

Research on The Decrease of MDA Content in Tissues by Herbal Medicine Great Burdock Achene

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Abstract. The great burdock achene, known as a kind of traditional herbal medicine, has antioxidant effects and can improve the oxidant resistance of organism. Therefore, an animal exercise models was set up to study the effects by it on motor ability of freely moving rats and defense system of free radical. The result shows that the great burdock achene can decrease the MDA (malondialdehyde) content in tissues and can lessen damage to body from lipid peroxidation mediated by oxyradical. A referential suggestion is made that the great burdock achene be applied to the diet of athletes.

Keywords: the great burdock achene, MDA (malondialdehyde), radical, athletic training, rats.

1. Introduction

Burdock is a common name of any plant of the genus *Arctium* of the family Asteraceae (aster family). The flowers, usually purple, are followed by roundish many-seeded burs. Burdock is classified in the division Magnoliophyta, class Magnoliopsida, and order Asterales, family Asteraceae. The dry seeds of great burdock (*A. lappa*) have been used medicinally in China.

2. Subject and Method in the Experiment

2.1 Subject and Method

The rats chosen in the experiment are 24 SD male rats, weight 180g-220g, two months old, raised 3 days for adaptation to the experimental environment and the abnormal ones will be taken away. The left rats will be divided into 3 stochastic groups. Comparatively quiet, Group B will be intensively trained and tested for durability, and then Group C will be trained and fed with burdock medicine. The three groups will be raised in respectively different cages. The environmental temperature will be $25.45 \pm 0.72^{\circ}\text{C}$, and humidity,

$58.92 \pm 1.77\%$, natural light illumination. Group A will be in quiet condition and free for water and food; Group B and C will be trained first for a 5-week adaptation training in the treadmill system, 5 days per week, 20 minutes per day, ratio of slope will be 0 and the increasing speed of running will be 15 m/min, 22 m/min, 27 m/min, 31 m/min, 35 m/min, respectively for each week; then a 2-week intensive endurance training, 5 days per week, 20 minutes per day, ratio of slope will be 0 and the speed of running will be 35 m/min. Make 200 ml water extract from 1000 g burdock and feed 0.5 ml to each rat 3 hours before exercises. In the 1st day of the 8th week, the rats will be weighed and then slightly anaesthesia. Take blood from eye pit for blood serums and whole blood for the amount of hemoglobin. Put them to death by breaking the spinal cord. Then, immediately take out the heart, liver, kidney brain and muscles. Wash them in iced normal saline and dry them with filter paper and reserve them in a fridge of -20°C for later use.

The statistics obtained will be processed by the soft ware SPSS12.0, noted by the form of $X \pm \text{SD}$ for univariate analysis of variance.

3. Result and Discussion

Table 1 Effects by burdock on MDA enzymatic activity of the rats (unit: nmol/mgProt)

	Group A (n=8)	Group B (n=8)	Group C (n=8)
heart	0.46±0.11	0.66±0.12 ^{△△}	0.53±0.10 ^{△△▲}
liver	1.03±0.12	1.92±0.22 ^{△△}	1.75±0.21 ^{△▲}

kidney	0.91±0.21	1.44±0.34 ^{△△}	1.21±0.42 [△]
brain	1.62±0.48	3.16±0.72 ^{△△}	2.25±0.59 ^{△▲}
quadriceps femoris muscles	1.47±0.23	3.61±0.42 ^{△△}	2.52±0.36 ^{△△▲▲}

Notes: △△ shows high salience when compared with Group A (P <0.01) △ shows salience when compared with Group A. (P<0.05) ▲▲ shows high salience when compared with Group B (P<0.01) ▲ shows salience when compared with Group B. (P<0.05)

As to the heart, MDA content of Group B is higher than that of Group A, and the difference shows high salience (P<0.01); MDA content of Group C is lower than that of Group B, and the difference shows high salience (P<0.01).

