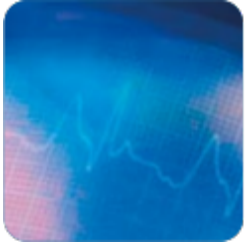


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# I. 应用

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## II. 作用机制

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Biol Pharm Bull 23: 735-737, 2000
- Ref. 063** 碧容健®显示出抗活性氧族的自由基清除活性。它能够抑制促炎介质的产生，因而确认了碧容健®的抗炎性和免疫调制特性。  
Cho K-J, Yun C-H, Yoon D-Y, Cho Y-S, Rimbach G, Packer L, Chung A-S  
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Toxicol Appl Pharmacol 168: 64-71, 2000
- Ref. 062** 碧容健®阻滞细胞蛋白氧化修饰的功效比其他抗氧化剂强。  
Kim J, Chehade J, Pinnas JL, Mooradian AD  
Effect of select antioxidants on malondialdehyde modification of proteins.  
Nutrition 16: 1079- 1081, 2000
- Ref. 052** 碧容健®可改善衰老过程常见症状中的学习记忆障碍和记忆缺失。  
Liu F, Zhang Y, Lau BHS  
Pycnogenol® improves learning impairment and memory deficit in senescence-accelerated mice.  
J Anti Aging Med 2: 349-355, 1999
- Ref. 051** 在一项比较研究中，碧容健®表现出比维生素C和E、硫辛酸、辅酶Q10和葡萄籽更高校的抗氧化活性。结合碧容健®可增强辅酶Q10等其他抗氧化剂的抗氧化作用。  
Chida M, Suzuki K, Nakanishi-Ueda T, Ueda T, Yasuhara H, Koide R, Armstrong D  
In vitro testing of antioxidants and biochemical endpoints in bovine retinal tissue.  
Ophthalmic Res 31: 407-415, 1999
- Ref. 033** 鉴于相应自由基的相对稳定性和维生素C和E等同系物诱导的再生性，碧容健®是一种高效的抗氧化剂。  
Guo Q, Zhao B, Packer L  
Electron spin resonance study of free radicals formed from a procyanidin-rich pine (Pinus maritime) bark extract, Pycnogenol®.  
J Free Radic Biol Med 27: 1308- 1312, 1999
- Ref. 030** 碧容健®可预防维生素C被氧化和被循环氧化的功效高于其他黄酮类药物。  
Cossins E, Lee R, Packer L  
ESR studies of vitamin C regeneration, order of reactivity of natural source phytochemical preparations.  
Biochem Mol Biol Int 45: 583-597, 1998
- Ref. 029** 碧容健®可减缓因免疫细胞和血液细胞生成系统活动下降而引起的衰老，使它们恢复正常功能。  
Liu FJ, Zhang YX, Lau BHS  
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- Ref. 026** 碧容健®能够保护内皮细胞中的α-生育酚。  
Virgili F, Kim D, Packer L  
Procyanidins extracted from pine bark protect α-tocopherol in ECV 304 endothelial cells challenged by activated RAW 264.7 macrophages: role of nitric oxide and peroxynitrite.  
FEBS Lett 431: 315-318, 1998
- Ref. 025** 碧容健®可抑制氧化应激作用，将羟自由基诱发的DNA损害降至最低。  
Nelson AB, Lau BHS, Ide N, Rong Y  
Pycnogenol® inhibits macrophage oxidative burst, lipoprotein oxidation and hydroxyl radical-induced DNA damage.  
Drug Dev Ind Pharm 24: 139- 144, 1998
- Ref. 022** 碧容健®除自由基清除特性外，碧容健®还能调制激活炎性细胞中一氧化氮自由基的产生。  
Virgili F, Kobuchi H, Packer L  
Procyanidins extracted from Pinus maritime (Pycnogenol®): scavengers of free radical species and modulators of nitrogen monoxide metabolism in activated murine raw 264.7 macrophages.  
J Free Radic Biol Med 24: 1120- 1129, 1998

