

CARBAL THERAPY FOR TREATMENT OF DIABETIC FOOT (CO2 WATER BATH)

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الخلاصة :-

تم دراسة مائة حالة من المرضى المصابين بالقدم السكري ٦٠ من النساء و ٤٠ من الرجال يتراوح أعمارهم بين ٣٠ الى ٧٠ سنة اي معدل ٥٠ سنة الذين تمت مراجعتهم الى مركز النجف للسكري و الغدد الصماء القدم السكري من تاريخ ١-١-٢٠٠٩ إلى ١-١-٢٠١١ حيث تم علاجهم بالماء المشبع بثاني أوكسيد الكربون (CARBOTHERA) باستعمال جهاز مصنع من قبل شركة ميسيووشي رايون المحدودة. حيث ان مدة الجلسة الاولى ٢٠ دقيقة ثم ٣٠ دقيقة للجلسات اللاحقة ويعتمد عدد الجلسات على استجابة المريض لأن الإصابة تتراوح بين الجروح البسيطة الى الجروح العميقة وحتى الغنغرينا (GANGREN) ويكون لكل مريض كيس خاص يوضع فيه الماء المشبع بثاني أوكسيد الكربون ثم يوضع القدم فيه وعند الانتهاء الجلسة يطرح الماء والكيس معا وتم يعقم الإناء ويبدل الكيس باخر جديد لاستعماله لمريض آخر. وقبل بدء الجلسة نقوم بتنظيف الجرح وإزالة النسيج التالف مع أخذ مسحة من الجرح قبل بدء الجلسات لغرض إجراء زرع وإعطاء مضاد حيوي حسب الزرع مع إجراء تحليل السكر في كل جلسة ويتم إجراء تحليل سكر التراكمي لكل مريض مع تحليل اليوريا في الدم وكانت النتائج العلاج مشجعة . حيث تم شفاء ٦٥ % من المرضى المصابين بمرض السكري شفاء تام و ٣٤ % تم شفائهم جزئياً أو تم شفائهم وأصيبوا بجروح أخرى بعد فترة بنفس القدم ولكن في مكان آخر. ومريض واحد فقط تم إحالته الى طبيب الكسور لغرض إجراء عملية بتر الاصابع لذا يعتبر علاج قدم السكري بالماء المشبع بثاني أوكسيد الكربون بتركيز ٩٠٠ الى ١٠٠٠ جزء بالمليون من العلاجات الناجعة اذا استعملت لمرضى القدم السكري بطريقة صحيحة وبتركيز ثابت وبدرجة حرارة ثابتة ٣٧ درجة مئوية مع انتظام الجلسات

ABSTRACT:

BACKGROUND

Study effect of carbon dioxide water bath therapy (carbothera) in treatment of patient with diabetic foot which they are not response to convention treatment such as daily dressing, debridement, antibiotic and laser therapy in our diabetic and endocrine Najaf centre.

SUBJECT

One hundred patient with diabetic foot sixty female and forty male with average age 50 years(range from 30 to 70 year) attending to diabetic and endocrine Najaf centre use as subject in our study followed in two year period(from1/1/2009 to1/1/2011) treated by carbon dioxide water bath therapy .

METHOD

Artificial carbon dioxide containing water for foot bathing was generated using CO2 enriching water production unit manufactured by Mitsubishi Rayon engineering com..Ltd .The carbon dioxide concentration was set at about 900 to 1000 part per million (ppm) and water temperature was set at 37c(fig1).

Diabetic patient immersed foot in water bath start 20 minute then 30 minute at each set done daily or in alternative day ,water usually put in plastic bag and discarded after end of set for each patient then clean plate with disinfectant ,to be use for other patient, we isolated special plate for patient with gangrene .no. of set depend on diabetic foot response , in addition daily dressing and removing dead necrotic tissue and giving antibiotic usually according to culture and sensitivity test is also done. FBS measure on

each set, B.U , Serum cretin in and HbA1c done every three month. Patient with osteomyelitis, congestive heart failure, sever varicosity of leg excluded from study.

