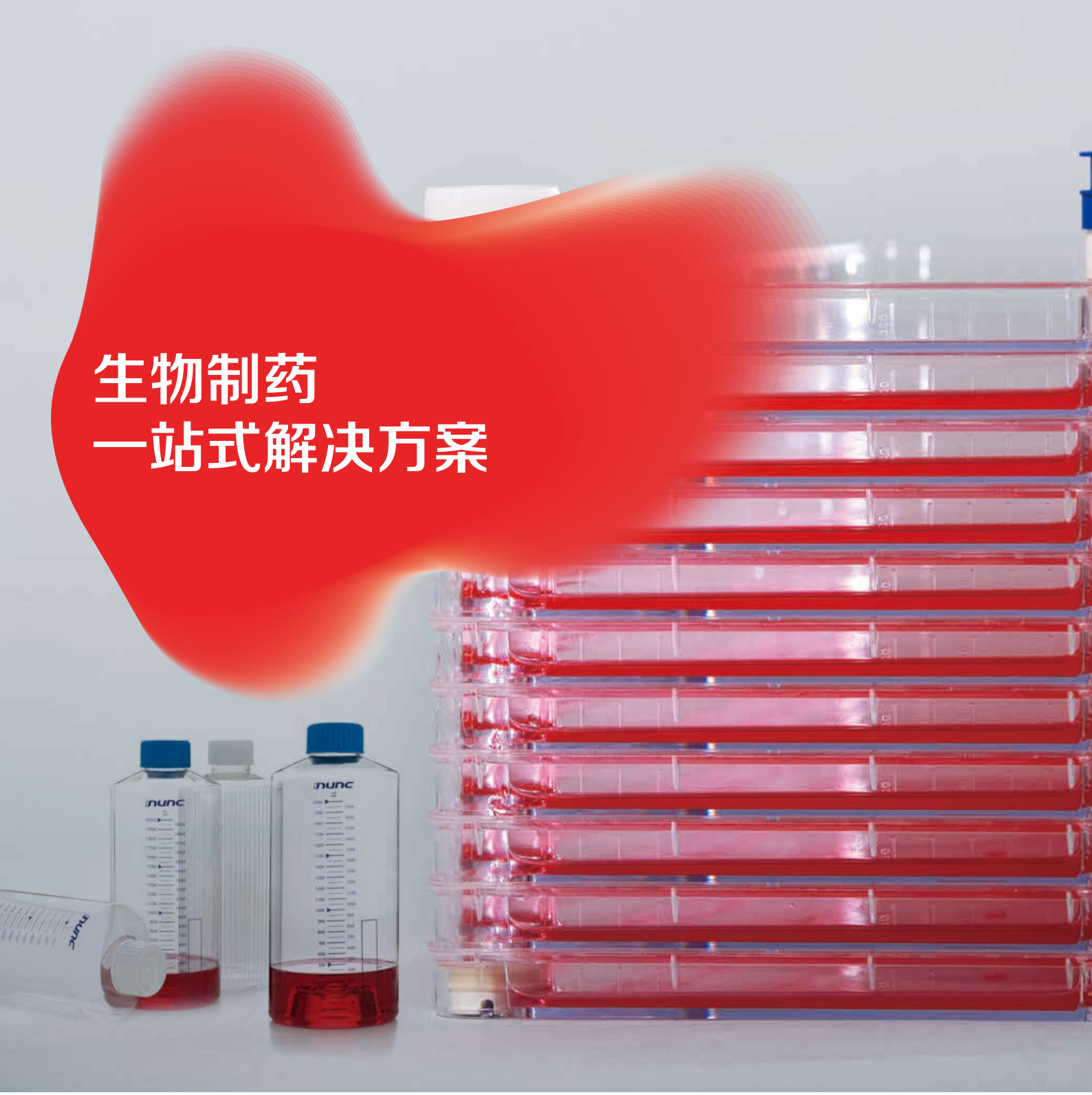

Thermo Scientific Nunc&Nalgene
大规模细胞培养系统

ThermoFisher
SCIENTIFIC

Thermo Scientific Nunc Brand产品
—— 赛默飞世尔科技的一部分

Thermo Fisher Scientific赛默飞世尔科技：服务科学，领先世界。我们的产品和服务帮助我们的客户使世界变得更健康、清洁和安全。公司的年度销售额超过90亿USD，全球3万名员工服务于超过35万名客户。这些客户来自制药、生物技术公司、医院、临床诊断实验室、大学研究机构、政府部门，以及环境和工业过程控制领域。

Nunc品牌成立于1953年，来自北欧的丹麦，和Nalgene同属赛默飞世尔科技旗下品牌。产品超过2000种，其产品线涵盖了整个生命科学领域。一直以来，致力于为世界各国的科研人员提供顶级的一次性塑料实验室器具及为生物制药行业提供细胞培养器皿等产品。其中，细胞培养系列产品，酶标系列产品，细胞工厂系列产品，以及冷冻保藏系列产品已经成为生命科学用户的首选。

Nunc产品的价值观：创新，质量，服务，合作。

Thermo Scientific™ Nunc™产品质量保证

质量贯穿于Nunc产品生产的每一个环节，从原材料的挑选到产品的加工制造，从生产到售后服务。所有的部门都把质量放在Nunc产品的核心地位。

同时，我们也感到非常自豪，Nunc产品得到了非常多用户的肯定与支持。

Nunc A/S工厂通过了ISO 9001：2000和ISO 13485：2003质量认证。这两个证书都符合美国GMP对于医疗器械生产的质量标准。

Nunc A/S工厂还通过了“环境管理系统标准”ISO 14001：2004。作为一家生产塑料制品的公司，我们愿意对生产的各个环节进行改造，为环境保护作出更多的贡献。比如减少废水排放，降低能源消耗，减少有害物质排放，推广工业废料的循环使用等等。

ThermoFisher SCIENTIFIC

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info.nnichina@thermofisher.com

大部分Nunc细胞培养器皿都由高纯度的医用级聚苯乙烯制成，同时表面经过特殊处理以满足贴壁细胞生长。所有带有NunclonΔ标志的产品都表明该产品使用细胞培养专用的聚苯乙烯材料生产，并且经过NunclonΔ表面处理。

Nunclon表面处理限制在培养区域，比如培养瓶的瓶颈、培养皿的侧面等区域是没有经过处理的，以防止细胞在非培养区域吸附并生长。

NunclonΔ聚苯乙烯表面经过单层细胞形成试验检测，使用两种不同的细胞株和一种原代细胞。

使用特选的对毒性物质非常敏感的细胞株来检测克隆效率。

用于NunclonΔ检测的细胞株如下：

PCE：原代鸡胚细胞用来检测NunclonΔ处理表面对原代细胞生长的支持。

F2002：来源于人胚肺组织，是二倍体纤维原样细胞株，用于疫苗生产。用来检测单层细胞形成。

HEL：来源于人胚肺纤原细胞，用来检测单层细胞形成。

V79-4 (ATCC CCL93)：来源于中国仓鼠肺组织，用来检测克隆效率。

L929 (ATCC CCL 1)：纤原样细胞，来源于一个克隆株。亲本L株来源于雄性C3H/An鼠的正常皮下蜂巢和脂肪组织，用来检测单层细胞形成。

原材料成功地通过了USP生物反应性等级VI测试-50，（植入7日）。Nunc通过ISO文件中的描述进行放射线照射来维持产品的无菌状态。

热原质和内毒素是一种热稳定生物混合物，有害于细胞的生长和增生扩散。由于它们不能够被放射线消灭，因而需要一个独立的测试来证明它们是否存在。

Thermo Scientific Nunc Brand产品
—— 赛默飞世尔科技的一部分

ISO 13485认证

2003年5月，纽约Rochester的Nalge Nunc International (NNI)制造工厂进一步完善了其质量体系，使其符合ISO 13485标准。升级后的质量体系取代了从1995年5月开始实施的ISO 9001体系。这一新的质量管理体系可确保我们的产品在设计、生产和销售时完全达到NNI组织承诺的标准。我们的质量管理体系还通过了“英国标准协会”的认证。长期以来，Thermo Scientific™ NALGENE™品牌产品的质量、可靠性和一致性得到了社会的公认。我们的ISO 13485认证进一步证明了我们的承诺，那就是为客户生产优质的产品。

此目录中的NALGENE产品完全符合ISO 13485：2003质量管理体系的标准。此目录中由未经ISO认证的制造商提供的器具在章节索引中以斜体字表示。

ISO 13485:2003
FM 31464

通过GMP认证

为您提供更多保证

1998年5月，纽约Rochester制造工厂以其所生产的用于食品和药品管理的一流设备（不包括设计），通过了GMP（良好生产规范）认证。精选的NALGENE产品符合21 CFR一质量体系规范的820部分。精选产品符合GMP规定，这进一步证明了我们的承诺，即为您提供恒久可靠的NALGENE品质产品。为了确保我们能够保持自身的标准，我们每年两次接受独立的第三方审计。

为制药和生物工程行业提供一流的产品和服务

赛默飞世尔科技（Thermo Fisher Scientific，纽约证交所代码TMO）是全球科学服务领域的领导者。我们致力于帮助客户使世界变得更健康、更干净、更安全。公司年销售额超过90亿美元，拥有员工3万多人，在全球范围内服务超过35万家客户。我们的客户包括：制药和生物公司，大学，科研院所和政府机构，医院和临床诊断实验室，血站，环境及工业实验室。

实验室产品集团是赛默飞世尔科技旗下的三个事业集团之一，专注于为生命科学实验室提供高品质的产品和服务。产品涵盖生物学实验所需要的样品处理和保存设备，细胞和微生物培养设备，微孔板检测仪器，分子生物学仪器，液体处理系统，细胞组学高内涵分析系统，自动化实验平台，生物安全操作平台和各种耗材。

在制药和生物工程领域，无论您是在做生物制品的研发生产还是化学药物的研发，您的实验室都需要先进、可靠的仪器设备和消耗品保证您的意图得到真实的体现。您的使命是为攻克人类的疾病寻找方案，而赛默飞世尔的使命就是为您的工作提供先进、可靠的工具。我们提供的仪器、设备、消耗品、试剂不仅种类广泛，而且均代表着行业内最高的技术水平，她们是帮助您实现目标的利器。在生物药品研发和生产领域，我们提供从细胞培养，细胞破碎，菌体和细胞收集，质粒抽提，蛋白、核酸分离和纯化，样品浓缩和干燥，到样品保存等一系列产品；在新药筛选方面，我们提供配置灵活的自动化工作站，荧光和化学放光检测仪，细胞高内涵分析系统，这些仪器代表着国际最先进的技术水平，将使您事半功倍；我们提供的生物安全设备、各种生物密封装置使您在实验中远离被病原微生物感染的风险；我们提供的消耗品让您每天的工作变得更加轻松愉快。

除了在技术方面的优势之外，赛默飞世尔提供一流的服务水平，我们在国内有强大的售前和售后技术服务队伍，专业化的物流平台，在上海有一个产品展示和技术培训中心，我们有能力并非常愿意为您提供最专业和最及时的服务。

技术支持

如果您在使用、操作或维护NALGENE NUNC品牌产品时需要技术支持，请致电我们的“技术服务中心”。我们的技术应用专家可以为您解答有关产品应用和具体规格方面的各种问题。

中国地区

电话：86-21-68654588
传真：86-21-64457830
电子邮件：info.nnichina@thermofisher.com

北美地区

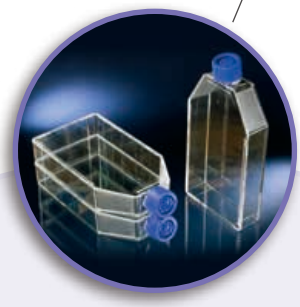
电话：1-800-625-4327
传真：1-800-625-4363（1-800-NALGENE）
电子邮件：nnitech@nalgenunc.com

其他地区

电话：+1 585-899-7198（美国）
传真：+1 585-899-7195
电子邮件：intlmktg@nalgenunc.com

线性放大

EasyFlask



Production plant design

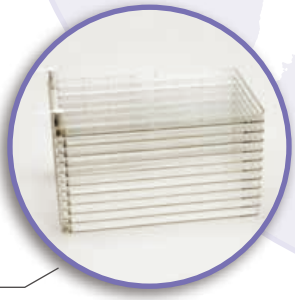
Flask

CF40

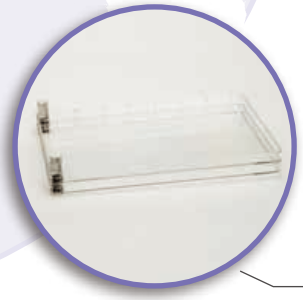
TripleFlask

The Art of
CellCulture

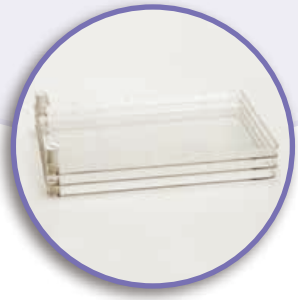
Nunc can furthermore assist in designing your production plant, advise on Pneumatic systems for EPA-TEC aut. Mantipulator and advise on peristaltic pumps, making Nunc the perferred partner through all stages of your product development and production.