- Ref. 021** 研究显示, 在其他试验的提取物中, 碧容健®是最强的羟自由基和超氧自由基清除剂。碧容健®还具有热稳定性。  
Noda Y, Anzai K, Mori A, Kohno M, Shinmei M, Packer L  
Hydroxyl and superoxide anion radical scavenging activities of natural source antioxidants using the computerized JES-FR30 ESR spectrometer system.  
Biochem Mol Biol Int 42: 35-44, 1997
- Ref. 020** 碧容健®可促进细胞内膜动脉中抗氧化酶的合成, 使其量加倍。  
Wei ZH, Peng QL, Lau BHS  
Pycnogenol® enhances endothelial cell antioxidant defenses.  
Redox Rep 3: 219-224, 1997
- Ref. 014** 碧容健®可保护内皮细胞壁免受自由基之害。内皮细胞损伤是动脉粥样硬化的主要原因之一。  
Rong Y, Li L, Shah V, Lau BHS  
Pycnogenol® protects vascular endothelial cells from t-butyl hydroperoxide induced oxidant injury.  
Biotechnol Ther 5: 117- 126, 1995
- Ref. 010** 碧容健®可清除体外的超氧自由基, 抑制体内水肿。抗炎性与自由基清除活动密切相关。  
Blazso G, Gabor M, Sibbel R, Rohdewald P  
Anti-inflammatory and superoxide radical scavenging activities of a procyanidins containing extract from the bark of Pinus pinaster sol. and its fractions.  
Pharm Parmacol Lett 3: 217-220, 1994
- Ref. 008** 碧容健®可呈剂量依赖性保护皮肤免受紫外辐射诱导的氧化应激损伤 (脂质过氧化和细胞毒性)。  
Guochang Z  
Ultraviolet radiation-induced oxidative stress in cultured human skin fibroblasts and antioxidant protection.  
Bio Res Rep Univ Jyväskylä 33: 1-86, 1993
- Ref. 007** 碧容健®是极好的酶促羟自由基和单态氧自由基 (最危险的两种自由基) 清除剂。  
Elstner EF, Kleber E  
Radical scavenger properties of leucocyanidine.  
In: Das N.P., ed. Flavonoids in Biology & Medicine III: Current issues in Flavonoid Research: National University of Singapore Press: 227-235, 1990

## 19 内皮功能

- Ref. 553** 临床研究: 碧容健®能显著改善与新冠疫情后有关的一些迹象和症状, 改善心血管风险因素。  
Belcaro G, Cornelli U, Cesarone MR, Scipione C, Scipione V, Hu S, Feragalli B, Corsi M, Cox D, Cotellese R, Hosoi M, Burki C  
Preventive effects of Pycnogenol® on cardiovascular risk factors (including endothelial function) and microcirculation in subjects recovering from coronavirus disease 2019 (COVID- 19).  
Minerva Med. 113(2):300-8, 2022
- Ref. 499** 基于碧容健®改善内皮功能的能力, 碧容健®可减少依他普仑 (抗抑郁药) 引起的性功能障碍和男女的心率升高。  
Smetanka A, Stara V, Farsky I, Tonhajzerova I, Ondrejka I  
Pycnogenol® supplementation as an adjunct treatment for antidepressant-induced sexual dysfunction.  
Physiol Int 106(1): 59-69, 2019
- Ref. 449** 一项关于碧容健®通过改善内皮功能和抗氧化状态来缓解更年期症状的疗效的综述。  
Rohdewald P  
Relief from Menopausal Symptoms by Non-hormonal Treatment with Pycnogenol® (French Maritime Pine Bark Extract).  
J Genit Syst & Disor 5:4, 2016
- Ref. 408** 临床研究: 碧容健®可改善内皮功能。这项公开注册研究的结果表明, 对于边缘型高血压、高血糖和高脂血症受试者来说, 很可能有重要的预防性作用。  
Hu S, Belcaro G, Cornelli U, Luzzi R, Cesarone MR, Dugall M, Feragalli B, Errichi B, Ippolito E, Grossi MG, Hosoi M, Gizzi G, Trignani M  
Effects of Pycnogenol® on endothelial dysfunction in borderline hypertensive, hyperlipidemic, and hyperglycemic individuals: the borderline study.  
Int Angiol 34(1): 43-52, 2015

