FİTOKİMYASALLAR

- Flavonoidler (quercetein, hesperidin, rutin, naringin vb)
- Coumarin ve psoralenler (bergapten, aurapten, prangol vb)
- Karotenoidler (β karoten,phytoene,auroxhantin vb)

Flavonoidler

Bitkilerde, meyve, sebzelerde yaygın olarak bulunan düşük molekül ağırlıklı fenolik maddeler

Güçlü serbest radikal temizleyiciler

- Antikarsinojenik etki (Gastrik ca, prostat ca., skuamoz hücreli ca, meme ca met., kolon ca, fibrosarkom)
- Kardiyovasküler etki (kapiller frajiliteyi önleyici etki, platelet agregasyonunu önleyici etki, KAH önleyici etki (LDL oksidasyonunu önler), hiperkolesterolemiyi düzeltici etki, antihipertansif etki)
- Antiinflamatuar, antiallerjik ve analjezik etki
- Hiperglisemiyi düzenleyici etki (Hepatik glikoliz ↑, hepatik glukoneogenez)
- Antimikrobiyal etki (Herpes simpleks, Poliovirus, Parainfluenza, Solunum sinsityal virusu,Gr (-) bakteriler)
- Antidepresan ve anksiyolitik etki
- Ekolojik fonksiyon – rodentisidal etki

Quercetin

(3,5,7,3’,4’-pentahydroxyflavone)

Flavonol altgrubundaki en güçlü doğal antioksidanlardan birisi

Table 1. Que Content in Common Plants and Beverages

Food	mg/100 g	Beverage	mg/100 mL
Apple	10 - 26	Apple juice	0.25
Apricot	5.3	Grape juice	0.44
Pear	2.8	Grapefruit juice	0.49
Plum	0-1.5	Lemon juice	0.74
Red grape	3.7	Orange juice	0.34 - 0.57
Broad bean	134	Red wine	0.4 -1.6
Broccoli	0.6	Black tea (loose)	1.6
Cauliflower	3.1	Black tea (bags)	1.7- 2.5
White onion	54	Green tea	1.4 - 2.3
Lettuce	32 - 47	Tomato juice	1.3

Quercetin'in antiplatelet özellikleri

- Platelet agregasyonuna etki

(Kollojen, trombin, araşidonik asit ve ADP)

- Platelet sinyalizasyon proteinlerine etki

(Fyn, Lyn, Src, Syk protein kinaz,PI3 kinaz,protein kinaz C inhibisyonu)

- Diğer platelet fonksiyon parametlerine etki (Platelet dens ve alfa granülleri ekzositozu, Ca^{+2} immobilizasyonu ve platelet yayılımının inhibisyonu)