CF10

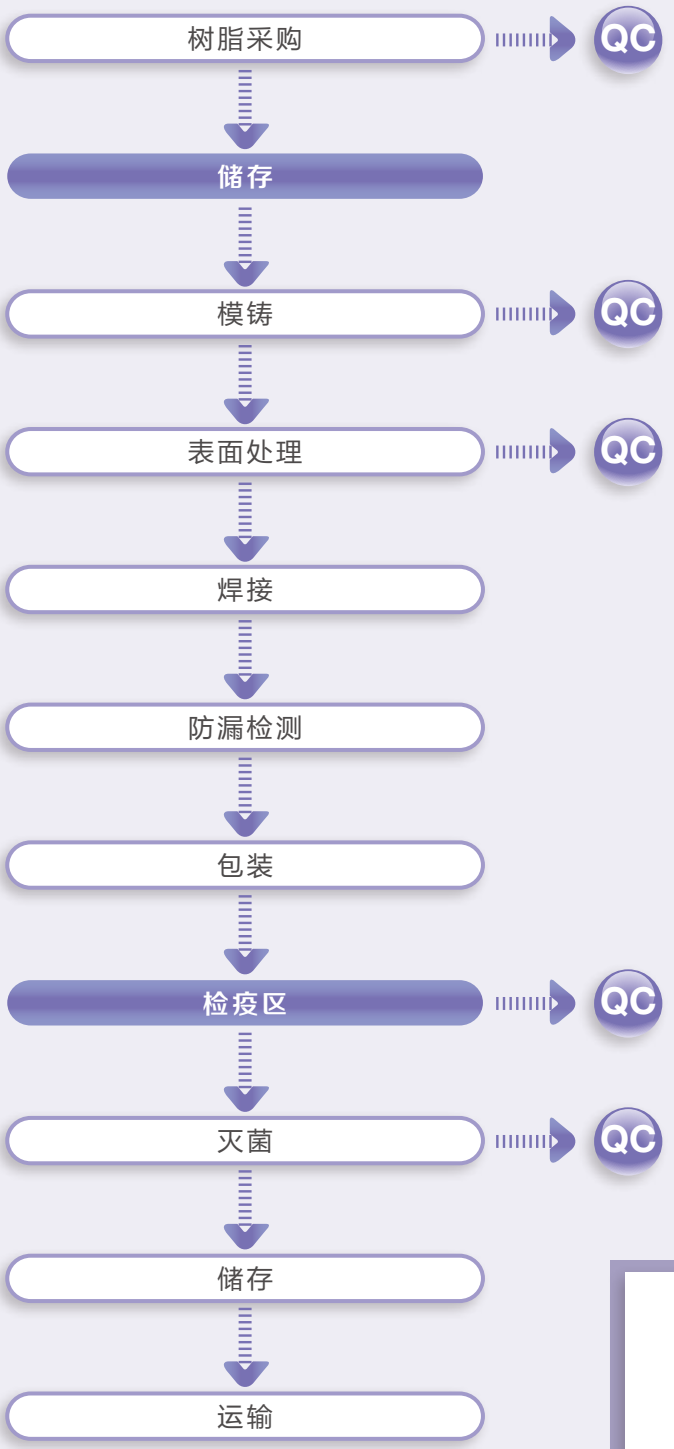


CF1



CF2

细胞工厂的质量控制——QC



HPLC检测树脂：确保批间稳定性及高质量

物理检测：产品外部尺寸符合图纸标准

物理检测：亲水性测试；表面特性

防漏检测：139mbar
平衡时间：1分钟
检测时间：120秒

灭菌程序依据ISO 11137

细胞培养验证：

- 单层细胞培养测试L929；F2002；HEL；PCE
- 细胞克隆测试——V79-4

EasYFlasks易用培养瓶

- 多种表面选择：NunclonΔ表面，PDL预包被表面或胶原蛋白I预包被表面（可以增加细胞贴壁能力，易于生长）
- 可以完全接触到整个生长表面
- 只需旋转1/3转就可开关瓶盖，符合人体工程学标准
- 可视性的“Y”标志可以确定瓶盖透气位置，即使在培养瓶堆叠在培养箱中都可轻易看见
- 培养瓶两旁刻有刻度
- 可以选用透气/密封和过滤两种型号瓶盖
- 每个包装内都附有额外的瓶盖

EasYFlasks NunclonΔ易用培养瓶

聚苯乙烯，已灭菌

目录编号	156340	156367	156472	156499	159920*	159910*	159933*	159934*
培养面积，cm^2	25	25	75	75	175	175	225	225
瓶颈类型	弯颈	弯颈	弯颈	弯颈	弯颈	弯颈	弯颈	弯颈
瓶盖	透气/密封	过滤	透气/密封	过滤	透气/密封	过滤	透气/密封	过滤
瓶盖材料	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE
建议工作容量，mL	7	7	25	25	55	55	70	70
数量 每包/箱	10/200	10/200	5/100	5/100	5/30	5/30	5/30	5/30

HDPE = 高密度聚乙烯（High Density Polyethylene）　　* 每个包装袋都印有批号和目录编号

连续透气的过滤瓶盖

瓶盖带有一个疏水性的过滤膜，保证气流通畅。

“Y”标志显示“透气”或“密封”

任何脚标处于向上的垂直状态则表示瓶盖在透气的位置。

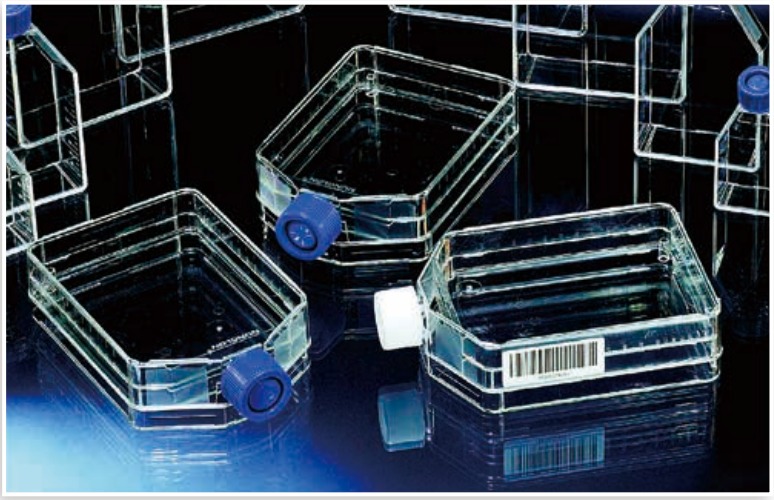
“Y”标志显示“透气”或“密封”

任何脚标处于向下的垂直状态则表示瓶盖是密封的。

三层培养瓶

Nunclon Δ表面

- 三个平行的生长表面，提供了总面积为500cm^{2}的培养面积
- 外尺寸为标准175cm^{2}的培养瓶
- 适用于生产规模放大
- 每个包装内都附有额外的瓶盖
- 通过NunclonΔ认证
- 使用长型Code 128条型码标记

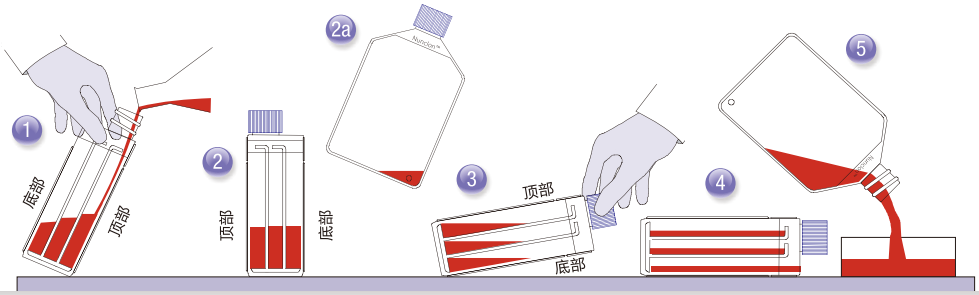


NunclonΔ三层细胞培养瓶

聚苯乙烯，已灭菌

目录编号	132867	132913	132920
条型码	-	-	+
培养面积，cm^2	500	500	500
瓶颈类型	直颈	直颈	直颈
瓶盖	透气/密封	过滤	过滤
瓶盖材料	HDPE	HDPE	HDPE
建议工作容量，mL	200	200	200
数量 每包/箱	4/32	4/32	4/32

HDPE = 高密度聚乙烯（High Density Polyethylene）



1. 预备细胞悬浮液。缓慢地将液体灌注到三层培养瓶中，避免产生泡沫或气泡。建议的工作容量为100-200mL。
2. 把培养瓶竖直放置一段时间，使瓶中各个隔层的液体达到平衡。
2a. 对于小容量液体，可以立刻沿着角落连接线倾侧培养瓶，加快液体达到平衡状态。
3. 迅速而轻缓地将培养瓶放置在培养位置。
4. 液体会均匀地分布在三个生长表面上。
5. 培养瓶可以与普通培养瓶一样倒空。如果要收获细胞，可加入10-15mL胰酶。

EasyFill细胞工厂

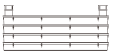
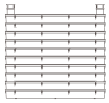
Nunclon Δ表面

- 省时省空间、用于大规模细胞培养的装置：1×10层EasyFill细胞工厂相当于36×T-175培养瓶
- 无菌无热源，即拆即用，无需其他附件
- 大口设计易于液体的快速灌注和排空
- Plug and play连接器，方便的拔插式降低污染风险

Nunc EasyFill细胞工厂Nunclon Δ表面

聚苯乙稀，已灭菌，长度335mm，宽度205mm



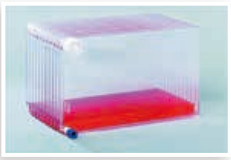



目录编号	140000	140250	140360	140400	140410	140440（可定制化）
层数	1	2	4	10	10	40
培养面积，cm^2	630	1260	2520	6300	6300	25280
建议工作容量，mL	200	400	800	2000	2000	8000
数量 每包/箱	1/6	1/6	1/4	1/2	1/6	1/2

使用指南

注意：“Nunc EasyFill细胞工厂”适用于科学研究、实验室规模生产及小/中式工业生产。大规模工业批量生产，请选择“Nunc细胞工厂”及“Nunc活性通气细胞工厂”

1. 
将培养基直接注入Nunc EasyFill细胞工厂

2. 
将细胞工厂朝有小口一侧放置，平衡液面

3. 
将细胞工厂侧向旋转90°，使进液口一面朝上，静置后培养基将会平均分配至每一层腔室

4. 
双手小心握住进液口一侧，将细胞工厂缓缓放倒至水平位。请勿抓握第一层边缘，以免造成损坏

5. 
孵育培养

6. 
拧松并移除过滤盖。将培养基直接倒入收集容器

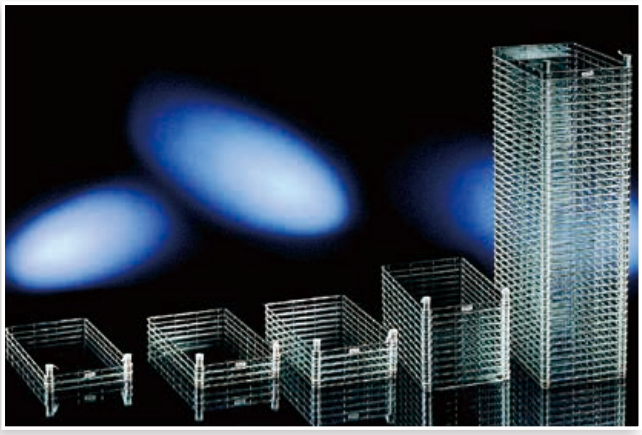
附件

目录号	说明	材料	伽马射线照射	细胞工厂兼容性	每包/盒单位
140065	Nunc EasyFill细胞工厂通用型适配器	HDPE	是	EasyFill	1/12
140085	Nunc EasyFill细胞工厂¼" (6.350mm)突起盖	HDPE	是	EasyFill	1/12
140086	Nunc EasyFill细胞工厂3/8" (9.525mm)突起盖	HDPE	是	EasyFill	1/12
140067	1.0µm过滤器组件，Nunc EasyFill细胞工厂突起盖	HDPE	是	EasyFill	1/2
140080	0.22µm过滤器组件，Nunc EasyFill细胞工厂突起盖	HDPE	是	EasyFill	1/2
140120	填充软管套件，细胞工厂接头带MPC连接头	白金硅胶软管/PC接头	是	全部	1/2

细胞工厂

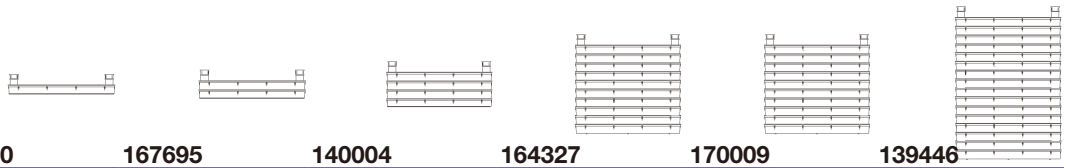
Nunclon Δ表面

- 用于工业批量生产，如疫苗，单克隆抗体或者制药工业
- 适合粘壁细胞
- 也能用于悬浮培养
- 生长运动参数与实验及培养完全相同
- 可以方便地按比例扩增，可以选择1、2、4、10和40层
- 受污染风险低
- 结构紧密
- 通过NunclonΔ认证的表面处理确保了细胞粘附和生长的最佳条件