RESULT

One hundred patient with diabetic foot attend to alnajaf endocrine and diabetic centre treated by carbothera (CO2 water bath therapy) 60 female and 40 male with average age 50 year ,result in 65% of patient have complete cure and 35% have partial response to treatment or recurrence after cure of same lesion or recurrence in another area of foot.

CONCLUSION

CO2 is a natural, chemical and technical therapeutic mean which is effective in treatment of diabetic foot and has no side effects when used for the proper indications and in proper dose and can be used for other patient with vascular disease other than diabetic (atherosclerosis' ,burger disease) and also can be use in treatment of diabetic neuropathy which is my next research.

Key word:

Diabetic foot, Carbon Dioxide Foot Bathing, CO2 balneotherapy, Arteriosclerosis obliterans, Physiological Actions of Spa therapy, Carbothera.

INTRODUCION

Diabetes mellitus is a group of metabolic diseases characterized by high blood sugar (glucose) levels, that result from defects in insulin secretion, or action, or both(18). Diabetes consider as common cause of mortalitaty and morbidity in world due to multisystem involvement in which lead to several metabolic change in vascular system. It is estimated that approximately 250 million people have diabetes - 5.9% of the world's population. Around 80% of these people live in developing countries. Diabetes affects approximately 17 million people (about 8% of the population) in the United States. In addition, an estimated additional 12 million people in the United States have diabetes and don't even know it. Diabetes is the third leading cause of death in the United States after heart disease and cancer (18). By 2025, the global estimate is expected to rise to some 380 million - 7.1% of the adult population. Worryingly ,type 2 diabetes is increasing among young people around the world.

Every year, more than 1 million people with diabetes lose a leg as a consequence of their condition. This means that every 30 seconds a lower limb is lost to diabetes some where in the world (18). The majority of these amputations are preceded by a foot ulcer. The most important factors relating to the development of these ulcers are peripheral neuropathy, foot deformities, minor foot trauma and peripheral vascular disease .The spectrum of foot lesions varies in from region to region due to differences in socioeconomic conditions, standards of foot care, and quality of footwear. In developed countries, one in six people with diabetes will have an ulcer during their life time . In developing countries, diabetes-related foot problems are thought to be even more common.

These complications do not only represent a major personal tragedy for each sufferer; they also place a considerable financial burden on healthcare and society in general.

It is now recognized that type 2 diabetes in children is becoming a global public health issue (18). It is inevitable that these young people will go on to develop diabetes related micro and macro vascular complications - including disabling and life-threatening foot problems -at a relatively early age.

The three most common type of diabetes are:

1-Type 1 diabetes which previously called juvenile diabetes or insulin dependent diabetic ,which effect children and adolescent ,some time occur in adult which called Latent onset diabetes in adult (LADA).

2-Type 11 diabetic or adult type or non insulin dependent diabetes , which usually effected 3rd and 4th decade but some time occur in adolescent so called mature onset diabetes (MODY).

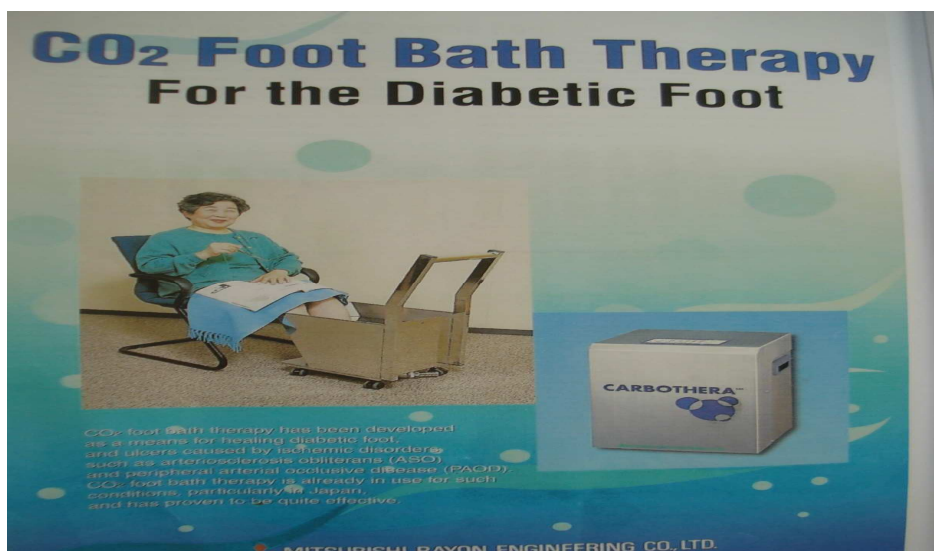
3- Gestational diabetes which affected pregnant women at 2nd and 3rd trimester due to placental hormone secretion which counteract insulin action to preserve glucose for baby.