Quercetin metabolitlerinin platelet fonksiyonlarına etkisi

Tamarixetin

Quercetin-3’-sulphate

Quercetin-3’glucuronide

Que-4’-O-B-D-glucoside

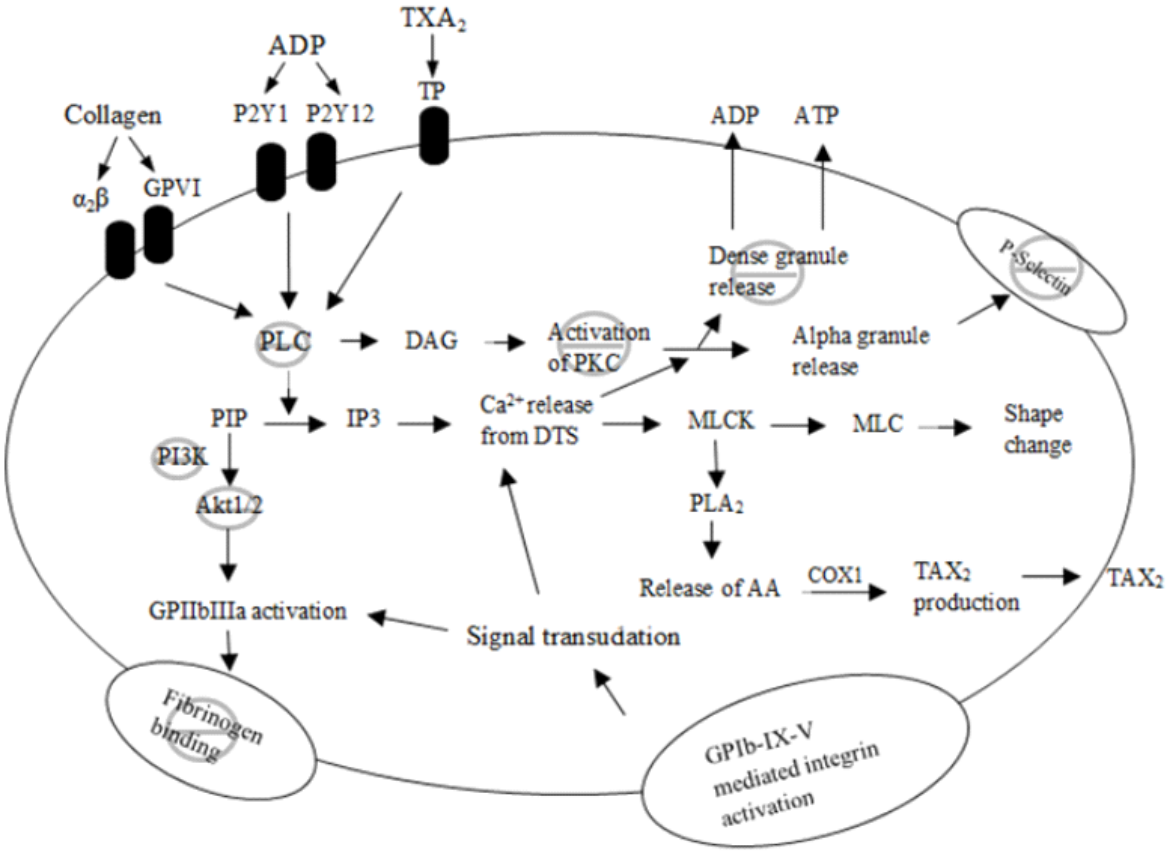
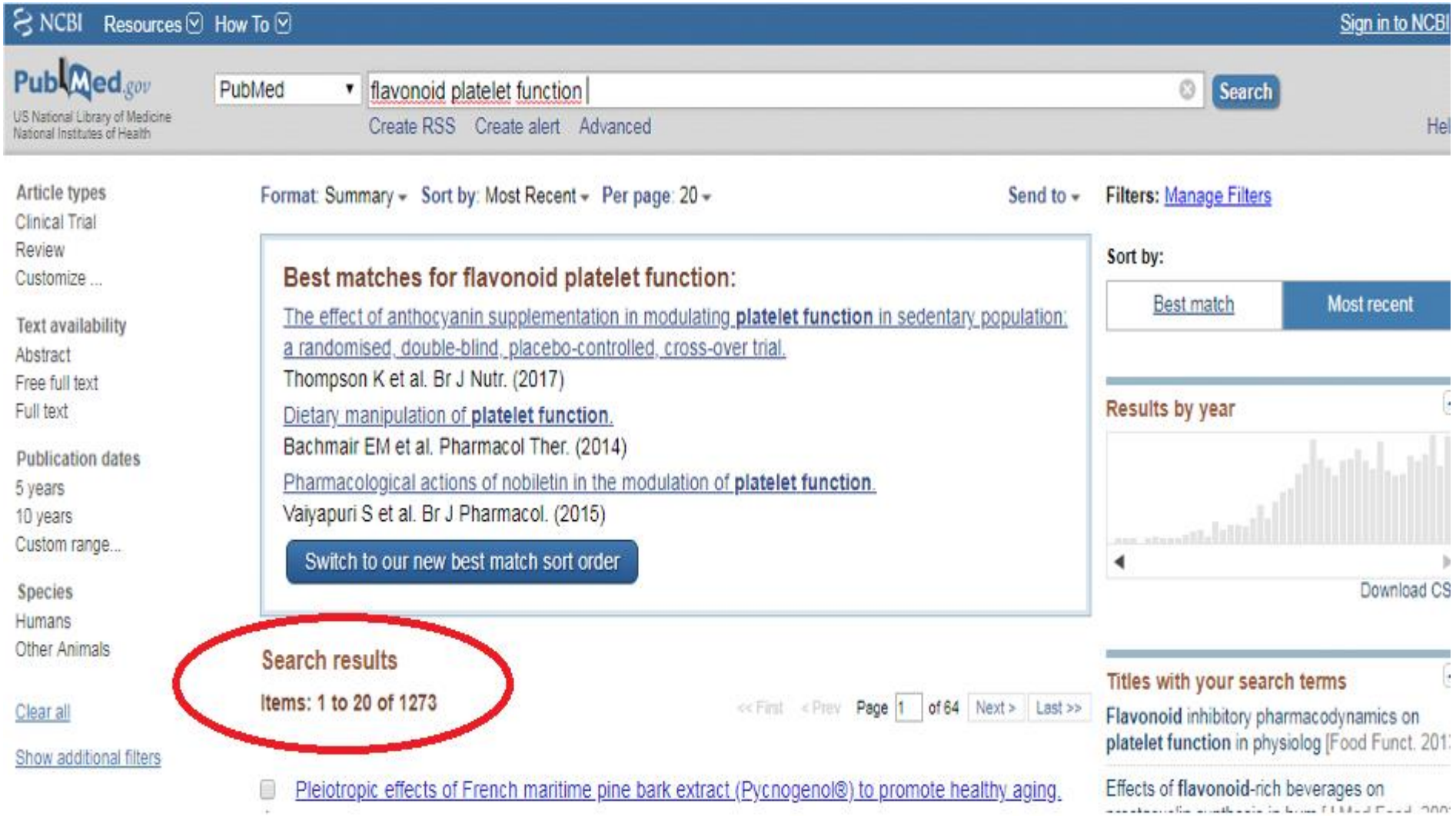