- Ref. 372** 人服用碧容健®后的代谢物会被红细胞、白细胞、内皮细胞和神经细胞经GLUT1转运体内化。这种组织-特异性积累代表了碧容健®主要活动模式的常见共同特性，它与炎症控制、内皮功能和认知效益相关。  
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Facilitated Uptake of a Bioactive Metabolite of Maritime Pine Bark Extract (Pycnogenol®) into Human Erythrocytes.  
PLOS ONE 8(4): 1- 10, 2013
- Ref. 371** 碧容健®作为天然混合物，与提取物成分相比，能更好地调控内皮功能障碍。  
Jankyova S, Hlavackova L, Kralova E, Slazneva J, Drobna V, Zuzik P, Drafi F, Mucaji P, Racanska E  
The Evaluation of Efficacy of Pycnogenol® Fractions on Endothelial Dysfunction.  
Acta Fac Pharm Univ Comen LX(1): 7- 14, 2013
- Ref. 353** 人摄入碧容健®后形成的代谢物可积累于免疫细胞（白细胞）内，调制炎症过程。  
Uhlenhut K, Högger P  
Facilitated cellular uptake and suppression of inducible nitric oxide synthase by a metabolite of maritime pine bark extract (Pycnogenol®).  
Free Radic Biol Med, 53: 305-313, 2012
- Ref. 349** 临床研究：心脏药物之外再服用碧容健®能显著增强心脏病患者的血管内皮功能。  
Enseleit F, Sudano I, Périat D, Winnik S, Wolfrum M, Flammer AJ, Fröhlich GM, Kaiser P, Hirt A, Haile SR, Krasniqi N, Matter CM, Uhlenhut K, Högger P, Neidhart M, Lüscher TF, Ruschitzka F, Noll G  
Effects of Pycnogenol® on endothelial function in patients with stable coronary artery disease: a double-blind, randomized, placebo-controlled, cross-over study.  
Eur Heart J 33(13): 1589-97, 2012
- Ref. 237** 临床研究：糖尿病和高血压药物之外再服用碧容健®可进一步显著改善患者的血糖和心血管风险因子，允许大多数患者减少抗高血压药物的服用。  
Zibadi S, Rohdewald P, Park D, Watson RR  
Reduction of cardiovascular risk factors in subjects with Type 2 Diabetes by Pycnogenol® supplementation.  
Nutr Res 28: 315-320, 2008
- Ref. 230** 临床研究：碧容健®摄入可使年轻健康男性的血管舒张增加42%，从而保证为肌肉活动提供充足的血液和氧供应。  
Nishioka K, Hidaka T, Nakamura S, Umemura T, Jitsuiki D, Soga J, Goto C, Chayama K, Yoshizumi M, Higashi Y  
Pycnogenol®, French Maritime Pine Bark Extract, augments endothelium-dependent vasodilation in humans.  
Hypertens Res 30: 775-780, 2007
- Ref. 117** 临床研究：作为高血压药物和硝苯地平的辅助药物，碧容健®可改善血管内皮功能，允许减少药物剂量。  
Liu X, Wei J, Tan F, Zhou S, Würthwein G, Rohdewald P  
Pycnogenol® French maritime pine bark extract, improves endothelial function of hypertensive patients.  
Life Sci 74: 855-862, 2004
- Ref. 109** 临床研究：在一项剂量探索研究中，碧容健®能够降低II型糖尿病患者的血糖水平，改善患者的内皮功能。  
Liu X, Zhou H-J, Rohdewald P  
French maritime pine bark extract Pycnogenol® dose-dependently lowers glucose in type II diabetic patients.  
Diabetes Care 27: 839, 2004
- Ref. 069** 碧容健®会显著减少β-淀粉样蛋白引起的血管损伤。β-淀粉样变性是阿尔茨海默病（AD）的神经病理学标志之一，这表明碧容健®具有能够降低阿尔茨海默病风险的作用。  
Liu F, Lau BHS, Peng Q, Shah V  
Pycnogenol® protects vascular endothelial cells from β-amyloid-induced injury.  
Biol Pharm Bull 23: 735-737, 2000
- Ref. 068** 碧容健®可抑制组织白细胞募集相关的数个机制，进而导致抗炎活性产生。  
Peng Q, Wei Z, Lau BHS  
Pycnogenol® inhibits tumor necrosis factor-α-induced nuclear factor kappa B activation and adhesion molecule expression in human vascular endothelial cells.  
Cell Mol Life Sci 57: 834-841, 2000
- Ref. 027** 碧容健®阻碍血管收缩。碧容健®通过一氧化氮促进血管舒张活性。  
Fitzpatrick DF, Bing B, Rohdewald P  
Endothelium-dependent vascular effects of Pycnogenol®.  
J Cardiovasc Pharmacol 32: 509-515, 1998