METHOD AND MATERIAL:

Artificial carbon dioxide containing water for foot bathing was generated using Co2 enriching water production unit manufactured by Mitsubishi Rayon engineering com.Ltd .The carbon dioxide concentration was set at about 900 to 1000 part per million (ppm) .And water temperature was set at 37c(fig1) .

Diabetic patient immersed foot in water bath start 20 minute then 30 minute at each set done daily or in alternative day ,water usually put in plastic bag and discarded after end of set for each patient then clean plate with disinfectant ,to be use for other patient, we isolated special plate for patient with gangrene .no. of set depend on diabetic foot response , in addition daily dressing and removing dead necrotic tissue and giving antibiotic usually according to culture and sensitivity test is also done. FBS measure on each set ,BU ,Serum cretinin and HbA1c done every three month.

Patient with osteomyelitis ,congestive heart failure , sever varicosity of leg excluded from study.



RUSULT;

In this study of 100 diabetic patient with diabetic foot referred to endocrine and diabetic Najaf centre treated by carbon dioxide bath water therapy 60 patient female and 40 patient male with age around 50 year result in 60 patient complete cure ,5 patient end with auto amputation of affected area and cure for rest of foot,20 patient partial response,4 patient cure with recurrence lesion in same area ,6 patient recurrence on

another leg ,2 patient cure by add laser therapy to the edge of lesion to remove dead tissue and then complete with carbo thera treatment until they are cure ,2 patient failure of treatment and referred to orthopedic surgeon for amputation,1 patient not complete set in spite of her improvement on treatment because she is from kutt city .

DISSCUTION

In 1624 medical scholar van helmont (1577- 1644) confirmed that gases contain carbon dioxide. The anti- infective properties of carbon dioxide were discover and analyze by boyel (1637- 1691) and Lavoisier (1743-1794).

The first systematic medical research of CO₂ use was conducted by lalouette (1777), who showed that chronic and invent rated skin damage cured by serial application of CO₂.

Area where CO₂ enriched water emerges naturally from ground developed in 19th century into curative spas for heart(11) .because the method use of such water involved volumetric loading(pre-loading) in full water bath .however, application of CO₂ to skin gained suitable degree of acceptance based on the experiences of physicians' and eventually came to be used as an effective mode of treatment for circulatory disorder(9), vascular disorders(6) and disorder of autonomic function and regulation .The treatment took advantages of local features such as a spa cure or were carried out using carbon dioxide springs(1) or (artificial) therapeutic recognized As medications(Jordan,1985).

Highly concentrated CO₂ in the form of gas (carbon dioxide fumaroles) or dissolved in water forms as a magma product following volcanic eruption on the earth's crust.

When these gas springs or source gases reach the earth's surface .The concentration decreased on account of the drop in pressure ,or removal of the gaseous ingredients takes place according to Henry - Dalton law .This can be technically prevented .It possible at substantial cost ,to artificial obtain a supersaturated CO₂ concentration beneficial for treatment.

Eighty percent of German natural mineral's spas contain the minimum concentration of 400 mg CO₂ required for treatment (hentschel,1967;schnizer,1985) (14).

Medical gases, such as Linda and Messer Griesheim .are pharmaceutical listed in the German and European pharmacopeias ,this artificially produce dry gas ,which identical to the CO₂ released from naturally occurring gases vented from the ground and from carbon dioxide spring.

CO₂ application to the skin raises the oxygen partial pressure not only of the skin but of the muscles as well (komoto et al.,1986) (28).