Figure 2. Schematic representation of agonist-induced platelet activation pathways and the proposed effect of Que leading to inhibition of platelet function. Que has been demonstrated to inhibit platelet function via multiple pathways, including, inhibition of multiple signalling proteins, granule exocytosis and fibrinogen binding. Effect of Que is denoted by ⊖

Effect of the Flavonol Quercetin on Human Platelet Function: A Review

Sapha Mosawy

Food and Public Health 2015, 5(1): 1-9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İpucu: Aramayı sadece Türkçe dilinde yap. Arama yapacağınız dili şu sayfada belirtebilirsiniz: Google Akademik Ayarları.

Select **flavonoids** and whole juice from purple grapes inhibit **platelet function** and enhance nitric oxide release

[PDF] semanticscholar.org
Free from Publisher

JE Freedman, C Parker Iii, L Li, JA Perlman, B Frei... - Circulation, 2001 - Am Heart Assoc

Background—Moderate red wine consumption is inversely associated with coronary ischemia, and both red wine and purple grape juice (PGJ) contain **flavonoids** with antioxidant and antiplatelet properties believed to be protective against cardiovascular ...

☆ 99 Alıntılanma sayısı: 553 İlgili makaleler 10 sürümün hepsi

The **flavonoids** quercetin and catechin synergistically inhibit **platelet function** by antagonizing the intracellular production of hydrogen peroxide

[PDF] semanticscholar.org

P Pignatelli, FM Pulcinelli, A Celestini... - ... American journal of ..., 2000 - academic.oup.com

Background: Epidemiologic studies have shown an inverse relation between moderate consumption of red wine and cardiovascular disease. Studies have shown that red wine and its component **flavonoids** inhibit in vivo **platelet** activation, but the underlying mechanism has ...

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Polyphenols and cardiovascular disease: effects on endothelial and **platelet function**

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JA Vita - The American journal of clinical nutrition, 2005 - academic.oup.com

... of polyphenolic **flavonoids** and reduced risk of cardiovascular disease. The remainder of the review focuses on possible mechanisms for this beneficial effect, including improved endothelial **function** and reduced **platelet** aggregation. EPIDEMIOLOGIC STUDIES OF **FLAVONOID** ...

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Modification of **platelet function** and arachidonic acid metabolism by bioflavonoids: structure-activity relations

R Landolfi, RL Mower, M Steiner - Biochemical pharmacology, 1984 - Elsevier

... both quercetin and myricetin, while inhibiting lipoxygenase, failed to enhance **platelet** aggregation ... Our results show that a large number of **flavonoids** possess antiaggregating activity ... 1. TA Geissman, The Chemistry of **Flavonoid** Compounds, p. 1. Macmillan, New York (1962) ...