- Ref. 026** 碧容健®能够保护内皮细胞中的  $\alpha$ -生育酚。  
Virgili F, Kim D, Packer L  
Procyanidins extracted from pine bark protect  $\alpha$ -tocopherol in ECV 304 endothelial cells challenged by activated RAW 264.7 macrophages: role of nitric oxide and peroxynitrite.  
FEBS Lett 431: 315-318, 1998
- Ref. 020** 碧容健®可促进细胞内膜动脉中抗氧化酶的合成，使其量加倍。  
Wei ZH, Peng QL, Lau BHS  
Pycnogenol® enhances endothelial cell antioxidant defenses.  
Redox Rep 3: 219-224, 1997
- Ref. 014** 碧容健®可保护内皮细胞壁免受自由基之害。内皮细胞损伤是动脉粥样硬化的主要原因之一。  
Rong Y, Li L, Shah V, Lau BHS  
Pycnogenol® protects vascular endothelial cells from t-butyl hydroperoxide induced oxidant injury.  
Biotechnol Ther 5: 117- 126, 1995

## 20 血小板功能

- Ref. 553** 临床研究：碧容健®能显著改善与新冠疫情后有关的一些迹象和症状，改善心血管风险因素。  
Belcaro G, Comelli U, Cesarone MR, Scipione C, Scipione V, Hu S, Feragalli B, Corsi M, Cox D, Cotellesse R, Hosoi M, Burki C  
Preventive effects of Pycnogenol® on cardiovascular risk factors (including endothelial function) and microcirculation in subjects recovering from coronavirus disease 2019 (COVID- 19).  
Minerva Med. 113(2):300-8, 2022
- Ref. 528** 临床研究：碧容健®预防复发性视网膜静脉血栓的效果优于阿司匹林、噻氯匹定和舒洛地特，且无副作用。  
Belcaro G, Dugall M, Bradford HD, Cesarone MR, Feragalli B, Gizzi C, Cotellesse R, Hu S, Rodriguez P, Hosoi M.  
Recurrent retinal vein thrombosis: prevention with Aspirin, Pycnogenol®, ticlopidine, or sulodexide.  
Minerva Cardioangiol. 2019 Apr;67(2):109- 114, 2019
- Ref. 507** 临床研究：碧容健®通过降低血栓素（一种促进血小板聚集的物质）的血液水平，降低克罗恩病患者血栓栓塞发作的风险。  
Kolacek, M., Paduchova, Z., Dvorakova, M., Zitnanova, I., Ciema, I., Durackova, Z., Muchova, J.  
Effect of natural polyphenols on thromboxane levels in children with Crohn's disease.  
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- Ref. 499** 临床研究：基于碧容健®改善内皮功能的能力，碧容健®可减少依他普仑（抗抑郁药）引起的性功能障碍和男女的心率升高。  
Smetanka A, Stara V, Farsky, I, Tonhajzerova I, Ondrejka I  
Pycnogenol® supplementation as an adjunct treatment for antidepressant-induced sexual dysfunction.  
Physiol Int 106(1): 59-69, 2019
- Ref. 476** 在预防血栓后综合征和新发静脉血栓症方面，碧容健®比阿司匹林、舒洛地特和噻氯匹定更加有效。  
Belcaro G, Dugall M, Hu S, Feragalli B, Cotellesse R, Ledda A, Corsi M, Ricci A, Ippolito E, Errichi BM, Comelli U, Cesarone MR, Hosoi M  
Prevention of recurrent venous thrombosis and post-thrombotic syndrome.  
Minerva Cardioangiol 66(3): 238-245, 2018
- Ref. 469** 临床研究：碧容健®可减轻水肿，对某些血栓事件可能也有控制作用。  
Belcaro G, Comelli U, Dugall M, Hosoi M, Cotellesse R, Feragalli B  
Long-haul flights, edema, and thrombotic events: prevention with stockings and Pycnogenol® supplementation (LONFLIT Registry Study).  
Minerva Cardioangiol 66: 152- 159, 2018
- Ref. 434** 综述：与碧容健®生物活性和碧容健®用于治疗浮肿、溃疡、血栓形成、CVI 和痔疮的临床作用有关的研究总结。  
Rohdewald P  
Gerbstoffhaltiger Extrakt zur oralen und topischen Behandlung bei CVI und Hämorrhoidalleiden.  
Phlebologie 44: 334-338, 2015
- Ref. 417** 临床研究：碧容健®被证明有助于预防视网膜静脉血栓形成。  
Rodriguez P, Belcaro G, Dugall M, Hu S, Luzzi R, Ledda A, Ippolito E, Corsi M, Ricci A, Feragalli B, Comelli U, Gizzi C, Hosoi M  
Recurrence of retinal vein thrombosis with Pycnogenol® or Aspirin® supplementation: a registry study.  