CO₂ stimulate the warmth receptors in the skin and inhibit the cold receptors ,as result, carbon dioxide enriched water feels about 2C warmer than fresh water(Jorden1985).

In addition,CO₂ has an anti-inflammatory effect .change in CO₂ concentration affect the intermediate metabolism .Arise in the CO₂ concentration bring about arise in serum phosphorus and in the lactic dehydrogenize(Strauss-Blasche G et al. 2003 FKKK)(33).

This is based on the inhibition of glycol sis or the promotion of glycogen formation (plotner et al.1990) (34).

The mechanism of action is still a matter of speculation, whether CO₂ act directly or through a mediator.

The rise in CO₂ concentration within the tissue and peripheral blood vessels causes pre capillary arterioles to dilated, thereby opening capillary that were functionally closed(4). the same is true also when CO₂ is applied to the skin (Ito et al.,1989).The peripheral resistance decrease and the blood pressure decrease.

Direct Effect of Carbon Dioxide Bath ,Schmidt(16) observe two effect that strong impression on the patient .these are the countless water bubbles on the skins surface and flushed color of the skin

The Secondary Direct Effect of CO₂ Bath observe by research done by (K.L.Schmidt ,Germany):

1-flushing of skin, presence of distinct ischemic boundary line(at and above 300- 500 mg CO₂/L).

2- Effects as anti inflammatory.

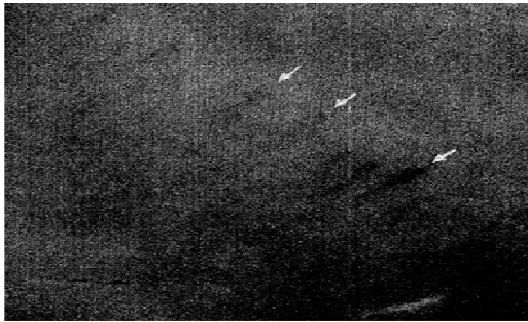
3-stimulation of warmth receptor in skin, inhibition of cold receptor.

4-vasodilatations (precapillary arterioles).

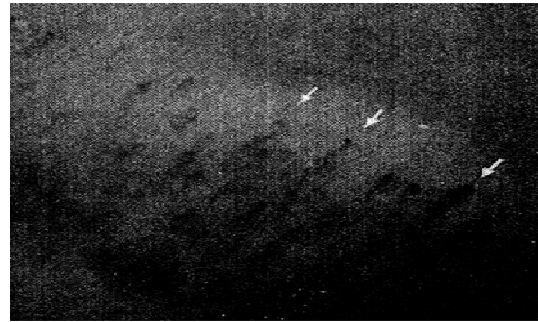
5-Reconstruction of functionally closed capillaries.(3).

from Stein & Weinstein Am Heart J, 1942

Before bath



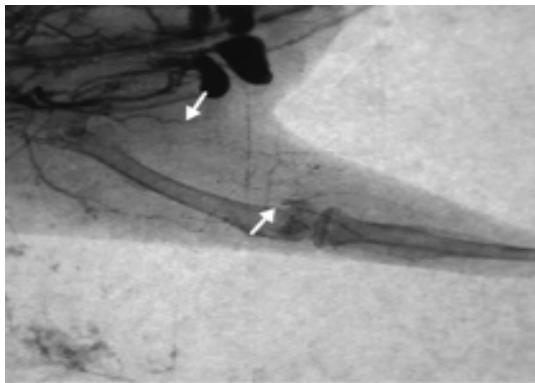
After bath



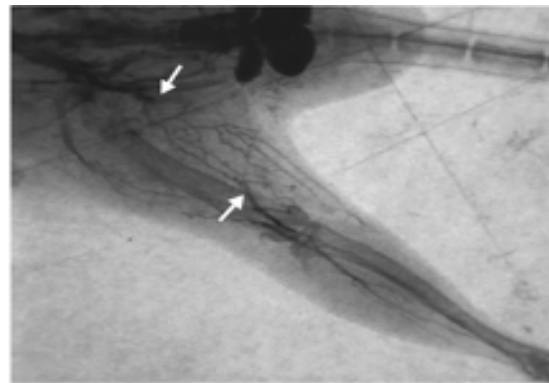
6-Rightward shift in O₂ dissociation curve .