Nunc细胞工厂

聚苯乙烯（Polystyrene），已灭菌，长度335mm，宽度205mm

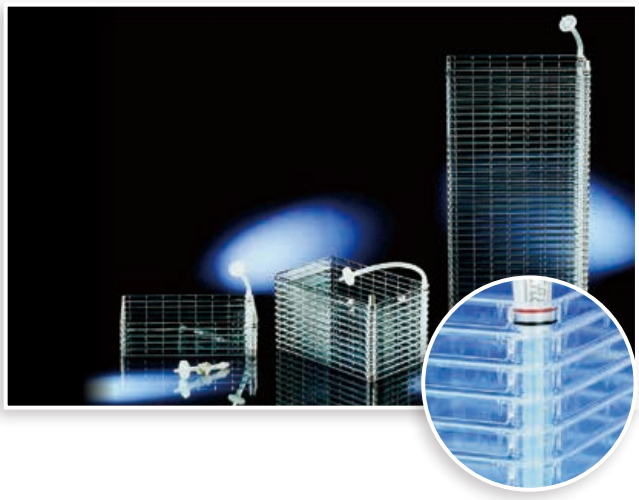


目录编号	165250	167695	140004	164327	170009	139446
层数	1	2	4	10	10	40
培养面积，cm^2	632	1264	2528	6320	6320	25280
建议工作容量，mL	200	400	800	2000	2000	8000
数量 每包/箱	1/8	1/6	1/10	1/2	1/6	1/2

活性气细胞工厂(AGCF)

Nunclon Δ表面

- 我们专利设计的气流系统，可确保用户特定混合气体有效地通过预装的滤器，泵入培养盘中；培养盘从而获得均一分布的受调控的气体成分
- 气体在每一层培养盘内及不同培养盘间均获得均匀分布
- 在培养和护理细胞的过程中，特别针对那些需氧细胞和pH敏感细胞，一个受调控的、均匀分布的气体培养环境是非常有益的
- 对大多数细胞而言，均获得更高的生长率和更高的产出



Nunc活性通气细胞工厂

长度335mm，宽度205mm

目录编号	173239	173238	173240
层数	4	10	40
培养面积，cm^2	2528	6320	25280
建议工作容量，mL	800	2000	8000
数量 每包/箱	1/10	1/6	1/2

细胞工厂
附件

用于培养基灌注和排放的细胞工厂附件

连接器，过滤器和封盖

目录编号	173248	173208	179553	173249	167525	170615	167649	140099
描述	带连接器的Gelman过滤器	带连接器和隔膜的通气过滤器	Gelman过滤器	0.2µ带连接器的空气过滤器	可滤接口盖	封盖	白色透气螺旋盖	PC连接器（长）
已灭菌	+	+	+	+	+	+	+	-
数量 每包/箱	1/2	1/2	1/10	1/2	1/20	2/40	2/800	10/10

Start-up Kit

已灭菌

目录编号	170769
描述	Starter-up kit：PC连接器，通气过滤器，白色可滤接口盖，封盖，软管夹和硅胶软管

Nunc细胞工厂

操作指南图示

1

撕去接口盖上的封膜

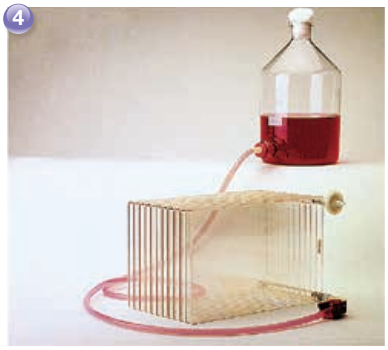
2

插入通气过滤器

3

连接到培养基容器

4

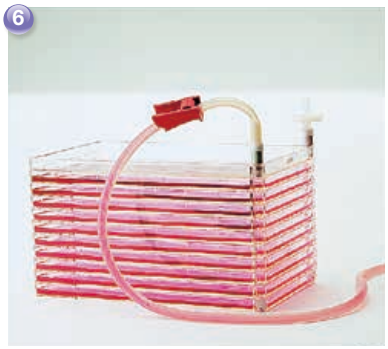


竖立放置，装有过滤器的一端朝上，使培养基均匀分配

5

翻转90°

6



翻转至水平位置

7

将连接器换成封盖，孵育培养

8

倒空培养液

参考文献：Cell Factory Instructions www.nuncbrand.com/go/cfinstructions

细胞工厂全自动操作系统

ACFM

ACFM是一个电动控制的系统，可以自动灌注和清空4 × 3Nunc细胞工厂10（164327、170009、173238和140400）或4 × 1细胞工厂40（139446和173240）中的培养液或细胞悬液。

Nunc细胞工厂全自动操作系统

目录编号	120288
描述	细胞工厂自动操作系统
材料	不锈钢
适用于细胞工厂10	164327，170009，173238，140400
适用于细胞工厂40	139446，173240
规格	宽度1195mm，深度1660mm，高度1405mm，重量空载1050kg
地面承重要求	1500kg
电源要求	三相380V 50Hz 16A
压缩空气	6bar

Nunc CO_2培养箱

Nunc培养箱

温度高达60°C

目录编号	120300
材料	不锈钢
适用于细胞工厂10	Cat.Nos.164327，170009，173238
适用于细胞工厂40	Cat.Nos.139446，173240
规格	宽度1860mm，深度1155mm，高度1485mm，重量600kg
电源要求	单相220V 50/60Hz 10A/16A
温度	环境温度+7°C~50°C
CO_2	普通值，达20%

- 带加热窗和加热套的门
- 自动CO_2控制
- 自动温度控制
- 内置风扇改善空气循环
- 具有自动警报功能
- 可培养4 × 4个CF40或4 × 12个CF10

细胞工厂手动操作器

- Nunc手动操作装置设计用于手动处理生长面积为6,320cm^{2}的细胞工厂10和生长面积为25,280cm^{2}的细胞工厂40
- CF40手动操作器带有轮子和脚制动器

Nunc细胞工厂手动操作器处理系统

目录编号	176953	132752
描述	CF40手动操作装置	CF10手动操作装置
材料	不锈钢	不锈钢
适用于细胞工厂	CF40 139446/173240	CF10 164327/170009/173238

Nunc细胞工厂操作振动器

- 平行振动分离细胞
- 振动通常可直接控制或由定时器预设置
- 一个支架可盛放4 × 3个CF10和4 × 1个CF40
- 振动频率可调
- 振动器可手动或定时器控制
- 用于支架中的细胞工厂10和40

Nunc细胞工厂操作振动器

目录编号	132849
材料	不锈钢
适用于细胞工厂10	164327，170009，173238
适用于细胞工厂40	139446，173240
规格	宽度590mm，长度1700mm，高度1285mm，重量650kg
电源要求	单相220V 50/60Hz 10A/16A

架子及推车

CF40架子及推车

- 可装载4个CF40配套以下设备使用：
- Nunc CO_2培养箱
- Nunc细胞工厂全自动操作系统
- Nunc细胞工厂操作振动器（需配套120289使用）
- 也可用于细胞工厂在洁净室之间的转移

CF10架子及推车

- 可装载4 × 3个CF10配套以下设备使用：
- Nunc CO_2培养箱
- Nunc细胞工厂全自动操作系统
- Nunc细胞工厂操作振动器（需配套120289使用）
- 也可用于细胞工厂在洁净室之间的转移

架子及推车

目录编号	140503	140504
材料	不锈钢	不锈钢
适用于细胞工厂	CF40 139446，173240	CF10 164327, 170009, 173238, 140400

配件

目录编号	120289
描述	Shaker架子配件

ACFM操作指南

1

系统包括：
1×ACFM；1×手推车（含支架）。

2

进液位置：
将放置在支架上的4×CF40抬起到进液位置。

3

支架上的4×CF40被放置于ACFM叉上。4个CF40通过管路系统连接成为一个可一并操作的单元，一共提供10m^{2}的培养面积。

4

进液：
细胞工厂位于进液位置。松开每个细胞工厂的安全夹，培养液灌注到每一个细胞工厂中。

5

装好培养液的细胞工厂被重新放回支架上。

6

装有培养液的细胞工厂可放入培养室。

7

液体排空：
可以进行单个或多个细胞工厂的液体排空。

8

摇动：
ACFM具有一个可调的摇摆晃动功能，便于胰酶消化细胞。

细胞培养滚瓶

Nunc In Vitro细胞培养滚瓶

- 用于工业级的疫苗、单克隆抗体或药物的生产
- 由耐用的PETG材料制成
- 为贴壁细胞提供优质的表面
- 旋盖的设计符合人体工程学，开合简便，可以减少手腕的污染，且增加产率
- 丰富的产品选择范围，培养面积从1050cm^{2}到4200cm^2
- 可选择标准型号，也可以选择专利的XPS（扩展表面）型号。XPS型号提供更大的细胞培养面积和更高的产率，而且不需增加设备或者人力
- 易读的刻度便于培养基灌注
- 每个瓶身上都印有批号，提供最大的可跟踪性

已灭菌

目录编号	1060-05	1060-20	1060-52	1060-50	1060-85	1860-22	1760-20	2160-05	2160-20	4260-22
材料	标准	标准	标准 PDL-包被	标准 PDL-包被	标准 通气	标准 加长型	XPS扩展 表面	XPS扩展 表面	XPS扩展 表面	XPS扩展 表面
尺寸	1.2X	1.2X	1.2X	1.2X	1.2X	1XL	2X	2.5X	2.5X	5X
培养面积，cm^2	1050	1050	1050	1050	1050	1800	1700	2100	2100	4200
建议工作容量，mL	100-500	100-500	100-500	100-500	100-500	200-1000	200-600	200-600	200-600	400-1000
数量 每包/箱	5/20	20/20	2/2	20/20	5/20	22/22	20/20	5/20	20/20	22/22

附件

瓶盖替换装

目录编号	3080-01
材料	48mm HDPE Quick-Action透气盖
已灭菌	+
数量 每包/箱	1/300

Nunc TufRol PS细胞培养滚瓶

已灭菌

目录编号	181702	182702	182720	182744	183302	184302	184344	183902	184902	184920	184944	141744	142720	142744
描述	标准转瓶 透气盖	标准转瓶 密闭盖	标准转瓶 密闭盖	标准转瓶 密闭盖 双层包装	标准转瓶 易旋 透气盖	标准转瓶 易旋 密闭盖	标准转瓶 易旋 密闭盖 双层包装	标准转瓶 易旋 透气盖	标准转瓶 易旋 密闭盖	标准转瓶 易旋 密闭盖	标准转瓶 易旋 密闭盖 双层包装	转瓶 褶皱表面 透气盖 双层包装	转瓶 褶皱表面 密闭盖	转瓶 褶皱表面 密闭盖 双层包装
材料	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS
培养面积 cm^2	850	850	850	850	850	850	850	850	850	850	850	1450	1450	1450
数量 每包/箱	2/20	2/20	20/20	20/20	2/20	2/20	20/20	2/20	2/20	20/20	20/20	20/20	20/20	20/20

附件

目录编号	111250	112250
描述	透气盖	易旋盖
材料	HDPE	HDPE
已灭菌	+	+
数量 每包/箱	250/500	250/500

培养转瓶

平板表面

特性	优点
采用耐用材料PETG制作	比玻璃和聚苯乙烯更坚固；为贴附细胞提供最佳的基质；多株细胞获得较聚苯乙烯表面培养更高的培养产量
极好的低温耐受性，最低至-40°C冻存	非酶法移除细胞，如：冻融法
符合人体工程学的密封	减轻手腕疲劳
提供通气性密封	在CO_2培养箱内使用时，瓶内外可达到统一的压力、气体和pH
易读刻度	
每一个瓶身均印有批号	安全追踪
1050cm^2，1.2×瓶，总体大小和标准的850cm^2瓶身相似，但细胞生长表面积比后者多20%	是适用于相同的设备，却提供更高产量的转瓶
提供1800cm^2 1×L转瓶，长度为1.2×瓶的两倍	通过减少所需转瓶的数量减少劳动和无菌操作

扩展的褶状表面

特性	优点
采用耐用材料PETG制作	比玻璃和聚苯乙烯更坚固；为贴附细胞提供最佳的基质；多株细胞获得较聚苯乙烯表面培养更高的培养产量
极好的低温耐受性，最低至-40°C冻存	非酶法移除细胞，如：冻融法
符合人体工程学的密封	减轻手腕疲劳
提供通气性密封	在CO_2培养箱内使用时，瓶内外可达到统一的压力、气体和pH
易读刻度	安全追踪
每一个瓶身均印有批号	
扩展表面的培养转瓶比相同容积的标准瓶提供最高达150%的更多培养面积	是适用于相同的设备，却提供更高产量的转瓶，通过减少所需转瓶的数量减少劳动和无菌操作
可选尺寸型号范围大	适合各种需要
扩展表面的培养转瓶具有更高的表面积：容积比	提高产量，无需增加设备
褶状区间为平板条	适用于显微镜下观测；更换培养基和收获细胞时，快速排干培养基
褶皱方向与旋转方向保持一致	减弱湍流