As to the liver, MDA content of Group B is higher than that of Group A, and the difference shows high salience (P<0.01); MDA content of Group C is lower than that of Group B, and the difference shows high salience (P<0.01).

As to the kidney, MDA content of Group B is higher than that of Group A, and the difference shows high salience (P<0.01); there is no obvious difference about MDA content between Group C and B ie. Group C is slightly lower than Group B.

As to the brain, MDA content of Group B is higher than that of Group A, and the difference shows high salience (P<0.01); MDA content of Group C is lower than that of Group B, and the difference shows high salience(P<0.05).

As to the quadriceps femoris muscles, MDA content of Group B is higher than that of Group A, and the difference shows high salience (P<0.01), MDA content of Group C is lower than that of Group B, and the difference shows high salience (P<0.01).

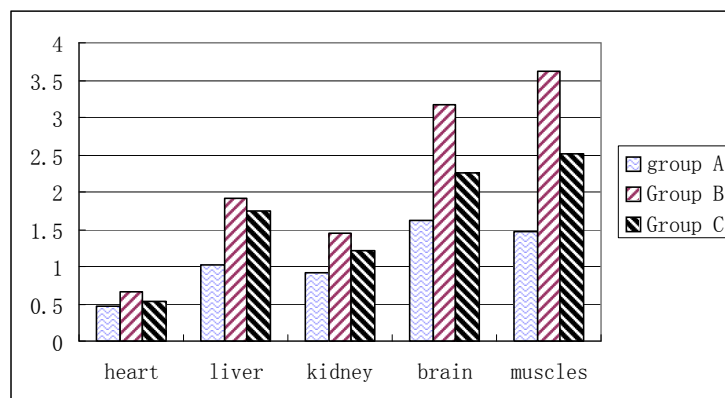


Chart 1 Changes of MDA content in different tissues of the rats

Chart 1 shows the order of the change:

Group A: brain>muscles>liver>kidney>heart

Group B: muscles>brain>liver>kidney>heart

Group C: muscles>brain>liver>kidney>heart

3.1 The effects of intensive training and endurance exercise on MDA content of different tissues of rats

The result of this experiment shows that MDA content of Group B is higher than that of Group A, and

the difference shows high salience (P<0.01). The increasing MDA in the tissues indicates the improving of radical, the worse lipid peroxidation, the balance of radical between generating and eliminating has been broken.

3.2 The effects of burdock on MDA content of different tissues of rats

The result of this experiment shows that, in the tissues of heart, liver and brain, MDA content of

Group C is lower than that of Group B, and the difference shows high salience ($P < 0.05$). This suggests that burdock can activate the SOD enzyme and decrease MDA content in the tissues of heart, liver and brain. As to the quadriceps femoris muscles, MDA content of Group C is lower than that of Group B, and the difference shows high salience ($P < 0.01$).

4. Conclusions

The great burdock achene has antioxidant effects and can improve the oxidant resistance of organism, reduce lipid peroxidation of the rats. The great burdock achene contains isoarctigenin, L-burdock phenol and other acidic materials that can be easily abstracted by ethanol. The acidic materials can easily lose H[·] and generate PHO with oxyradical. Besides this, the great burdock achene contains abundant carotene and vitamin C, which can act as absorbent of radicals. As a matter of fact, a large amount of radicals will be generated in intensive endurance exercises. So, it is significant both in theory and practice to discuss the unique advantage, exploration and application of burdock in the athletic diet, for it does not contain forbidden ingredients and has no side effects.

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Design of Virtual Class Based on Modern Communication Theory

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Abstract: Based on modern communication theory point of view, for the overall planning and designing the virtual class. Dissemination of information through the virtual class elements analysis to determine the composition of the virtual class module and rationalize the system of relations between the various modules. Modern communication theory to guide the construction of the virtual class and ensures not only put ideas into practical virtual class teaching.