7-Rise in venous response (vein tension).

8-Improvement in blood flow properties. figur 2



Control



CO₂ water

Angiographic analysis. Arrows indicate ligated ends of femoral arteries Increase in collateral vessels in the CO₂-bath. (Irie H et al. Circulation 2005) (4) .

9-Stimulation of sympathetic nerve system.

The factor which effect CO₂ path are:CO₂ concentration ,temperature ,surface area and time(length of exposures ,number of exposures and interval between exposures). (Hentschel,1967,Schnizer et al, 1984) (31).

Full baths in carbon dioxide water are contraindicated for sever heart failure , coronary disease and arrhythmia (Knopf.et al 1989).however, partial bath with CO2 are being used for patients with mild heart disease.

In our study we take large no of patient with different diabetic foot lesion from simple lesion to gangrenous , and our result consist with previous research done by Schmidt and Hartmann and Mastuo(17) ,in which diabetic patient with vascular lesion have good response and from one hundred patient sixty patient complete cure and five patient end with auto amputation of effect part with preserve healthy tissue ,while 20 patient partially responses and this may be due to un compliance of some patient ,about 7 patient in which they stop water bath when improve and return back when detoriated lesion ,5 patient seen by different doctor in which they are treated with vinegar and lesion become more complicated,3patient result from use unsaturated carbon dioxide water bath due to technical err and use cold water so same result shown in schmidit(16) and Hartman(30) as said CO2 concentration effected by temperature (temperature dependent), and use artificial CO2 bath is better than spring water due to saturated of artificial water bath with CO2.we also notice in all our patient flushing of skin as shown in study done by Schnizer and Erdl (14), promotes vascular change(vasomotion)in blood vessel of the skin .which also first noted that CO2 is observed by passing through intact skin. Following picture for some patient in our study:-

Case 1 63 year old Female History of diabetes since 20 year Presented with diabetic foot gangrene Orthopedic surgeon decide amputation above ankle She refuse operation and referred to our centre	I treat her by co2 water bath therapy in diabetic and endocrine najaf center/Iraq Period of treatment 3 month No of set 83 Time for each set 30 minute Result auto amputation with complete healing of rest of foot
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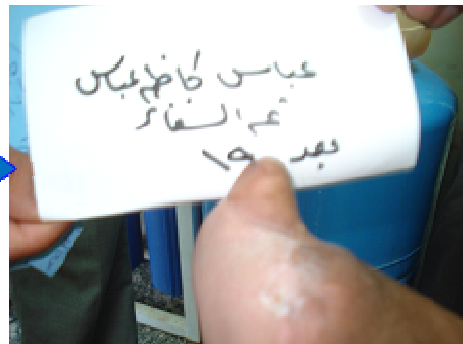
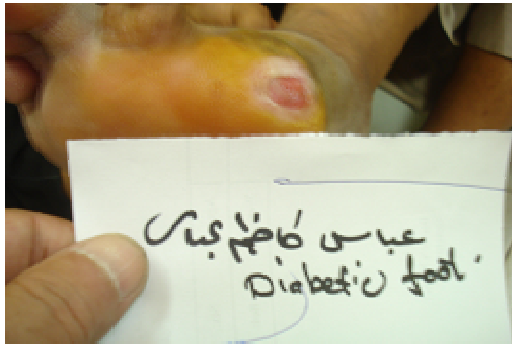