NALGENE瓶

NALGENE瓶——您可以完全依赖的系统

盖子为一次成型，无衬垫。与瓶子一起构成**保证防漏系统**。

密封环模制在盖子的内部。可与瓶颈的内斜面（削角）紧密结合在一起。这构成了NALGENE瓶的防漏系统。无需使用会磨损、皱折或导致污染的衬垫。

瓶子和瓶盖上的螺纹为连续直肩式半梯形螺纹，而非低质量的圆形螺纹。

NALGENE瓶颈设计与弧形肩部方形培养基瓶上有美国商标。请参阅产品分类清单。

绝大多数NALGENE瓶的瓶颈扣环为模制而成，因此其内表面非常光滑，在最大程度上减少了瓶内物质的滞留。

耐用均衡瓶壁*通常较厚，防破裂和防穿孔性能更佳。

瓶底具有易于清洁的弧形内角。稳定的底座上塑印有永久的树脂代码和容量。

* 与许多竞争品牌的塑料瓶不同的是，大多数NALGENE瓶（最大容量达4L）为注坯吹塑成型，可保证瓶颈、削角部位或成型的精确性和瓶壁厚度的一致性。注坯吹塑成型的瓶表面更光滑、底部更稳定。较低的模制压力进一步增加了产品的可靠性，从而避免了挤压形成褶皱或破裂造成的污染。

已有相关测试证实，独特的NALGENE盖/瓶系统具有良好的防漏效果。

泄漏测试瓶、细口大瓶以及其他盖子尺寸小于100mm的带盖容器，（带螺旋盖的广口瓶除外）- 带压力应用装置的标准测试盖，拧在随意选择的容器上。将容器充满水后倒置。在2 psig的压力下保持两分钟（该压力值大于产品在实际应用中需要承受的压力）。如果没有水溢出，则该容器就是防漏容器。

泄漏测试盖–在补充步骤中，将压力应用装置安装在标准测试瓶的底部。充满水后拧紧盖子，将容器倒置。按上述方式施加压力。两分钟后检查是否有水溢出。

泄漏测试瓶、细口大瓶以及其他带有大盖（100mm或120mm）的容器，和所有带螺旋盖的广口瓶–将标准测试盖拧在充满水的容器上。使容器倒置或横置并保持15分钟。如果没有水溢出，则该容器就是防漏容器。在补充步骤中，使用标准测试容器对盖子进行测试。

减少了污染–NALGENE瓶和细口大瓶不含混合剂和塑化剂，如邻苯二甲酸盐（PVC瓶除外），这就消除了样品的污染源。

- NALGENE瓶与玻璃瓶相比，具有重量轻，以及更佳的防漏、耐破损、抗污染性等诸多优点。
- 如果您发现有NALGENE瓶或细口大瓶没有达到防漏效果，敬请告知，我们会为您进行更换。这是NNI保证。
- 在常温常压下，配备各自的NALGENE盖后，NALGENE瓶和细口大瓶能起到相应的防漏作用，特定材料或设计、另有单独注明的产品除外。

2019 无菌方形培养基瓶，PETG（聚对苯二甲酸乙二醇酯共聚物）；白色高密度聚乙烯螺旋盖

是玻璃培养基瓶的替代品，物美价廉。PETG方形瓶，瓶壁厚，经久耐用，且标有容量刻度。降低了CO_2/O_2的渗透性。瓶子和瓶盖已辐射消毒并且无热原，节省了昂贵的清洗、去除热原和高温高压灭菌步骤。瓶盖和瓶颈部位的热缩带可提供封口保护作用。收缩薄膜托盘包装。整箱出售。2L产品（目录编号2019-2000）上有模制手柄和53mm (53B)的白色瓶盖。该培养基瓶无菌（达10^{-6}SAL）、无热原、无细胞毒素，符合USP Class VI准则。无菌/透明/防漏/有刻度

A 可高温高压灭菌的图标

带有此图标的产品可在温度121°C，15psig (1bar)的条件下（建议循环条件）进行20分钟的高温高压灭菌处理。

目录编号2019 -0030TM1 TM2	-0060TM1 TM2	-0125TM1 TM2	-0250TM1 TM2	-0500TM1 TM2	-1000TM1 TM2	-2000TM1 TM2
容量，mL	30	60	125	250	500	1000	2000
容量，oz.	1	2	4	8	16	32	64
盖尺寸，mm	20	24	38-430	38-430	38-430	38-430	53B
每箱托盘数量	4	4	2	2	2	2	2
每盒数量	24	24	24	24	12	12	6
每箱数量	96	96	48	48	24	24	12

TM2弧形肩部方形瓶设计受美国商标注册号2857279保护

NALGENE瓶

2250 可高温高压操作的细口大瓶（带手柄），聚丙烯；白色聚丙烯螺旋盖，TPE垫圈

常见的圆形设计，带手柄和83B螺旋盖，可高温高压灭菌PP瓶体。是存储大量的培养基、蒸馏水和其他溶液的理想选择。带有1加仑或5升的刻度标记。适用13-1/2号塞。注意：为实现最佳效果，高温高压操作时请使用合适的通气盖。请参阅“参考”章节的消毒操作说明。
不建议用于处理危险品。可高温高压灭菌/有刻度/防漏

目录编号2250	-0020	-0050	-0130
标称肩部容量，L	10	20	50
标称肩部容量，gal.	2-1/2	5-1/2	13
满装容量（约），L	12.5	24	55
每盒数量	1	1	1
每箱数量	6	4	1

* 有关防漏测试的详细信息，请参阅“瓶／信息”章节内容

2226 耐用真空细口大瓶，聚丙烯；白色聚丙烯盖，TPE垫圈

超厚瓶壁使该聚丙烯细口大瓶更为坚固。能满足极其严格的操作要求。可作为真空收集装置使用，能保持完全真空状态达8小时之久。防漏，可高温高压灭菌。为方便起见，真空应用时请采用2158系列快速填充/通气盖。随附83B盖，带TPE垫圈。注意：为实现最佳效果，高温高压操作时请使用合适的通气盖。请参阅“参考”章节的消毒操作说明。可高温高压灭菌

目录编号2226	-0020	-0050
标称肩部容量，L	10	20
标称肩部容量，gal.	2-1/2	5-1/2
满装容量（约），L	12	24
每盒数量	1	1
每箱数量	6	4

要了解有关其他真空装置的详细信息，请参阅目录编号为2162的产品部分

2251 Clearboy，透明细口大瓶，聚碳酸酯；白色聚丙烯螺旋盖；TPE垫圈

Clearboy细口大瓶材质透明，相比玻璃产品质量更轻、更安全。聚碳酸酯容器无毒，且非常坚硬。可高温高压灭菌以进行无菌应用。适用于大量的培养基和培养准备，对那些需要目视检查容纳物质量方面的应用尤其重要。是冷藏或冷冻储存水性溶液的理想选择。带有1加仑或5升的刻度标记。盖尺寸为83B (83mm)。注意：为实现最佳效果，高温高压操作时请使用合适的通气盖。请参阅“参考”章节的消毒操作说明。可高温高压灭菌/L900/透明/有刻度/防漏

目录编号2251	-0020	-0050
标称肩部容量，L	10	20
标称肩部容量，gal.	2-1/2	5-1/2
满装容量（约），L	12	24
每盒数量	1	1
每箱数量	4	4

2210 细口大瓶（带手柄），低密度聚乙烯；白色聚丙烯螺旋盖

是存储和运输试剂的理想选择。相比于HDPE，低密度聚乙烯(LDPE)使用的催化剂很少，更适合盛放对聚合催化剂敏感的试剂。圆形、标有刻度，每一刻度为5升或1加仑。宽大的肩部手柄便于搬运和倾倒，即使带有手套也可操作自如。随附83B防漏阀盖，瓶颈适用13-1/2号塞。有刻度/防漏

目录编号2210	-0020	-0040	-0050	-0065	-0130
标称肩部容量，L	10	15	20	25	50
标称肩部容量，gal.	2-1/2	4	5-1/2	6-1/2	13
满装容量（约），L	12.5	18	23	28	54
每箱数量	6	4	4	4	1

NALGENE瓶

2256 琥珀色细口大瓶，琥珀色高密度聚乙烯；琥珀色聚丙烯盖

宽大的肩部手柄设计，使用方便。不透明细口大瓶，符合U.S. Pharmacopoeia Light Transmission Test (USP 23, 661)有关存储光敏物质的要求。是存储和混合光敏化学品、试剂、缓冲液和标准样品的最佳选择。防漏/新设计

目录编号2256	-7020
标称肩部容量，L	10
标称肩部容量，gal.	2.5
满装容量（约），L	12.5
盖尺寸，mm	83B
每盒数量	1
每箱数量	6

2234 广口大瓶（带手柄），低密度聚乙烯；白色聚丙烯螺旋盖

广口设计，易于盛放固体、粉末或配合顶部混合器使用。与2210系列细口大瓶的材料相同，带有100mm瓶盖。带有1加仑或5升的刻度标记。有刻度/防漏

目录编号2234	-0020	-0030	-0050
标称肩部容量，L	10	15	20
标称肩部容量，gal.	2-1/2	4	5-1/2
满装容量（约），L	12	18	23
每盒数量	1	1	1
每箱数量	6	6	4

有关防漏测试的详细信息，请参阅“瓶／信息”章节内容

A

2235 可高温高压灭菌的广口大瓶（带手柄），聚丙烯；白色聚丙烯螺旋盖

广口设计和宽大的肩部手柄，使用方便。带有1加仑或5升的刻度标记。盖尺寸为100mm。是进行微生物分析，尤其是处理大量粉末或其他固体样品的理想工具。最初是为食品沙门氏菌测试中的取样而设计。注意：为实现最佳效果，高温高压操作时请使用合适的通气盖，请参阅“参考”章节的消毒操作说明。可高温高压灭菌/有刻度/防漏

目录编号2235	-0020	-0050
标称肩部容量，L	10	20
标称肩部容量，gal.	2-1/2	5-1/2
满装容量（约），L	12	23
每盒数量	1	1
每箱数量	6	4

有关防漏测试的详细信息，请参阅“瓶／信息”章节内容

A

2261 卫生细口大瓶，聚碳酸酯

是透明、无螺纹，可用于制药和生物技术应用中的接收器或分配容器。瓶颈上模制有3in. 卫生法兰，可安装标准法兰配件。夹具盖系统安全防漏，永不松动。其卫生设计使得清洁工作比带螺纹的容器更加容易。

采用与NALGENE PC Clearboys（目录编号DS2213、2251、2317）和PC相同的树脂原料模制而成，可作为卫生PC细口大瓶使用，而无需进行材料验证。带提供聚丙烯材质的细口大瓶（目录编号2630）。所用原料符合USP Class VI和FDA的要求。提供各种附件。可高温高压灭菌

目录编号	标称容量，L	满装容量（约），L	标称重量，g	颈口	每箱数量
2261- 0050	20	24	870	3in.	4

NALGENE瓶

2630 卫生细口大瓶，聚丙烯，带3in. 熔接卫生法兰

Tri-Clover法兰熔接在标准NALGENE PP细口大瓶上，可进行无菌液体传输或取样。无螺纹，清洗方便。要对盖进行密封，请使用连接夹具(2670-0300)和垫圈(2672-0300)。注意：为实现最佳效果，高温高压灭菌时请安装通气端盖，但是夹具不要夹得太紧。可高温高压灭菌/防漏

目录编号2630	-0010	-0020	-0050
细口大瓶容量（标称），L	10	20	30
法兰尺寸	3	3	3
每箱数量	1	1	1

A

2640 可高温高压灭菌的细口大瓶（带卫生法兰），聚丙烯；聚丙烯盖

标准NALGENE细口大瓶上已安装1-1/2in. 的熔接卫生装置，作为分配口使用。该装置位于靠近瓶底的侧面，能够实现安全连接，因此该细口大瓶可作为大型系统（如发酵罐或色谱柱）的贮液器使用。由可高温高压灭菌的PP模制而成。所有材料均无细胞毒素，并已通过USP Class VI Biosafety Evaluation。带TPE垫圈的83B PP瓶盖。不建议用于处理危险品。适用13-1/2号塞。注意：为实现最佳效果，高温高压操作时请使用合适的通气盖。请参阅“参考”章节的消毒操作说明。可高温高压灭菌/有刻度/防漏

目录编号2640	-0020	-0050	-0130
标称肩部容量，L	10	20	50
标称肩部容量，gal.	2-1/2	5-1/2	13
满装容量（约），L	12.5	24	55
每箱数量	1	1	1

USP VI A

2670 连接夹具，PVDF

全塑螺纹夹具系统。建议与2630和2640系列细口大瓶一起使用。可高温高压灭菌

目录编号2670	-0075	-0150	-0300
大小，in.	3/4 Mini	1-1/2 Tri	3 Tri
大小，mm	19	38	76
每箱数量	1	1	1

A

2685 耐用夹具，不锈钢

坚固的弹簧夹具，能够实现紧密的液体连接，防止渗漏。可高温高压灭菌

目录编号2685	-0300
大小，in.	3 Tri
大小，mm	76
每箱数量	1

A

2672 垫圈，热塑弹性体

这些垫圈能够实现与那些用于多个NALGENE容器的TPE垫圈的材料兼容性。可高温高压灭菌/USP VI

目录编号2672	-0075	-0150	-0300
套圈大小，in.	3/4	1.5	3
套圈大小，mm	19	38	76
每盒数量	1	1	1
每箱数量	6	6	6

USP VI A

NALGENE瓶

USP VI

11100 带盖的重型圆筒罐，高密度聚乙烯

罐体坚固，表面坚硬，具有良好的耐温性。不可高温高压灭菌。可对圆筒罐进行改装，在其上安装厂装的放水口，最大容量可高达378L。大小：19至757L。21CFR177.1520/USP VI