Keywords: virtual class; modern communication theory; virtual studio

基于现代传播理论的虚拟课堂的设计

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【摘要】基于现代传播学的理论观点,进行虚拟课堂的总体规划设计。通过对虚拟课堂信息传播要素的分析,确定虚拟课堂的组成模块并理顺各模块的系统关系。用现代传播学的理论指导虚拟课堂的建设既理清了思路又保证虚拟课堂的教学实用性。

【关键词】: 虚拟课堂; 现代传播理论; 虚拟演播室

1 引言

虚拟课堂是指利用计算机、网络、多媒体等技术,构建一个虚拟的教学环境,用来模拟真实的教室,使在实际教室中的教学活动顺利自然地在虚拟教室中实现。充分结合传统教育与目前网络教学的优点,虚拟课堂在师生分离状态下实现高质量的虚拟面对面环境与学习者自主学习环境的结合^[1]。虚拟课堂的开发与应用有着广泛的应用,不光学校教育有着极大需求,社会教育的师生分离特点决定了此项技术有着更好的应用范围。

教学行为在某种意义上是一个特殊的传播行为,笔者试引入现代传播学的分析方法,进行虚拟课堂的总体规划设计。通过对虚拟课堂信息传播要素的分析,确定虚拟课堂的组成模块并理顺各模块的系统关系。对虚拟课堂系统进行总体上的规划,用现代传播学的

分析办法把虚拟课堂众多问题归为信源——传输——信宿三个大部分,同时也考虑到信源编码、信宿解码、信道干扰等一系列问题。

2 虚拟课堂的开发背景

网络技术与多媒体技术的快速发展,使得在网络上实现视频、声音、图像等多媒体数据传输成为现实。现代远程教育是网络通信技术、计算机技术和多媒体技术相结合的新型教育技术。解决了学习者不受时间、空间的限制,随时随地进行学习,学生能够以自己的方式在家中求学,教师与学生之间可以通过电子通讯等方式讨论研究问题^[2]。然而,从目前的远程网络教育实践情况来看,社会对这种教学模式的认可程度有限,甚至在一定范围与程度上持怀疑态度。究其原因,是目前网络教学平台不够完善,尤其是长期师生分离状态下的学生面对面的教学活动的需求得不到满

足,从而对学习者的学习效果和情绪产生负面影响。

与此同时,虚拟演播室技术的成熟、成本的降低使其应用范围越来越大。它在教育领域的应用,一方面能丰富教学内容,另一方面也给教学方式带来了创新。当代教育已经进入了数字化、智能化、个性化的发展阶段^[2]。基于多媒体网络学习平台的开放性、自主性、实践性和探究性的学习方式已是大势所趋。在这种背景下,国内外的教育研究都不约而同地把目光投向虚拟课堂的研究与设计。

3 现代传播理论

教育教学活动是一种特别的传播活动,是教学者与学习者之间的信息交流互动活动。现代传播理论主要体现在传播模式之中,本文在研究中重视香农-韦弗传播理论和贝罗“SMCR”传播理论。

3.1 香农-韦弗传播理论

在早期的传播理论研究中,传播是单向的,接受者只是被动地接收信息。香农(Claude Shannon)和韦弗(Warren Weaver)认为,接受者即信宿不仅接受信息、解释信息,还对传播信息做出反应,传播是一种双向互动过程,借助反馈手段使传播过程能够不断循环。尽管以后人们又开发了很多传播模式,但香农-韦弗传播模式让我们能确定并分析传播过程的各个重要阶段和要素,今天依然非常值得研究^[3]。

3.2 贝罗“SMCR”传播理论

贝罗“SMCR”传播模式是香农-韦弗传播模式在社会学方面的一个发展,它把传播过程各要素的特征表达的很明确。贝罗(David.K.Berlo)认为,传播过程包括四个基本的要素:信源、信息、通道和信宿^[4]。传播最终的效果,不是由其中的任何一个要素所决定,而是四个要素及关系共同决定的。现代学习理论揭示了人类学习内在的规律,现代传播理论则揭示出教学活动中各个要素及其相互关系。