<p>CASE 2 48 Year old female She is known case of diabetic since 15 year Presented with big lacerated foot wound after surgical operation (teo amputation)</p>	<p>Treated by co2 water bath Period of treatment 4 month No of set 90 set /daily except Friday Result complete healing</p>
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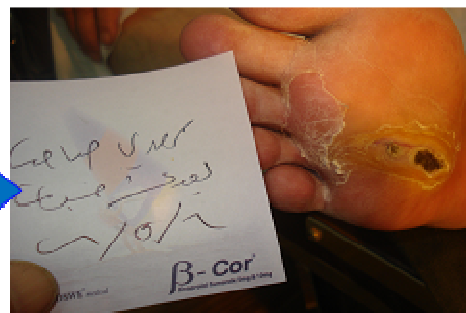
<p>CASE 3 50 Years old male He is a known case of diabetic since 12 year Presented with deep seated ulcer in Area of amputated toe</p>	<p>No of set 19 /daily except Friday Duration of treatment 3 week Result complete healing of ulcer</p>
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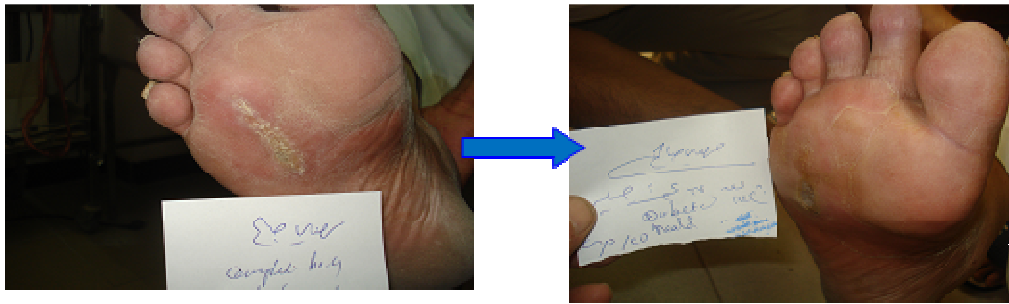


<p>CASE 4 55 Year old female She is A known case of diabetic since 10 year Presented with diabetic foot cellulitis</p>	<p>No of set 10 set Period 2 week Result complete cure Treated by co2 water bath therapy</p>
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<p>CASE 5 48 Year old male A known case of Diabetes since 13 year Presented with diabetes foot ulcer</p>	<p>Treated with co2 water bath therapy No of set 30 daily Duration of treatment 1month Result complete cure</p>
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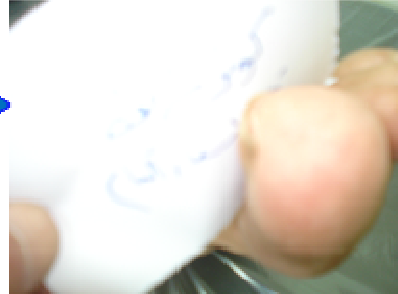
<p>CASE 6 45 Year old male A known case of diabetes since 17 year Presented with necrotic gangrenous toe</p>	<p>Treated by co2 therapy No of set 36 Duration 2 month Result complete cure with auto amputation of little toe</p>
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<p>CASE 7 65 Year old male A known case of diabetic since 15 year Presented with burn foot</p>	<p>Treated by co2 therapy No of set 10 Duration of treatment 2week</p>
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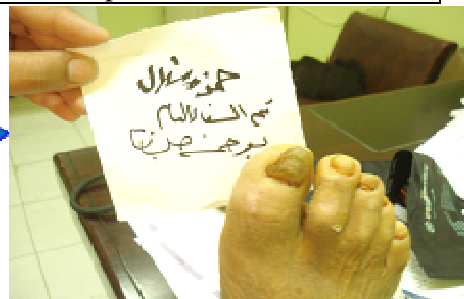
<p>CASE 8 50 Year old female Presented with diabetic foot infection A known case of diabetic since 12 year</p>	<p>Treat by co2 therapy Duration 3 week No of set 20</p>
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<p>CASE 9 46 old female Presented with diabetic leg ulcer She is a known case of diabetic since 18 years</p>	<p>Treated by co2 water bath therapy No of set 16 2et Duration of treatment 3 weak Result complete cure</p>
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<p>CASE10 44 Year old man A known case of diabetic since 10 year Presented with bullnose formation in foot</p>	<p>Treated by co2 water bath therapy No of set 15 Duration 3weak Result complete cure</p>
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CONCLUSION

CO2 is a natural , chemical and technical therapeutic mean which is effective in treatment of diabetic foot and has no side effects when used for the proper indications and in proper dose and can be use for other patient with vascular disease other than diabetic and also can be use in treatment of diabetic neuropathy which is my next research.

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