目录编号11100	-0005	-0007	-0010	-0015	-0030	-0055	-0080	-0100	-0150	-0200
容量，L	19*	28*	38*	57*	113	208	303	378	568	757
容量，gal.	5*	7-1/2*	10*	15*	30	55	80	100	150	200
刻度，gal.	0.5	0.5	1	1	2.5	2.5	5	5	10	25
刻度，L	2	-	-	4	10	10	20	20	40	200
标称尺寸，外径×深度，cm	28×38	30×46	33×51	33×69	46×76	56×91	61×122	71×112	79×124	91×130
标称尺寸，外径×深度，in.	11×15	12×18	13×20	13×27	18×30	22×36	24×48	28×44	31×49	36×51
罐壁厚度，mm	4.7	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3	6.3
罐壁厚度，in.	3/16	3/16	3/16	3/16	3/16	1/4	1/4	1/4	1/4	1/4
每箱数量	1	1	1	1	1	1	1	1	1	1

* 罐体无公升刻度

USP VI

11102 带放水口的罐，高密度聚乙烯

与目录编号为11100的罐相同，仅多了一个目录编号为6421用于排水的针型放水口。含盖。放水口处可安装内径为5/8in. 的胶管。USP VI

目录编号11102	-0005	-0007	-0010	-0015	-0030	-0055
容量，L	19*	28*	38*	57*	114	208
容量，gal.	5*	7-1/2*	10*	15*	30	55
每箱数量	1	1	1	1	1	1

* 罐体无公升刻度

A USP VI

2651 带有混合器支撑板装置的圆顶罐的盖，聚丙烯，PVDF连接夹具

可与所有圆顶罐（目录编号为2650）一起使用的顶部混合器支撑板装置。独特的卫生法兰设备可允许您在封闭系统的顶部进行高架式混合操作。专门为配合NALGENE生物混合器（目录编号为2653、2654）的使用而设计，该装置包含一个6英寸的PP螺旋盖，中央焊有一个2英寸的卫生金属环，还带有一个2英寸的硅胶垫圈和一个连接夹具。可以与其他的2英寸卫生装置连接，用于排放管路和封闭系统填充。单个包装。可高温高压灭菌，但如果装有下部装置（目录编号2654）装配，存放时则必须保持垂直状态。可高温高压灭菌/USP VI

目录编号2651	-0200
每箱数量	1

A 可高温高压灭菌的图标

带有此图标的产品可在温度121°C，15psig (1bar)的条件下（建议循环条件）进行20分钟的高温高压灭菌处理。

NALGENE瓶

2650 圆顶罐，聚丙烯

专门设计用作封闭系统。可用于试剂的存储、配制或无菌混合（2653-0010、2653-0020、2651-0200和2654-xxxx）。圆顶罐是非金属制品，由聚丙烯制成，符合21CFR177. 1520和LJSP VI标准。该聚丙烯瓶可通过高温高压进行灭菌。瓶口尺寸为150mm，配有带垫圈的瓶盖，可确保密封性。它的瓶盖上带有混合器支撑板（目录编号2651），可安装生物混合器。**该圆顶罐可出厂配装放水龙头。**可高温高压灭菌/21CFR177. 1520/USP VI

115-380L/30-100加仑的容量

75L/20加仑容量

USP VI A

目录编号2650	-0020	-0030	-0055	-0100
容量，L	75	115	210	380
容量，gal.	20	30	55	100
外径×高度（标称），mm	419×813	470×981	559×1099	724×1321
外径×高度（标称），in.	16-1/2×32	18-1/2×38-5/8	22×43-1/4	28-1/2×52
瓶壁厚度（标称），mm	6.3	6.3	6.3	6.3
瓶壁厚度（标称），in.	1/4	1/4	1/4	5/16
每箱数量	1	1	1	1

6421 针型罐用放水口，聚丙烯；Teflon* TFE O形环

两个Teflon O形环，可实现绝对密封。仅适用于最大容量不超过100加仑，并带有厂装螺纹冲头的NALGENE罐。带有12个1-1/8in. 的垂直内螺纹。其升级产品的目录编号为96423。

目录编号6421	-0010
每盒数量	1
每箱数量	12

* 或等效物。Teflon是DuPont的注册商标

2653 生物混合器顶部驱动装置

生物混合器和下部装置是特别为在容量不超过400L的NALGENE®圆顶罐中进行无菌搅拌而设计的。该混合系统通过一个卫生装置安装在瓶盖上。

特点：

- 1/8HP的电机以最高可达240RPM的可变速度运行
- 直接安装在瓶上，以用于进行无菌搅拌
- 可通过编程对速度和时间进行自动控制
- 可执行顺时针和逆时针操作
- 拥有超负荷检测和自动关闭功能
- 启动时进行诊断模式检查操作
- 可实现对功率、速度、时间、混合量以及更多参数的LCD读取
- 适用于液体和浆液混合，但要受下列限制:
  1. 固体颗粒重量 < 20%
  2. 比重 < 1.2
  3. 粘性 < 500厘泊
- 已通过美国、加拿大、欧洲和日本等地区的认证

为您提供混合器使用说明，其中列出了简要的安装和维护指南。在订购能配合生物混合器使用的容器罐时，请确定带混合器支撑板的圆顶罐的盖（目录编号为2691）。有关选择轴/叶轮方面的信息，请参阅“下部装置”（目录编号2654）。有关担保信息，请联系NNI。

目录编号2653	-0010	-0020
电气要求	110Volt	220Volt
电源，HP	1/8	1/8
每箱数量	1	1

想了解更多的订购信息，请参阅目录编号为2654的产品的说明下所附图表

NALGENE瓶

A

2654 生物混合器的下部装置

凭借其叶轮和轴的结合设计，可在特殊尺寸的NALGENE罐中实现最佳的搅拌效果。只能与生物混合器顶部驱动装置一起使用。2654系列的叶轮和轴为316不锈钢材质。可高温高压灭菌

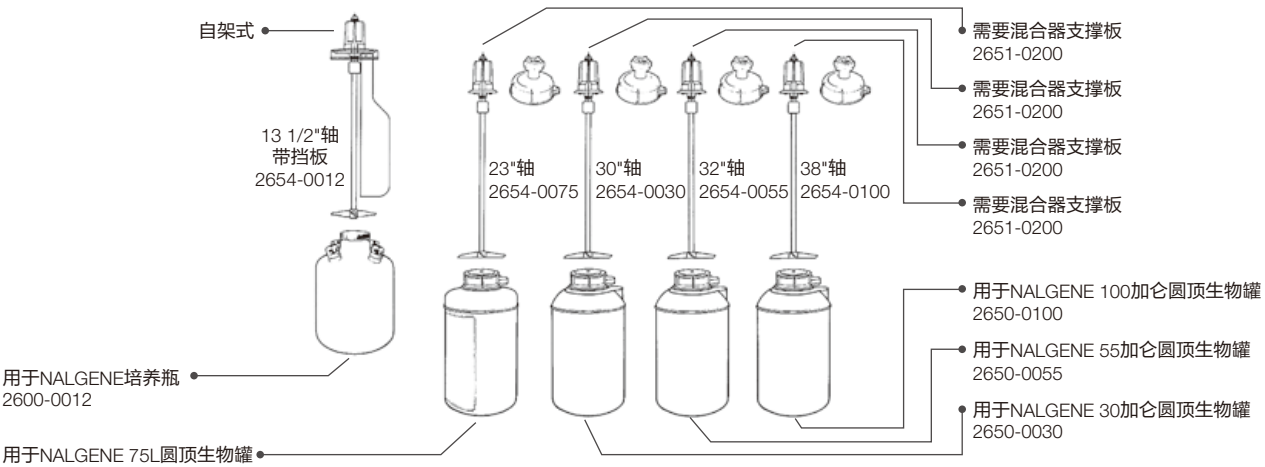
目录编号	配合使用的产品	轴长度 in.	轴长度 mm	混合器支撑板 目录编号	轴直径 in.	轴直径 mm	叶轮直径 in.	叶轮直径 mm	叶轮材料	每箱数量
2654-0012	12L培养容器 (2600-0012)	13.5	343	-	3/8	10	4	102	玻璃填充聚丙烯	1
2654-0030	30加仑圆顶生物瓶 (2650-0030)	30	762	2651-0200*	1/2	13	6.8	173	不锈钢	1
2654-0055	55加仑圆顶生物瓶 (2650-0055)	32	813	2651-0200*	1/2	13	8.8	224	不锈钢	1
2654-0075	75L圆顶罐 (11150-0020)/75L	23	584	2651-0200*	1/2	13	6.3	160	不锈钢	1
2654-0100	100加仑圆顶生物瓶 (2650-0100)	38	965	2651-0200*	1/2	13	10	254	不锈钢	1

* 单独出售

顶部驱动装置

2653-0010 (1/8-HP，110V)

下部装置/轴和叶轮



A

2624 高温高压灭菌移动车，不锈钢

专为在日常使用或维护期间运送小型NALGENE罐（容量不超过30加仑/115升）和细口大瓶而设计。具有防腐性和对某些酸和碱的耐化学性。角轮不会在地上留下印记。可高温高压灭菌

目录编号2624	-0020
最大载重限制，lbs.	522
最大载重限制，kg	227.3
内径×高度，in.	20-1/2×6-1/2
外径×高度，mm	521×165
每箱数量	1

NALGENE瓶

333050 圆形罐衬袋，Coex聚乙烯膜

USP VI NEW

专为NALGENE圆形罐 (19L-757L)设计。衬袋采用敞口平底设计，方便液体处理。是生物制药及诊断试剂混合的理想选择，一次性使用。Coex聚乙烯膜不含动物源成分(ADCF)。单独包装。无细胞毒，食品级。NALGENE是大罐和配套衬袋的不二选择。USP VI/新产品

非无菌

目录编号	衬袋容量	配套NALGENE罐目录编号	每箱数量
333050-0005	19L/5Gal	11100-0005，54100-0005	10
333050-0007	28L/7.5Gal	11100-0007，54100-0007	10
333050-0010	38L/10Gal	11100-0010，54100-0010	10
333050-0015	57L/15Gal	11100-0015，54100-0015	10
333050-0030	113L/30Gal	11100-0030，54100-0030	10
333050-0055	208L/55Gal	11100-0055，54100-0055	10
333050-0080	303L/80Gal	11100-0080，54100-0080	10
333050-0100	378L/100Gal	11100-0100，54100-0100	10
333050-0150	568L/150Gal	11100-0150，54100-0150	10
333050-0200	757L/200Gal	11100-0200，54100-0200	10

* 双层衬套主箱中含有10个单独热封包装袋

343050 圆形罐衬袋，Coex聚乙烯膜，Gamma射线辐照

USP VI NEW

专为NALGENE圆形罐(19L-757L)设计。衬袋采用敞口平底设计，方便液体处理。是生物制药及诊断试剂混合的理想选择，一次性使用。经过Gamma射线辐射(25-40kGy)。Coex聚乙烯膜不含动物源成分(ADCF)。单独包装。无细胞毒，食品级。NALGENE是大罐和配套衬袋的不二选择。USP VI/新产品

目录编号	衬袋容量	配套NALGENE罐目录编号	每箱数量
343050-0005	19L/5Gal	11100-0005，54100-0005	10
343050-0007	28L/7.5Gal	11100-0007，54100-0007	10
343050-0010	38L/10Gal	11100-0010，54100-0010	10
343050-0015	57L/15Gal	11100-0015，54100-0015	10
343050-0030	113L/30Gal	11100-0030，54100-0030	10
343050-0055	208L/55Gal	11100-0055，54100-0055	10
343050-0080	303L/80Gal	11100-0080，54100-0080	10
343050-0100	378L/100Gal	11100-0100，54100-0100	10
343050-0150	568L/150Gal	11100-0150，54100-0150	10
343050-0200	757L/200Gal	11100-0200/54100-0200	10

* 双层衬套主箱中含有10个单独热封包装袋

A 可高温高压灭菌的图标

带有此图标的产品可在温度121°C，15psig (1bar)的条件下（建议循环条件）进行20分钟的高温高压灭菌处理。

NALGENE瓶

A

2145 探针接头盖，聚丙烯；硅胶垫圈

您可以向NALGENE 1L和12L培养瓶中插入直径为7到14mm的探针。探针插入到位后，此盖可实现培养瓶内部与外部环境之间的密封，以防止污染。可高温高压灭菌

目录编号2145	-0384
盖尺寸，mm	38-430
每箱数量	2

目录编号为2600和2605的培养瓶所带的其他培养瓶盖和装置：高温高压灭菌隔膜盖（目录编号DS2168），带锯齿密封接头的盖（目录编号DS2167），锯齿密封接头（目录编号No. 6149），请参阅“瓶和细口大瓶附件”。

A USP VI

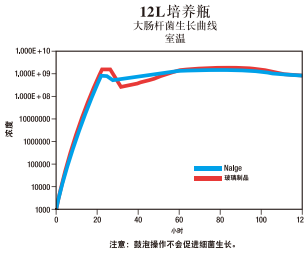
2600 培养瓶（带端口），聚碳酸酯；白色聚丙烯盖

价格实惠，质轻且抗裂。肩部带有四个存取口。塑料材质，瓶口周围的不会像玻璃一样碎裂。标有刻度，从3L到12L，最小刻度为0.5L。由食品级树脂材料制成，符合USP Class VI的要求。无细胞毒素。可高温高压灭菌/USP VI/透明