4 虚拟课堂整体设计

虚拟演播室和远程教育系统结合起来研究虚拟课堂有很重要的现实意义。两者的结合将极大提高目前远程网络教学平台的信息源的丰富程度和质量。虚拟课堂的整体设计如图1:

虚拟演播室系统在教学中的应用,从根本上改善了传统演播室录制课程的局限性。解决了传统演播室造价昂贵、录制的课程缺乏真实感、教学模式枯燥乏

味等问题。教学类视频节目在制作上的许多难点,如抽象的科学原理以及宏观世界与微观世界等,都非常适合采用动画模拟等虚拟现实的手法来表现,而虚拟演播室技术本身就是以图形工作站为基础的,在表现虚拟现实上有先天的优势。这样才能学得主动,发挥想象力和独创性,更适合学生理解记忆。虚拟演播室由计算机产生的丰富电子背景,创设了一个人性化的学习环境,使参与远程教育的学生能够在自然、亲切的气氛中进行学习,以达到激发学生学习兴趣和理解记忆的目的,弥补远程教学条件的不足。

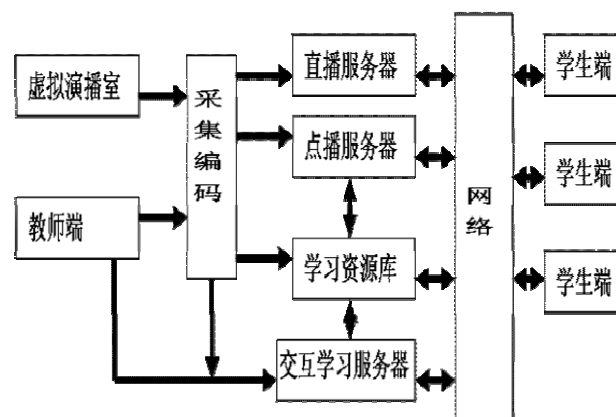


Figure 1. virtual class overall design
图1 虚拟课堂整体设计

学习者平台作为信息传输的信宿端必需具备较完善的功能,以实现多种信息形式的良好接受,尤其是较好地接收音视频信息。

5 虚拟课堂信源端模块设计

虚拟课堂教学系统中,教师端平台与虚拟演播室系统是信源端最主要的部分,也是虚拟课堂实现其它主要功能的基础。如何将教师端平台与虚拟演播室系统合理、有效的整合是目前远程教育平台必需深入研究的课题。虚拟演播室的优势是显而易见的,电脑生成的演员与背景之间的融合简直可以以假乱真。虚拟演播室软件来生成实际不存在的场景,并可以在瞬间改变场景,制作出真实演播室无法实现的效果。因此可创作出更丰富、更吸引人的节目,获得了更大的创作的想象空间,能够以低廉的成本产生新奇的视觉效果。本文结合目前远程教育平台的现状与教育机构或学校可实现的虚拟演播室系统试将信源端模块主体部分设计为由教师端与虚拟演播室系统整合完成,在逻辑上可划分为6个模块,如图2,各模块的功能如下:

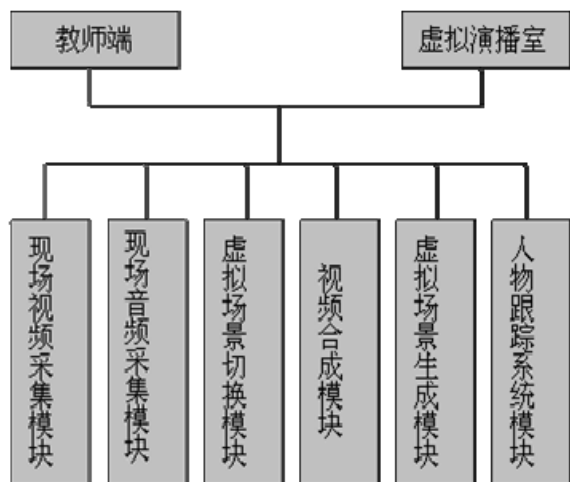


Figure2 . the module of information source side
图2 信源端的模块组成

(1) 现场视频采集模块：完成现场视频信息的采集任务，并根据现场环境与要求调节视频采集的各项参数，最终将采集到的视频信息传送到视频合成模块。

(2) 现场音频采集模块：实现现场音频信息的采集，并根据现场环境与要求调节音频采集的各项参数，最终将采集到的音频信息传送给音视频流合成端。

(3) 虚拟场景生成模块：完成虚拟场景的生成。虚拟演播室场景是由计算机生成的图形，包括二维和三维的。摄像机的位置参数等信息传送给虚拟场景生成模块后，模块随之生成与现场视频信息匹配的虚拟场景。虚拟场景生成模块生成的虚拟场景输出到虚拟场景切换模块以备选用。

(4) 虚拟场景切换模块：实现不同的虚拟场景之间的切换。虚拟场景切换模块从虚拟场景生成模块生成的虚拟场景中选择合适的场景并将之传送给视频合成模块。

(5) 视频合成模块：视频合成技术的基本技术是“抠像”技术，摄像机拍摄的现场视频信息通过“抠像”处理，与计算机生成的虚拟场景合成一个画面。

(6) 人物跟踪系统模块：主要是保证视频信息前景与计算机生成背景的“联动”，实现现场视频信息与虚拟场景的匹配。

6 虚拟课堂网络直播部分框架设计

6.1 网络直播是虚拟课堂的必备功能

虚拟课堂的开发不仅是基于虚拟演播室技术获得更丰富、更精彩的教与学的资源，还在于实现不同需

求的远程教学。目前的大多数远程教育活动中，一个教师对多个学生的模式较为多见。在个别化教学被重视的今天，一个教师讲多个学生听的依然是主流教学模式。虚拟课堂的教学实践中，老师和学生可能分布在较广泛的区域，也有可能是在一个局域网内。通过网络的连接，将教师的讲课内容与过程高质量传输给不同的学习者，实现较好的教学效果^[5]。虚拟课堂教学系统中，较困难的是实现多媒体信息的实时发送，实时传输多媒体信息绝大多数是单点对多点的传输模式。虚拟课堂信源端实现的教学内容，通过直播服务器实时发送给学习者，直播实现了视音频的一对多传输。笔者在参阅众多有关虚拟课堂教学资料后发现高质量视音频信息实时直播依然是目前虚拟课堂教学系统的难点或者说需要进一步提升性能的部分，故本文在信息传输部分分析中主要探讨信息的直播模式。结合目前的研究成果，本文选择用组播技术实现多媒体信息的传输，以实现虚拟课堂教学系统最关键的功能。

6.2 组播技术实现网络直播

虚拟课堂网络传播中直播部分用组播技术实现了一源对多宿的传输。直播服务器接收从虚拟课堂信源端传输过来的视音频数据，由视频编码模块和音频编码模块分别对其进行数字编码。编码之后的视频和音频数据的传送协议采用RTP/RTCP协议。由于教师和学生是“一对多”的模式，所以虚拟课堂教学系统直播部分采用组播方式进行发送。网络传输直播部分的设计主要包括视频信息的采集、编码及组播传输和音频信息的采集、编码及组播传输。本文结合目前远程教育平台的现状与网络情况试将网络直播部分设计为如图3的系统组成。