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- Ref. 370** 关于静脉功能不全和血栓形成管理中碧容健®相关作用的临床前及临床研究的最新简明综合评论。  
Gulati OP  
Pycnogenol® in Chronic Venous Insufficiency and Related Venous Disorders.  
Phytother Res. 2014 Mar;28(3):348-62, 2014
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- Ref. 337** 临床研究：12个月调查期内，碧容健®能预防遭受深静脉血栓患者发生水肿及血栓复发。  
Errichi BM, Belcaro G, Hosoi M, Cesarone MR, Dugall M, Feragalli B, Bavera P, Hosoi M, Zulli C, Corsi M, Ledda A, Luzzi R, Ricci A  
Prevention of post thrombotic syndrome with Pycnogenol® in a twelve-month study.  
Panminerva Med 53: 21-27, 2011
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- Ref. 233** 相比阿司匹林，碧容健®能更有效地减少I型糖尿病药理学模型的血小板聚集，这说明它具有预防糖尿病患者形成血栓的作用。  
Nocun M, Ulicna O, Muchova J, Durackova Z, Watala C  
French maritime pine bark extract (Pycnogenol®) reduces thromboxane generation in blood from diabetic male rats.  
Biomed Pharmacother 62: 168- 172, 2007
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- Ref. 134** 临床研究：在一项涉及200位参与者的双盲、安慰剂对照试验中，碧容健®可用于预防长途航班乘客的血栓形成。  
Belcaro G, Cesarone MR, Rohdewald P, Ricci A, Ippolito E, Dugall M, Griffin M, Ruffini I, Acerbi G, Vinciguerra MG, Bavera P, Di Renzo A, Errichi BM, Cerritelli F  
Prevention of Venous Thrombosis and Thrombophlebitis in Long-Haul Flights with Pycnogenol®.  
Clin Appl Thromb Hemost 10: 373-377, 2004
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- Ref. 080** 临床研究：碧容健®可降低未服用药物的高血压患者的血压。  
Hosseini S, Lee J, Sepulveda RT, Rohdewald P, Watson RR  
A randomized, double-blind, placebo-controlled, prospective, 16 week crossover study to determine the role of Pycnogenol® in modifying blood pressure in mildly hypertensive patients.  
Nutr Res 21: 1251- 1260, 2001
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- Ref. 053** 临床研究：碧容健®可抑制吸烟诱导的血栓烷B水平的升高，从而解释了吸烟者服用碧容健®后血小板聚集减少的原因。  
Araghi-Niknam M, Hosseini S, Larson D, Rohdewald P, Watson RR  
Pine bark extract reduces platelet aggregation.  
Int Med 2: 73-77, 1999
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- Ref. 043** 临床研究：碧容健®可抑制心脏病患者的血小板聚集和粘附，改善血液微循环。  
Wang S, Tan D, Zhao Y, Gao G, Gao X, Hu L  
The effect of Pycnogenol® on the microcirculation, platelet function and ischemic myocardium in patients with coronary artery diseases.  
Eur Bull Drug Res 7: 19-25, 1999
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- Ref. 042** 碧容健®有助于通过血管舒张、抗血小板聚集、自由基清除和毛细血管封闭作用维持健康的血液循环。文中还讨论了内皮一氧化氮(NO)的作用。  
Rohdewald P  
Reducing the risk for stroke and heart infarction with Pycnogenol®.  
Eur Bull Drug Res 7: 14- 18, 1999
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- Ref. 039** 综述：评论碧容健®心血管药理学特性的重点在于血小板聚集的预防。  
Watson R  
Reduction of cardiovascular disease risk factors by French Maritime Pine Bark Extract.  
Cardiovasc Rev Rep XX: 326-329, 1999
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- Ref. 036** 临床研究：碧容健®以剂量依赖性方式抑制人体的血小板聚集。该作用会持续6天以上，与阿司匹林不同的是，它不会增加出血时间。  
Pütter M, Grotemeyer KHM, Würthwein G, Araghi-Niknam M, Watson RR, Hosseini S, Rohdewald P  
Inhibition of smoking-induced platelet aggregation by aspirin and Pycnogenol®.  
Thromb Res 95: 155- 161, 1999