目录编号2600	-0012
满装容量，L	15
工作容量，L	12
总高度×外径，mm	429×289
总高度×外径，in.	16-7/8×11-3/8
盖，顶部	100mm
盖，侧面	38×430
每盒数量	1
每箱数量	2

A 可高温高压灭菌的图标

带有此图标的产品可在温度121°C，15psig (1bar)的条件下（建议循环条件）进行20分钟的高温高压灭菌处理。



目录编号为2600和2605的培养瓶所带的其他培养瓶盖和装置：高温高压灭菌隔膜盖（目录编号DS2168），带锯齿密封接头的盖（目录编号DS2167），锯齿密封接头（目标编号No. 6149），请参阅“瓶和细口大瓶附件”。

USP VI

2602 带生物混合器的培养瓶

该培养瓶系统由三件NALGENE产品组成，包括一个带端口的容积为12L的培养瓶（目录编号2600-0012）；一个1/8HP顶部驱动生物混合器（目录编号2653-0010或2653-0020）和一个带有3-1/2in. 轴（3/8=in.直径）的下部装置（轴上带有4in. 的轴流玻璃填充聚丙烯叶轮和2-1/2"宽的聚丙烯挡板），可实现高效的上下混合。新型生物混合器能够提供可变速度、可编程速度/连续控制，还能够实现顺时针和逆时针旋转，专为实现系统组件的最高效率而设计。这些混合器已经过认证，可以在美国、加拿大、日本和欧盟内使用。用户可以对培养瓶和下部装置进行高温高压灭菌。USP VI/透明

目录编号2602	-0110	-0220
电压	110V	220V
每箱数量	1	1

NALGENE瓶

2162 填充/通气盖

白色聚丙烯，TPE垫圈，TPE端口盖，NALGENE 50白金硅胶胶管全塑料瓶盖可用于向NALGENE细口大瓶进行培养基、生物试剂以及化学物质的无菌液体传输。可与任何大号NALGENE细口大瓶或适用53-mm (53B)或83-mm (83B)瓶盖的瓶子配合使用。*83B瓶盖上有内径为1/2-inch (13-mm)或1/4-inch (6-mm)胶管的选择。包括两条NALGENE 50白金硅胶胶管（目录编号8060），用于滴管和挡溅板。可与带有正确安装蠕动泵的NALGENE细口大瓶配合使用。可高温高压灭菌

目录编号2162	-0531	-0830	-0831
总高度（不带胶管）×直径，mm	68.6×66.7	98×102	98×102
总高度（不带胶管）×直径，in.	2-3/4×2-5/8	3-7/8×4	3-7/8×4
瓶盖尺寸，mm	53B	83B	83B
胶管内径，in.	1/4	1/2	1/4
每盒数量	1	1	1
每盒数量	6	6	6

A

6149 锯齿密封接头，聚丙烯接头（2个），乙醛螺母（2个），硅胶垫圈（2个），TPE端口盖

全塑料接头，可改装多数NALGENE和其他制造商生产的瓶盖，用以进行液体传输。独特的接头装置， 两端皆带有齿，因此可从两侧连接胶管。安装简便， 只需在瓶盖上钻两个直径为5/8in. (16mm)的圆孔，插入接头后拧紧，再连接胶管即可。随附详细的操作说明与安装模板。装配垫圈和螺母可起到防漏作用。53B瓶盖上可安装两个1/4in.的接头，而无法安装两个1/2in. 的接头。83B瓶盖上可安装上述任意尺寸的两个接头。可采用高温高压、气体或化学方法进行消毒。如要在真空环境下应用，请选择NALGENE耐用瓶或细口大瓶，目录编号2126-2226。可高温高压灭菌

目录编号6149	-0001	-0002
适合胶管的内径，in.	1/2	1/4
总高度×总宽度（最大处尺寸），mm	64×25	56×16
总高度×总宽度（最大处尺寸），in.	2-1/2×1	2-3/16×5/8
每盒数量	2	2
每箱数量	24	24

A

2135 用于NALGENE瓶和细口大瓶（带螺旋盖）的Flexible Top Works Systems

聚丙烯盖，白金硅胶衬垫

柔韧的硅胶Top Works Systems，包括实心、二口和三口共三种产品。白金硅胶胶管与其穿过的塞子为整体熔合而成，具有良好的防漏作用。可用于多数的NALGENE瓶和细口大瓶间的无菌液体传输。可高温高压灭菌/USP VI/防漏

USP VI

A

目录编号	NALGENE盖尺寸	盖材料（带孔）	衬垫材料	端口数量：内径尺寸，in.	每箱数量
2135-3800	38-430	PP	硅胶	无（实心衬垫）	1
2135-3803	38-430	PP	硅胶	3-(1)1/4；(2)1/8	1
2135-5300	53B	PP	硅胶	无（实心衬垫）	1
2135-5302	53B	PP	硅胶	2-1/4	1
2135-5303	53B	PP	硅胶	3-(1)1/8，(2)1/4	1
2135-8300	83B	PP	硅胶	无（实心衬垫）	1
2135-8302	83B	PP	硅胶	2-1/4	1
2135-8303	83B	PP	硅胶	3-(1)3/8；(2)1/4	1

NALGENE瓶

A

6151 T形连接器，聚丙烯，可高温高压灭菌

目录编号6151	-0125	-0187	-0250	-0312	-0375	-0500
适用胶管的内径尺寸，in.	1/8	3/16	1/4	5/16	3/8	1/2
每盒数量	12	12	12	12	12	12
每箱数量	72	72	72	72	48	48

A

6152 Y形连接器，聚丙烯，可高温高压灭菌

目录编号6152	-0125	-0187	-0250	-0312	-0375	-0500
适用胶管的内径尺寸，in.	1/8	3/16	1/4	5/16	3/8	1/2
每盒数量	12	12	12	12	12	12
每箱数量	72	72	72	72	48	48

A

6460 活塞，聚丙烯；Teflon* TEE塞

两端都有锯齿状排水小管。适用于1/4-in.至5/16-in.的所有胶管。可高温高压灭菌

目录编号6460	-0002	-0004
孔径，mm	2	4
每盒数量	1	1
每箱数量	6	6

* 或等效物。Teflon是DuPont的注册商标。

A 可高温高压灭菌的图标

带有此图标的产品可在温度121°C，15psig (1bar)的条件下（建议循环条件）进行20分钟的高温高压灭菌处理。

NALGENE胶管产品的选择指南

USP VI A

USP VI A

USP VI A

USP VI A

材料	ASTM	180	380	980	890	870	50/65	280	489	689
树脂		PVC	PVC	PVC强化	FEP	PFA白金	硅胶，酯硫化	PUR，醚	LLDPE	PP
等价物		Tygon R-3603	Tygon B-44-3/ B-44-4X/ S-50-HL	Tygon B-44-4X						
遵守条例		USDA，食品级 USP VI	USDA，食品级，3-A，NSF-51 USP VI	USDA，食品级	USDA，食品级	USDA，食品级	USDA，食品级，3-A，USP VI	不适用	USDA，食品级	USDA，食品级
硬度（邵氏）	D2240	55 (A)	65 (A)	65 (A)	58 (D)	60 (D)	50 (A)/65 (A)	85 (A)	50 (D)	75 (D)
比重	D792	1.19	1.20	1.20	2.17	2.15	1.15	1.18	0.92	0.90
工作温度范围（°F）	D789	-25到160	-10到175	-5到180	-103到400	-454到500	-80到450	-70到185	-100到175	-25到250
工作温度范围（°C）	D2117 D746	-32到71	-23到79	-21到82	-75到205	-268到260	-62到232	-56到85	-73到79	-4到121
真空度		极低†	极低	非真空	全真空	全真空	非真空	极低	全真空	全真空
杀菌		高温高压灭菌 气体 化学	高温高压灭菌 气体 化学	气体 化学	高温高压灭菌 气体 化学	高温高压灭菌 气体 化学	高温高压灭菌 气体 化学 辐射	气体	气体 化学	高温高压灭菌
扩张强度，psi	D638 D412	1,650	2,200	2,000	3,000	3,000	1,250	6,000	1,700	3,700
颜色		完全透明	完全透明	透明	透明	透明	半透明	透明	半透明	半透明
气味		轻微	轻微	轻微	无	无	无	轻微	轻微	无
味道		无	无	无	无	无	无	无	无	无
抗扯强度		良好	良好	非常好	良好	良好	一般	极佳	非常好	极佳
弯曲半径		4×外径	5×外径	6×外径	8×外径	10×外径	4×外径	6×外径	8×外径	10×外径
伸张度，%	D638 D412	450	400	350	300	300	750	550	600	200
耐燃性	D568	自灭	自灭	自灭	自灭	自灭	可燃	可燃	燃烧缓慢	燃烧缓慢
耐磨损燃性		非常好	非常好	良好	非常好	非常好	一般	极佳	良好	极佳
耐腐蚀燃性		极佳	极佳	极佳	极佳	极佳	良好	极佳	极佳	极佳
渗透性** N_2 O_2 CO_2		0.5-2 1-6 10-35	0.5-2 1-6 10-35	0.5-2 1-6 10-35	20 60 135	18 65 150	2,765 7,960 20,130	0.3-5 1-10 4-25	20 60 280	4 25 90

NALGENE瓶

3120 NALGENE BioBottle 2L离心瓶，一次离心即可处理高达12L的样品！

NALGEN E BioBottle，2L带密封盖，PPCO或PPHO材质；PP密封盖，硅胶垫圈。专为Thermo Scientific Sorvall RC 12BP离心机和H-1 2000 Swing Bucket转头设计。

- 可承受高达7,333 × G的转速
- USP Class VI，无内毒素，无溶血原
- 非常适合细菌、酵母及组织样本分离
- 改良的质量及性能更适合生物样本分离
- 可以代替原Thermo Scientific Sorvall BioBottle Cat.NO.77061

标有刻度，广口设计便于样品转移，外观符合人体工程学设计，便于离心瓶移动。光滑的内壁降低对细胞的剪切力。离心操作的温度范围：4°C~22°C，可在0°C保存，可高温高压灭菌。

NALGENE货号	产品描述	总容，mL	材质	数量/箱
3120-2006	BioBottle，2L带密封盖	2,000	PPCO	6
DS3132-0063	密封盖，63mm	——	PP	2

3141 离心瓶（带密封盖），聚丙烯共聚物；聚丙烯螺旋盖；硅胶垫圈

- 高速离心瓶，1L，聚丙烯共聚物PPCO材质，带密封盖
- 广口、高速离心瓶，最高转速可达15,810 × G。刻度标记，光滑内壁降低对细胞的剪切力。PPCO材质具有极佳耐化学性。建议使用温度4°C~22°C，可储存于-70°C。达到USP VI，无细胞毒性

目录编号	标称容量，mL	每箱数量
3141-1006	1000	6

A

3140 离心瓶（带密封盖），聚碳酸酯；聚丙烯螺旋盖；硅胶垫圈

- 高速离心瓶， 1L，聚碳酸酯 PC材质，带密封盖
- 广口、高速离心瓶，最高转速可达15,810 × G。刻度标记，半透明瓶体，光滑内壁降低对细胞的剪切力。建议使用温度4°C~22°C，可储存于-70°C。达到USP VI，无细胞毒性

目录编号	标称容量，mL	每箱数量
3140-1006	1000	6

A

A 可高温高压灭菌的图标

带有此图标的产品可在温度121°C，15psig (1bar)的条件下（建议循环条件）进行20分钟的高温高压灭菌处理。

NALGENE瓶

3120 离心瓶，聚丙烯共聚物；聚丙烯螺旋盖，瓶体半透明，具有极佳的化学性。强度高

最大额定值：

- 编号为3120-0250的产品额定值为13,200 × g（加密封后最高可达27,500 × g）*
- 编号为3120-0500的产品额定值为4,800 × g
- 编号为3120-9500的产品额定值为4,800 × g**
- 编号为3120-1000的产品额定值为7,100 × g（用于IEC转子时请加装编号为3120-1010的产品）
- 编号为3120-1010的产品额定值为7,100 × g可高温高压灭菌

目录编号3120	-0250	-0500	-9500**	-1000	-1010
标称容量，mL	250	500	500	1000	1000
每盒数量	4	4	4	4	4
每箱数量	36	24	24	16	16

* 离心瓶接头单独出售，目录编号为DS3125-0250。
** 为使离心瓶正常工作，其填充量不能超过总容量的75%。

3122 离心瓶，聚碳酸酯；聚丙烯螺旋盖　窄口设计，机械强度极佳

最大额定值：

- 编号为3122-0250的产品额定值为27,500 × g
- 编号为3122-0500的产品额定值为13,700 × g
- 编号为3122-1000的产品额定值为7,100 × g（用于IEC转子时请加装编号为3122-1010的产品）
- 编号为3122-1010的产品额定值为7,100 × g可高温高压灭菌/透明

目录编号3122	-0250	-0500	-1000	-1010
标称容量，mL	250	500	1000	1000
每盒数量	4	4	4	4
每箱数量	36	24	16	16

3140 离心瓶（带密封盖），聚碳酸酯；聚丙烯螺旋盖；硅胶垫圈

该离心瓶具有极佳的透明度和机械强度，并带有广口密封盖。

目录编号3140	-0250	-0500
标称容量，mL	250	450
每盒数量	4	4
每箱数量	36	24

3141 离心瓶（带密封盖），聚丙烯共聚物；聚丙烯螺旋盖；硅胶垫圈

该离心瓶具有极佳的耐化学性，并带有广口密封盖。

目录编号3141	-0250	-0500
标称容量，mL	250	450
每盒数量	4	4
每箱数量	36	24

NALGENE密封盖（目录编号DS3132-0058、DS3132-0063）也可单独出售。

Nunc细胞工厂常见问题

什么是细胞工厂?