☆ 99 Alıntılanma sayısı: 403 İlgili makaleler 6 sürümün hepsi

Turunçgiller - Narenciye

Citrus

C. aurantifolia, C. aurantium, C. deliciosa, C. grandis, C. jambhiri, C. karna, C. latifolia, C. limetta, C. limettioides, C. limon, C. limonia, C. lycopersicaeformis, C. macroptera, C. maderaspatana, C. madurensis, C. medica, C. megaloxycarpa, C. nobilis, C. paradisi, C.paratangerina, C. pennivesiculata, C. pseudolimon, C. reshni, C. reticulata, C. rugulosa, C. sinensis, C. unshiu

Bleeding time and thrombin time was significantly prolonged and there was increase in protein C and thrombin antithrombin complex levels. These results may be due to inactivation of thrombin because it significantly decreases fibrinogen concentration and inhibit platelet aggregation.

In vitro/in vivo effect of *Citrus limon* (L. Burm. f.) juice on blood parameters, coagulation and anticoagulation factors in rabbits

Azra Riaz, Rafeeq Alam Khan, Talat Mirza, Tazeen Mustansir and Mansoor Ahmed

Pak. J. Pharm. Sci., Vol.27, No.4, July 2014, pp.907-915

Table 1: *In vitro* comparison of *Citrus limon*, heparin and control on coagulation parameters

Parameters	Groups		
	Water for injection	*Citrus limon*	Heparin sodium
Thrombin time (Sec)	5.8±0.2	422.2±49.4**	600.0±0.0**
Prothrombin time (Sec)	8.4±0.2	5.3±0.1	600±0.01**
Activated partial thromboplastin time (Sec)	193.0±29.8	509.7±35.5**	569.9±20.7**
Fibrinogen concentration (mg/dl)	102.03±18.18	11.26±2.05**	7.21±2.51**

n=10, Values are means ± S.E.M., **p<0.005 highly significant as compared to control

Table 2: *In vivo* effect of *Citrus limon* juice and warfarin on coagulation parameters

Parameters (Sec)	30 DAY				60 DAY				
	Control	LCLD	MCLD	HCLD	Control	LCLD	MCLD	HCLD	Warfarin
BT	99.60 ±5.35	103.8 ±5.25	152.9± 8.77**	107.7 ±5.54	101.66 ±5.8	128.10 ±10.3*	168.50± 8.32**	109.8± 5.28	133.9± 12.7*
TT	9.36± 0.92	9.2± 0.13	12.4± 0.59**	8.8± 0.08	9.41± 1.02	9.21± 0.41	12.86± 0.54**	9.17± 0.09	16.58± 1.74**
PT	5.2± 0.12	5.12± 0.02	6.34± 0.73	5.84± 0.04	5.32± 0.12	5.22± 0.02	6.73± 0.89	6.57± 0.14	13.59± 1.73**
Aptt	8.25± 0.62	12.52± 2.08	12.1± 1.55	8.67± 0.11	8.33± 0.61	12.51 ±1.82	12.22± 1.30	9.13± 0.07	15.73± 1.77**
Fb(mg/dl)	439.47 ±43.70	412.17 ±28.71	333.11± 29.55*	380.23± 32.62	437.50± 43.14	407.08 ±28.65	336.33± 26.48*	339.58± 24.35*	315.40± 25.54*

n=10, Values are means ± S.E.M

*P ≤0.05 significantly different as compared to control, **P ≤0.005 highly significant as compared to control

LCLD: Low *Citrus limon* dose 0.2ml/kg/day; MCLD: Moderate *Citrus limon* dose 0.4ml/kg/day; HCLD: High *Citrus limon* dose

Thus present results show that grape fruit juice can act as an effective anticoagulant as it keeps the balance shifted towards anti-coagulant mechanisms.

Anticoagulant, Antiplatelet and Antianemic Effects of *Citrus paradisi* (Grape Fruit) Juice in Rabbits

Neelam Mallick, Rafeeq Alam Khan, Azra Riaz, Syeda Afroz

Pharmacology & Pharmacy, 2016, 7, 397-406