: Smaller black particles (possible melanin granules).

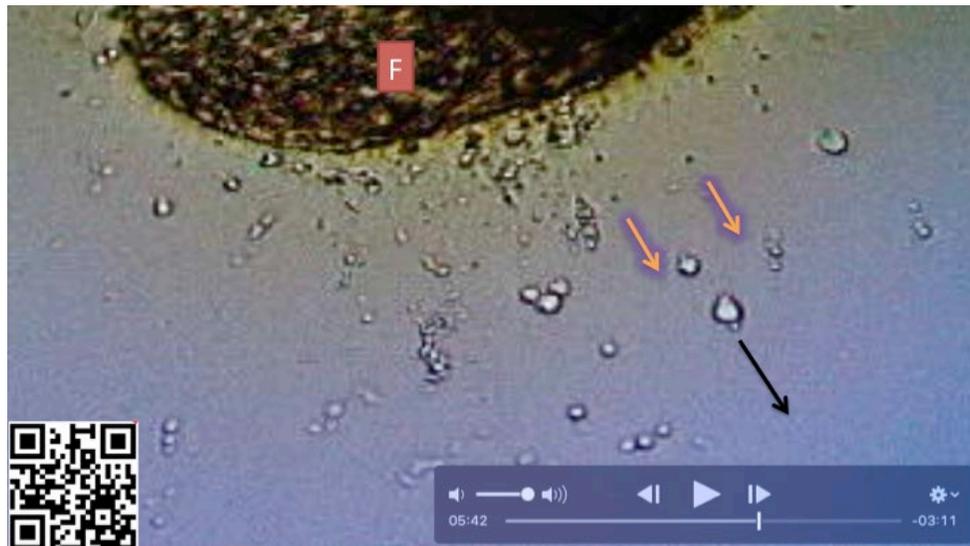


Figure 7: Selected video frame showing granules and lipid droplets attracted by K_3Fe DBS during crystallization. Black Arrow: Movement direction of lipid droplet. Highlighted Orange Arrows: Movement direction of unidentified granules.

For additional details link to: https://youtu.be/f-MGe_mrwr8

Or scan QR Code in left lower corner of figure.

For specific details move cursor from 00:50" to 01:06" stronger suction as crystallization nears follicle.

3.5. DEMONSTRATION OF DBSW ATTRACTING GREATER NUMBER OF PARTICLES IN BLACK HAIRS

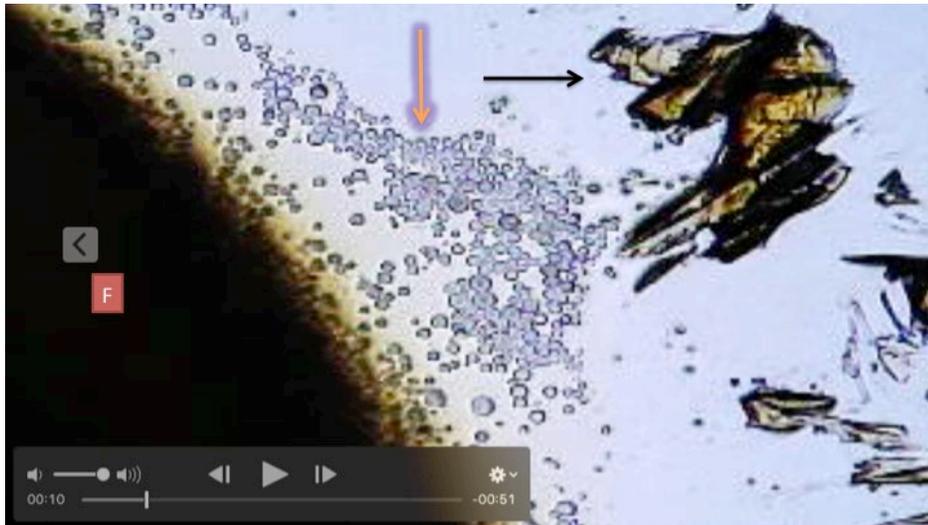


Figure 8: Black hair follicle showing increased particles migrating towards the K₃Fe crystals. F: Follicle. Black Arrow: K₃Fe crystals. Highlighted Orange Arrow: Pointing at greater number of particles attracted by DBSW during nucleation.

For additional details link to URL <https://youtu.be/vzbtEukLhBI>
Or scan QR Code:



4. DISCUSSION

The main message herein presented is the introduction of a mechanism linking a DBS phenomenon during crystallization attracting particles from human tissue as an additional factor in intra coronary plaque crystals formation This is supported by similarities in images obtained via different techniques, such as by optical microscopy from this manuscript as shown below (Fig 9); and electron microscopy by others as shown in Figure 1 (not shown) in reference [7].