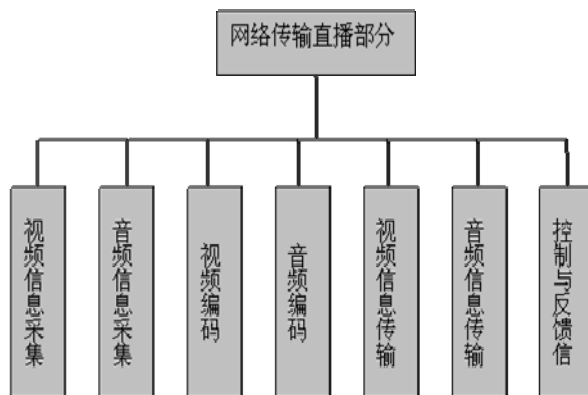


Figure3 . the design and composition of the webcast
图3 网络直播部分设计与组成

数字视频和数字音频数据通过不同的组播地址发送到组播骨干网上。视频信息采集模块在实现视频信息采集的同时，还可以实现对视频进行调节，包括色彩调节、视频大小的调节等。^[5]视频传输模块把编码之后的视频数据通过分层组播的方式发送到组播骨干网。

音频信息采集模块在实现音频信息采集的同时，还可以实现对音频信息进行调节，包括音量大小调节，音频输入端子选择等。音频信息传输模块把编码之后的音频数据通过组播的方式发送到组播骨干网上。

7 虚拟课堂信宿端模块设计

虚拟课堂信宿端即学习者接受端口，是整个虚拟课堂功能与成果的表现端口，也决定了虚拟课堂最终的意义所在。笔者按照信宿端接收信息的内容与控制关系将其划分为8个模块，如图4。各个模块的功能如下：

(1) 视频解码播放模块：当缓冲区内的视频数据包的预期播放时间达到后，取出该数据包进行解码回放。

(2) 音频解码回放模块：当缓冲区内的音频数据包的预期播放时间到达后，取出该数据包进行解码回放。

(3) 视音频同步模块：为了实现视音频的同步，音频和视频的解码回放采用同一个时钟，并以音频为主调节视频的解码回放，从而实现视音频的同步。

(4) 视频流同步模块：信源端视频数据是分层组播的，所以在信宿端就要对接收到的多个组播组的数据包进行同步处理，从而恢复它们在信源端产生时的顺序。

(5) 自适应数据流量控制模块：由于信源端的视频数据是分层编码的，视频传输模块通过不同的组播地址将其发送到组播骨干网。信源端分布在广泛区域里，他们接入网络的方式不同。自适应数据流量控制模块需要实现的功能就是在信源端发送一次视频数据的情况下，满足不同接入带宽用户的需求。

(6) 数据丢包处理模块：多媒体数据包从信源端到信宿端所经过的路径不一样，所用的时间也不一样。这样就会出现有些数据到的早，有些数据到的晚。由于虚拟课堂实时性的要求，需要丢弃迟到的数据。数据丢包处理模块就是负责判断数据包是否迟到以及如果迟到该如何丢弃该数据包，并进行相应的错误隐蔽策略来弥补由于丢弃数据包所带来的视音频短暂停顿^[5]。

(7) 缓冲区管理模块：为了解决延时抖动的问题，设计了缓冲区。由于可能有多个线程同时在使用一个缓冲区，所以需要缓冲区进行互斥操作。

(8) 延迟抖动处理模块：由于多媒体视音频数据传输经过的路径不一样，所以网络传输延迟也就不一样，采用缓冲区来解决时延抖动的问题。



Figure4 . the module of information sink side
图4 信宿端模块组成

8 结束语

随着虚拟课堂设计与技术的不断完善与成熟，实现的功能日益丰富。功能实现的交叉使得相互逻辑关系随之复杂，用传播学的视角来分析虚拟课堂的众多问题也许是一条化繁为简的捷径。虚拟课堂的很多问题从传播学角度看就是例如信源编码、信宿解码、信道干扰等一系列问题，运用传播学相对成熟的理论能够较好解决虚拟课堂复杂的模块关系。如信源编码问题不仅涉及到我们如何在虚拟演播室里完成教学内容的设计与制作，也涉及到如何用最合适多媒体编码方式将信息进行信道编码。当数据送到网络传输部分，我们必然要考虑网络拥堵、数据丢包等一系列信道干扰问题。在虚拟课堂设计中引入传播学的理念指导虚拟课堂的建设既理清了思路又保证虚拟课堂的教学实用性。

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