## 21 增强细胞外基质

- Ref. 551** 碧容健®可以下调酪氨酸酶，减少与色素有关的介质，减少黑色素的产生，从而在体外抑制皮肤色素沉着。  
Ayres EL, Silva JDS, Eberlin S, Facchini G, Vasconcellos C, Costa A.  
In-vitro effect of pine bark extract on melanin synthesis, tyrosinase activity, production of endothelin- 1 and PPAR in cultured melanocytes exposed to Ultraviolet, Infrared, and Visible light radiation.  
J Cosmet Dermatol. 2021
- Ref. 464** 临床研究：已对碧容健®通过软骨细胞、滑液和血清而反映出来的临床疗效进行了系统研究。总体结果提示海岸松树皮提取物具有软骨保护潜能。这些结果为理解现有文献报告的碧容健®对骨关节炎患者通过症状评分而体现出来的临床疗效提供了合理基础。  
Jessberger S, Högger P, Genest F, Salter DM, Seefried L  
Cellular pharmacodynamic effects of Pycnogenol® in patients with severe osteoarthritis: a randomized controlled pilot study.  
BMC Complementary and Alternative Medicine 17: 537 DOI 10. 1186/s12906-017-2044- 1, 2017
- Ref. 430** 临床研究：本文评论了早期的碧容健®临床研究，确认了碧容健®增强皮肤弹性和增加水分的作用，强调了口服碧容健®使皮肤更加白皙的新成果，以及改善皮肤屏障功能的作用。  
Grether-Beck S, Marini A, Jaenicke T, Krutmann J  
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