4.1. DEMONSTRATION OF MALLEABLE LIPID DROPLETS ENTRAPMENT DURING CRYSTALLIZATION.

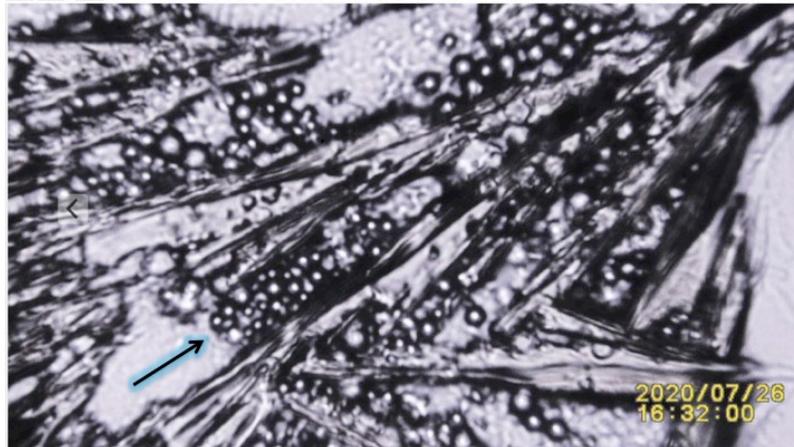


Figure 9: Black Hair in SSP K₃Fe crystals near follicle. Black Arrow: Left lower corner. Notice lipid particles trapped by crystals. For additional details, please link to URL <https://youtu.be/vzbtEukLhBI> Or scan QR Code in left upper corner of image.

4.2. K_3Fe CRYSTALS IDENTIFIED AS ANISOTROPIC AND FULLY ABSORBING BIOELECTROMAGNETIC RADIATION

K_3Fe crystals have been identified as anisotropic and found to fully absorb electromagnetic radiation, such as in the case of inherent human hair follicle BEMR [8], The first step in crystallization is called nucleation, the second leads to crystals formation. The emphasis in this manuscript is placed on the nucleation phase of K_3Fe in solution covering a hair follicle a.k.a. as a miniorgan. The images obtained show a “back and forth” motion during the water evaporation (dehydration) leading to the onset of nucleation. Only when nucleation occurred near the follicle itself ($\cong 1$ mm) is that a DBS was documented attracting human tissue particles (Fig 10).

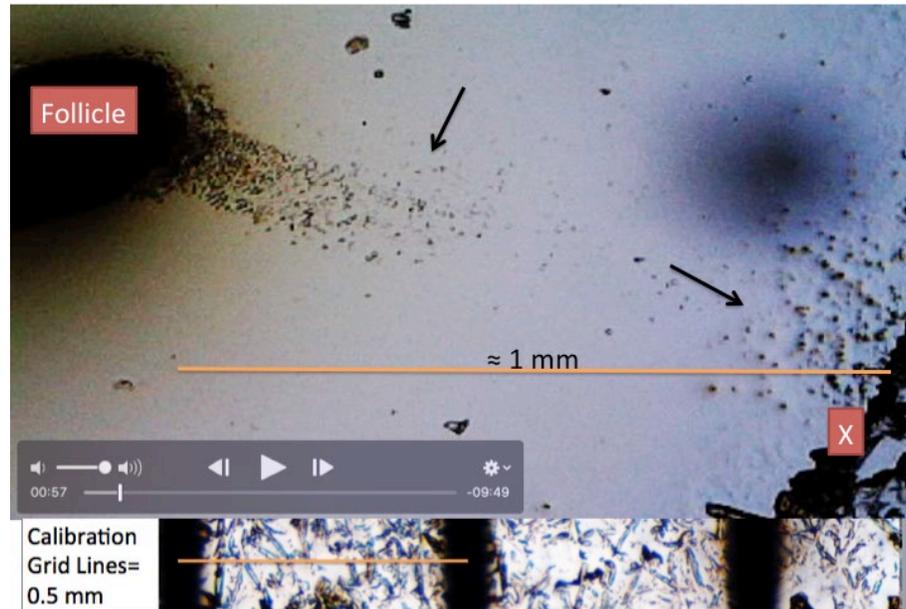


Figure 10: Microphotograph of video frame at 00:57". Showing hair follicle in SSP K_3Fe . X= K_3Fe nucleation. Black Arrows: Pointing at follicle's particles attracted by DBS. Orange Line: Showing approximate distance between follicle and nucleation site.

4.3. ELECTROMAGNETIC RADIATION CAN BE FULLY ABSORBED USING AN ANISOTROPIC CRYSTAL

K_3Fe crystals have been classified as anisotropic, and as such fully absorbing incoming electromagnetic radiation. Our experiments show the hair follicle BEMR triggered K_3Fe crystals as result of K_3Fe full absorption of electromagnetic radiation emitted by the hair follicles. This mechanism is demonstrated in Figures 4,5,6,7,8 and 10 plus video recordings.

5. SUMMARY AND CONCLUSIONS

Proposed is a mechanism for the genesis of coronary artery disease and its progression; involving two similar tandem events: A primary Dominant Backward Suction (DBS) suctioning blood tissue and lipids into the coronary arteries during diastole; and a secondary intra arterial DBS associated with localized dehydration triggered by the first stage of crystallization or nucleation attracting and trapping lipids present within $\cong 1$ mm of the arterial wall endothelium; this mechanism is inferred in Figures 9 and 10 plus video-recordings. The lipid droplets due to their malleability [9] are adhered to the crystals and stay “deformed but intact”, as if removed from circulation. Supporting the findings is correlation between hypo hydration and crystallization localized intra-arterial endothelial function [10], [11]. Additionally, lipids crystals injuring the inner arterial wall have been proposed to trigger chronic inflammation [12], thus starting a vicious cycle leading towards coronary artery disease progression

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CONFLICT OF INTEREST

The author have declared that no competing interests exist.

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