细胞工厂由经过Nunclon™Δ表面处理的纯净聚苯乙烯树脂制造，每一层间均通过超声作用焊接在一起。它被设计用于进行大规模细胞培养以及生物制品生产例如疫苗、单克隆抗体等生物制品的生产。它利用有限的空间提供了极大的生长表面积。并具有极低的污染风险和多层叠放时的易操作性。细胞工厂提供1、2、4、10及40层不同规格。

开始使用细胞工厂时需要哪些附件?

目录号为170769的无菌细胞工厂Start-up使用套件包含以下配件：2个细胞工厂HDPE连接器，目录号为171838；2个白色的Tyvek封口盖，目录号为171897；2个蓝色的密封盖，目录号为167652；一个Gelman 4210细菌空气过滤器；一根2m长内径8mm的硅胶管和夹具。附件中的白色Tyvek封口盖及蓝色的密封盖可分别提供20个及40个一箱的包装。每个细胞工厂需要2个盖子。

为了容纳细胞悬液，需要一个带放水口的储液罐，其底部有一个可通气的活塞。Nunc推荐Kimble Glass,Inc.生产的Kimax吸气瓶（可通过NNI 购买）。Kimble目录上1L瓶的目录号为14607-1000，2L瓶的目录号为14607-2000。我们提供一个特殊的细胞工厂手动操作装置（目录号为176953）以便于操作40层的细胞工厂。

Nunc细胞工厂使用手册提供了更详细的必需的配件列表以及操作流程，包括如何安装、培养细胞、收集细胞等。

10层细胞工厂中的细胞可以在显微镜底下观察吗?

由于10层和40层细胞工厂的高度，细胞无法在普通显微镜下进行观察。通常是通过将细胞接种至1层、2层或4层细胞工厂来加以控制。细胞生长在这三种细胞工厂中均可以在显微镜下进行观察。通过在观察一侧应用带高能光源的倒置相差显微镜，调节细胞工厂的高度即可观察上面几层的培养表面。

怎样用显微镜观察细胞工厂中的细胞生长?

有两种方法。

第一种方法，可以在倒置的显微镜中直接观察到底部1和2层的生长情况。这需要用一个物距为25mm的物镜。大多数品牌的显微镜都配有这种物镜。您也可以只使用一个4X的物镜，但这种物镜只适用于检查细胞层的均匀度。请联系显微镜的制造商获取详细资料。

第二种方法，由于生长的条件（表面和容量关系）与Nunc培养瓶相同，因此可以用同步的接种瓶代替对细胞工厂的直接观察。

细胞工厂能否进行高温高压灭菌或重复使用?

细胞工厂由聚苯乙烯制成，不能进行高温高压处理。尽管在对同一种细胞系进行多组试验间，有发现未进行灭菌而重复使用细胞工厂的情况，我们仍然倡议对细胞工厂进行一次性使用。

通气过滤器173248和173249之间的区别是什么?

173248是一个深滤程滤器，而173249是一个带0.2µm验证滤膜的过滤器。173248作为一个细菌通气过滤器可满足大多数的应用。而当需要验证带0.2µm滤膜滤器时应使用173249。

每个细胞工厂的培养面积和每个细胞工厂所需的培养基的体积是多少?

每一层细胞工厂($632m^2$)推荐培养基用量是200mL，因此推荐的最小的培养基用量和其培养面积如下表：

目录编号	层数	培养面积 (cm^2)	建议工作容量(mL)	数量每包/箱
165250	1	632	200	1/8
167695	2	1264	400	1/5
140004	4	2528	800	1/10
164327	10	6320	2000	1/2
170009	10	6320	2000	1/6
139446	40	25280	8000	1/2

传代批次	培养器	培养基容量/培养器	培养面积/培养器	总容量	总培养面积	$cm^2\ mL^{-1}$
0	1x25cm^2 flask	7mL	25cm^2	7mL	25cm^2	3.57
Split 1:3						
1	1x80cm^2 flask	25mL	80cm^2	25mL	80cm^2	3.20
Split 1:4.4						
2	2x175cm^2 flask	55mL	175cm^2	110mL	350cm^2	3.18
Split 1:3.6						
3	1xCF2	400mL	1,260cm^2	400mL	1,260cm^2	3.15
Split 1:5						
4	1xCF10	2L	6,320cm^2	2L	6,320cm^2	3.16
Split 1:4						
5	1xCF40	8L	25,280cm^2	8L	25,280cm^2	3.16
Split 1:4						
6	1xRack (4xCF40)	32L	10m^2	32L	10m^2	3.16
Split 1:4						
7	4xRack	32L	10m^2	128L	40m^2	3.16
Split 1:4						
8	16xRack	32L	10m^2	512L	160m^2	3.16

Nunc细胞工厂科技文献

Scientific References for Cell Factory

1. 使用细胞工厂CF-40，无血清瞬时表达抗体
Serum-free Transient Expression of Antibodies Using 40 Tray Cell Factories Peter Schlenke et al., Poster Renschler Biotechnologie
HEK 293 cells, antibody expression, serum free

2. 使用NUNC细胞工厂，T-flasks和培养转瓶（配合HyQ SFM4Megavir），Vero细胞培养的脊髓灰质炎病毒产品
Production of Poliovirus using Vero Cells Cultured in NUNC Cell Factories, T-flasks and Roller Bottles with HyQ SFM4Megavir. HyClone Application Note
Polio virus, VERO cells, SFM4MegaVir

3. 使用NUNC细胞工厂在封闭系统中生产大量树突状细胞
Generation of large number of dendritic cells in a closed system using Cell Factories. Sandra Tuyaerts et al., JIM 264 (2002) 135-151
Dendritic cells

4. 使用NUNC细胞工厂的腺病毒大规模制备
Large scale preparation of adenovirus using NUNC Cell Factories. work protocol
Adenovirus, 293 cells

5. 使用NUNC细胞工厂，成熟的单核细胞来源树突状细胞（应用于临床）的大规模制备
Large scale generation of mature monocyte-derived dendritic cells for clinical application in Cell Factories.Thomas Berger et al., JIM 268 (2002) 131-140
Dendritic cells

6. Lentiviral基因转入初级和二级NOD/SCID再植细胞
Lentviral gene transfer into primary and secondary NOD/SCID repopulating cells. Niels-Bjarne Woods et al. Blood, Vol 96, No.12, pp. 3725-3733
293T cells, Lentvirus

7. VHS病毒(Viral Hemmorhagic Septicemia)分子内二硫键的鉴定和VHS病毒糖蛋白二级修饰的鉴别。VHS病毒为一种鱼类弹状毒
Characterization of Intramolecular Disulfid Bonds and secondary Modifications of the glycoprotein from Viral Hemmorhagic Septicemia Virus, a Fish Rhabdovirus. Katja Einer-Jensen et al, Journal of Virology 1998, p. 10189-10196, Vol. 72, No.12
BF-2 cells, Hemmorhagic Septicemia Virus, Fish Rhabdovirus

8. 通过免疫黑色素瘤患者，接种成熟的、冻存的、多肽致敏单核细胞来源树突状细胞，从而快速介入肿瘤特异性型辅助性T淋巴细胞
Rapid Introduction of Tumor specific Type 1T Helper cells in metastatic Melanoma patients by vaccination with mature, cryopreserved, peptide-loaded monocyte-derived dendritic cells. Beatrice Schuler-Thurner et-al
Dendritic cells

9. Renschler Biotechnologie, Corporate Presentation, 2004五月(报告)
Renschler Biotechnologie, Corporate Presentation, May 2004
Contract manufacturing

10. 使用Q Sepharose XL，腺病毒的快速纯化
Rapid Adenovirus Purification using Q Sepharose XL Kjell Eriksson et al, poster Wilbio, Lake Tahoe Nov 2001 + ESGT, Stockholm Oct.2000
Adeno virus, gene therapy

11. 一种适用于肾小管上皮细胞生长及病毒生产的通用无血清培养基
A versatile serum-free medium for kidney epithelial cell growth and virus production Paul Price et al ,Gibco , Focus 2002, vol 24, p. 24-28
MDCK cells, MDBK cells, VERO cells, PK-15 cells, BHK 21 cells

12. 产品标书 (Richard Snyder，福罗里达大学)
Production Bidding Form University of Florida, Richard Snyder
293 cells, vector production

13. GMP-MSC的临床规模化生产
GMP – Clinical scale production of MSC L.Sensebe, presentation Tissue Engineering 2004, Bordeaux
MSC, bone marrow cells

14. 成人骨髓基质干细胞体外软骨形成，定义软骨发生过程中的细胞和分子事件顺序
In vitro cartilage formation by human adult stem cells from bone marrow stroma defines the sequence of cellular and molecular events during chondrogenesis. Ichiro Sekiya et al. PNAS, april 2, 2002, vol 99, no.7, 4397-4402
Human marrow stromal cells, MSC

15. MRI磁共振成像、靶向导管定位移植成肌祖细胞至梗死左心室心肌
Magnetic Resonance Imaging of targeted catheter-based Implantation of myogenic precursor cells into infracted left ventricular Myocardium. Jerome Garot et al., Journal of the American College of Cardiology, Vol 41, No.10,p. 1841-1846,2003
Myogenic precursor cells (MPC)

16. 核仁素是一种基质结合区DNA结合蛋白，能够特异地识别潜在的碱基未配对高发区
Nucleolin is a Matrix attachment rgion DNA-binding Protein that specifically recognizes a region with high base-unpaired Potential. Lillian Dickinson et al., Molecular and cellular Biology, Jan 15. 1995, vol.15, no.1, p. 456-465
K562 (human erythroleukemia cell line)

17. 人胸腺基质淋巴生成素有效刺激髓细胞
Human Thymic Stromal Lymphopoietin preferentially stimulates Myeloid cells. Pedro Reche et al., Journal of Immunology
Human epithelial cells, 293T

18. 人眼前节内第二代FIV载体介导标记基因的表达后房水流动性维持
Preservation of aqueos outflow facility after second generation FIV vector mediated expression of marker genes in anterior segments of human eyes. Niels Loewen et al. Investigative Ophtalmology visual science, Dec. 2002, vol. 43, No.12, 3686-3690
Lentiviral vectors, 293T cells

19. 膜辅蛋白是流行性角膜结膜炎关联腺病毒的一个受体
Membrane cofactor protein is a receptor for adenoviruses associated with epidemic eratoconjunctivities. Eugene Wu et al., Journal of Virology, Apr. 2004, p. 3897-3905
Chang conjunctival cells

20. 甲肝病毒外壳蛋白在感染后的免疫应答

Immune respons to Hepatitis A virus capsid Proteins after infection. Chwan-Heng Wang et al., Journal of Clinical Mictobiology, Mar. 1996, Vol. 34, No.3

Fibroblast cells, Hepatitis A virus

21. 移植至大鼠梗死心肌的成肌细胞的功能游离于其宿主

Myoblasts transplanted into rat infracted myocardium are functionally isolated from their host. Bertrand Leobon et al., PNAS, june 24, 2003, Vol.100, No.13 7808-7811

Primary muscle cells (Wistar rat), transfection, Adenovirus

22. 凝血因子VII突变体V154G，模拟凝血因子VIIa的一种酶原样形态

Factor VII mutant V154G models a zymogen-like form of Factor VIIa. Raffaella Toso et al., Biochemical Journal Immediate Publication, Oct. 1, 2002

HEK 293 (human embryonic kidney) cells

23. 层粘蛋白A1链N-端球状结构域可与a1b1和 a2b1整联蛋白结合，还可与串珠素肝素含硫结构域结合

The N-terminal globular domain of the laminin a1 chain binds to a1b1 and a2b1 integrins and to the heparin sulfate-containing domains of perlecan. Norbert Ettner et al., FEBS Letters 430 (1998) 217-221

HEK 293, 293 EBNA cells

24. 对当前通用的真核细胞培养工业系统的研究：优点和缺点－(原文为法语)

Etude comparee des principaux systemes industriels actuels de cultures cellulaire (in french) eukaryotes: avantages et inconvenients Yvan Applagnat-Tartet, 2003

Theoretical comparing culture systems

25. 磷酸甘油激酶在肿瘤发生中扮演二硫键还原酶的角色

Phosphoglycerate kinase acts in tumor angiogenesis as a disulphide reductase. Angelina Lay et al., Nature Vol. 408 Dec. 14, 2000 869-873

HT1080 cells

26. 人甲状旁腺激素受体结构及功能研究 － (原文为德语)

Strukturelle und funktionelle Untersuchung am humanen Parathormon-Rezeptor (in german) Dissertation Ulla Grauschopf

CHO-K1 cell line

27. 一个呈多型硫酸酯酶缺乏表型细胞系的永生化及特性研究

Immortalization and characterization of a cell line exhibiting a severe multiple sulphatase deficiency phenotype. Kathy Nelson et al., Biochem j. (1997) 326 (125-130)

KD3/LNC4S.12 cells, Gal4S production

28. 从人骨髓培养的塑料贴附可再生干细胞的快速扩增

Rapid expansion of recycling stem cells in cultures of plastic-adeherent cells from human bone marrow. David Colter et al., Proc Natl Acad Sci USA 2000 Match 28; 97 (7): 3213-3218

hMSC

29. 重组山羊N-乙酰葡糖胺-6-硫酸酯酶的表达、纯化和特性研究

Expression, purification and characterization of recombinant caprine N-acetylgluosamine-6-sulphatase. (Tom Litjens et al. Biochem J. (1997) 327 (89-94))

CHO-K1, transfection

30. 体外生成、对抗头颈癌的细胞毒性T细胞，可识别多个HLA-A2抗原表位（其中包括起源于p53和MDM-2蛋白的多肽）

In vitro generated cytolytic T lymphocytes reactive against head and neck cancer recognize multiple epitopes presented by HLAA2, including peptides derived from the p53 and MDM-2 proteins. Tadao Asai et al., Cancer Immunity, Vol 2, p.3 (April 16, 2002)

HNC cell lines (PCI-13,PCI-1,SCC-74)

31. 包含同源“甲状腺球蛋白I型”的肝素结合结构域、高碱性结构域的“胰岛素样生长因子结合蛋白-3，-5，-6”[(IGFBP's) -3，-5，-6] 抑制“胰岛素样生长因子结合蛋白-4”[(IGFBP) -4] 的降解

Heparin-binding, highly basic regions within the thyroglobulin type-1 repeat of insulin-like growth factor (IGF)-binding proteins (IGFBP's)-3, -5, and -6 inhibit IGFBP-4 degradation. John Fowlkes et al., Endocrinology Vol. 138, No. 6, 2280-2285

MC3T3-E1 cells (osteoblasts)

32. 从骨髓基质扩增成人干细胞: 早期祖细胞产出最大化的条件及质量评估

Expansion of human adult stem cells from bone marrow stroma: Conditions that maximize the yields of early progentitors and evaluate their quality. Ichito Sekiya et al., Stem Cells 2002; 20: 530-541

MSC's

33. 垂体腺苷酸环化酶激活肽受体的表达、纯化和重建

Expression, purification and reconstitution of receptor for pituitary adenylate cyclase-activating Polypeptide. Tetsuya Ohtaki et al., J. Biol Chem, Vol 273, issue 25, 15464-15473 (1998)

PACR19 cells

34. US专利6,664,385/ 代理: Biogen US Patent 6,664,385/ Assignee: Biogen

Fusion protein KIM-1, COS cells

35. 应用组合C4S-Keyhole成像技术来研究冷冻保护剂在工程组织中的动力学

Use of a combined C4S-Keyhole imaging technique to study the dynamics of cryoprotective agents in an engineered tissue. N.P.Bideault et al., Presentation at ISMRM 98, Sydney Australia

Fibroblasts

36. 使用Daniplestim、Leridistim、Progenipoietin、Promegapoietin和自体血浆进行粒系祖细胞和粒系祖后细胞的临床规模生产

Clinical scale production of granulocyte progenitor and post-progenitor cells using daniplestim, leridistim, Progenipoietin, Promegapoietin and autologous plasma. S.Patel et al., Cytotherapy 2000,vol2, no.2, pp.85-94

PBMC

37. 纤维蛋白原通过Aa-链羧基端RGD位点结合整联蛋白a5b1

Fibrinogen binds to Inegrin a5b1 via the carboxyl-terminal RGD site of the Aa-chain. Kazuhisa Suehiro et al., J.Biochem. Vol.128, pp.705-710 (2000)

Recombinant Fibrinogen, transfected BHK cells

38. US专利: 6,723,325/ 代理: Acambis

US Patent: 6,723,325 Assignee: Acambis

Smallpox vaccine, vaccinia virus, MRC-5, chicken embryo fibroblasts

39. 使用NUNC细胞工厂对粒系祖细胞和粒系祖后细胞进行的临床规模生产

Clinical scale production of granulocyte progenitors and post-progenitors using NUNC Cell Factories. R. Guo et al., ISHAGE, San Diego 2000, abstract

Peripheral blood progenitor cells

40. 对用于生产人乙酰胆碱酯酶（使用重组293细胞）的锚着依赖细胞繁殖系统的评估

Evaluation of anchorage-dependent cell propagation systems for production of human acetylcholinesterase by recombinant 293 cells. A. Lazar et al., Cytotechnology, 1993;13(2): 115-123

Recominant 293 cells

41. 在鸟类细胞中表达外源基因：一种潜在的重组蛋白生产工具

Heterologous Gene Expression in Avian Cells: Potential as a producer of recombinant (Acrobate) Proteins. Sun-Young Lee et al., J.Biomed.Sci 1999; 6:8-17

QF cell line, EPO expression

42. 从细胞培养中快速高效纯化甲肝病毒

Rapid and efficient purification of Hepatitis A virus from cell culture. Naomi Bishop et al, JIM 47 (1994) 203-216

Hepatitis A virus, BS-C-1 cells (African green monkey kidney)

43. 大规模转染哺乳动物细胞用以生产重组腺病毒

Large scale transfection of mammalian cells for the production of recombinant adenovirus. Shyam Subramanian, Merck&Co, presentation Wilbio November 2000 Gene Therapy

Adeno virus, PER.C6 cells

44. 使用无血清条件的逆转录病毒载体生产的优化

Optimization of retroviral vector production using serum free conditions. H.G.Eckert et al, Eufets, workpaper in collaboration with NUNC

Serum-free conditions, retroviral vectors, CD34+ cells

45. 培养箱设计：优化热传递及温度控制的塑料生物反应器

Incubator design for optimal heat transfer and temperature control in plastic bioreactors. William Adams, et al. Merck&Co, Pharmaceutical engineering Jan/feb 2003, Vol 23, no. 1

Heat transfer, Temperature control

46. 弓形虫体外培养：经济高效的大量生产

Toxoplasma gondii in vitro cultivation: economic and efficient mass production. C. Harmer et al., Journal of Microbiological Methods 27 (1996), 225-228

Hep-2 cells, Toxoplasma Gondii

47. 从人肝癌细胞来源PLC/PRF/5细胞中纯化谷胱甘肽转移酶（GST）及其性能研究

Purification and characterization of glutathione S-transferase from the human hepatoma derived PLC/PRF/5 cell line. Paul Dierickx, Biomedical research 10 (4) 301-306, (1989)

PLC/PRF/5 cell line, hepatoma, Glutathione-S-transferase

48. 甲肝病毒在细胞培养中的大规模生产：感染类型对病毒产量及细胞完整性所产生的效果

Large scale Production of Hepatitis A virus in cell culture: Effect of type of infection on virus yield and cell integrity. Betty Robertson et al, J. GEN. Virol. (1988), 69, 2129-2134

Hepatitis A virus, FRhK4 cells, foetal resus monkey kidney cells

49. 应用多盘电池系统进行的人纤维原细胞干扰素大规模生产

Large scale production of human fibroblast interferon in multitray battery system. V. Pakos et al. Develop.biol.Standard., vol. 60 pp. 317-320

General description, Interferon

50. 互联式培养瓶系统对锚着依赖细胞的大量培养

Communicating vessel systems for mass cell culture of anchorage dependent cells. R. Skoda et al., Develop.biol.Standard. 42, 1978, 121-126

General handling description

51. 甲肝病毒的体外繁殖和检验

Propagation and assay of hepatitis A virus in vitro. Guenter Siegel et al., Journal of Virological Methods, 9 (1984) 53-67

Hepatitis A, PLC/PRF/5 cells (hepatoma derived), MRC-5 cells

52. 用于恶性肿瘤过继免疫治疗的LAK细胞的新型大规模生产和冷冻工艺流程

A new procedure for large scale production and freezing of lymphokine activated killer (LAK) cells to be used in adoptive immunotherapy of cancer. Carlo Gambacorti et al. Tumori, 74: 523-530 (1988)

PBL activation

53. 肯塔基州农村儿童接种的一种福尔马林灭活甲肝病毒疫苗（VAQTA），安全、耐受且具免疫原性

Safety, tolerability and immunogenicity of a formalin-inactivated hepatitis A vaccine (VAQTA) in rural Kentucky children. Stan Block et al. Pediatr. Infect.Dis.J. 1993, 12:976-980

MRC-5 cells, Hepatitis A

54. 琼脂糖胶电泳系统分离抗体在动物农业学中的应用

Agarose Gel Electrophorisis System for the separation of Antibiotics used in animal Agriculture. Michael Salvatore et al., Analyst march 1993, vol 118

CF as Bioassay dish

55. 重组小鼠神经营养因子3（neurotrophin-3）的生产和鉴定

Production and characterization of recombinant mouse neurotrophin-3. Rudolf Goetz et al., Eur.J.Biochem. 204, 745-749 (1992)

Rabbit kidney cells, RK13, vaccinia virus

56. 人血管生长素（Angiogenin）在幼仓鼠肾细胞中的表达

Expression of human Angiogenin in cultured baby hamster kidney cells. Kotoku Kurachi et al. Biochemistry 1988, 27, 6557-6562

BHK cells, transfection

57. 一个核酸酶在一种甲肝病毒疫苗VAQTA纯化过程中的应用

Use of a nuclease enzyme in the purification of VAQTA, A hepatitis A vaccine A. Hagen et al., Biotechnology and applied Biochemistry 23(3), 1996, 209-215

Large scale manufacture, inactivated Hepatitis A vaccine

58. 重组人高血压蛋白原酶的酶活性鉴定

Enzymatic characterization of recombinant human renninl. Pilot et al. Biochemistry and Cell Biology 73 (3-4). 1995. 163-170

Transfected DAMP cells, dog pithelial cells, human rennin

59. 用于细胞培养的非灌注附加系统

Nonperfused attachment systems for cell cultivation. AY Elliot, Bioprocess Technol (United States) 1990, 10, p207-116; ISSN 0888-7470

Large scale application description

60. Mammamoduline的大规模生产；发展一种贴附细胞生长的低成本高产出工艺

Large scale production of mammamoduline. Development of a low cost, large scale production process for adherent cell growth. EJ Schlaeger et al., ESACT-Proceedings 1994

MDA-MB-21 cells, CF as carrier-seeding device

61. 在特定蛋白缺失培养基中培养的人癌细胞肿瘤分泌产物的分离

Isolation of tumor-secreted products from human carcinoma cells maintained in a defined protein-free medium. E. Aldermann et al., Proc.Natl.Acad.Sci.USA, vol 82, pp5771-5775, september 1985

HT-29 cells, protein free medium

62. 用于在存在饲养条件及无饲养条件下大规模培养人胚胎干细胞的永生化饲养（细胞）

Immortalized feeders for the scale-up of human embryinic stem cells in feeder and feeder-free conditions. Andre Choo, Jayanthi Padmanabhan, Angela Chin, Wey Jia Fong, Steve K.W. Oh, bioprocessing Technology Institute, Biommedical Sciences Institures, Singapore

Human embryonic stem cells, Immortalized feeders, Undifferentiated

63. 用琼脂糖凝胶电泳系统分离畜牧业兽用抗体

Agarose gel electrophoresis system for the separation of antibiotics used in animal agriculture. M.J. Salvatore et al., The Analyst 1993, vol. 118, no. 3, pp. 281-287

64. 从大鼠胶质瘤细胞株纯化糖蛋白血管内皮细胞线粒体

Purification of a Glycoprotein Vascular Endothelial Cell Mitogen From a Rat Glioma-Derived Cell Line. G. Conn et al., PNAS 1990, vol. 87, no. 4, pp. 1323-1327

65. 人骨髓干/祖细胞促进小鼠海马内源性神经干细胞的神经发生

Human stem/progenitor cells from bone marrow promote neurogenesis of endogenous neural stem cells in the hippocampus of mice. J.R. Munoz et al., PNAS 2005, vol. 102, no. 50, pp. 18171-18176

Culturing HEL 299 Cell Line on a

Nunclon Δ Cell Culture Treated Surface

Introduction

NUNC Brand Nunclon. cell culture products are tested for cell growth and plating efficiency using several different cell lines. Nunclon. products are tested with two cell lines L929, HEL 299 or F2002 and one Primary Chick Embryo cellculture for monolayer formation, plus cell line V79 (-4) for cloning efficiency. The HEL 299 cell line is derived from embryonic lung tissue of a human male. It is a diploid fibroblast-like cell line initially developed for use in vaccine development.

This TechNote describes a procedure for culturing HEL 299 cell line on a Nunclon. treated surface.

Materials and Methods

- HEL 299 Cells (ATCC CCL 137)
- Minimum Essential Medium Eagle (MEM)
- Fetal Bovine Serum (FBS)
- L-Glutamine, 200 mM
- Sodium Pyruvate, 100 mM
- Lactalbumin Hydrolysate, 10% in Earle's Balanced Salt Solution
- Dulbecco's Phosphate Buffered Saline, 1X (without Ca^{2+} or Mg^{2+})
- EDTA, 0.02% Solution
- Trypsin Solution, 1X
- Antibiotic/Antimycotic Solution, 100X
- Crystal Violet or Methyl Violet, 0.1-0.4% in aqueous alcohol solution
- Reference lots

Prepare growth medium for HEL 299 cell line as follows:

MEM 1X	500.0 mL
FBS	58.0 mL
L-glutamine	5.8 mL
10% Lactalbumin Hydrolysate	5.8 mL
Sodium pyruvate	5.8 mL
Antibiotic/Antimycotic	5.8 mL
Total	581.2 mL

Culturing Procedure

1. Place culture vessels (samples and reference lots, as appropriate) in a laminar flow hood along with the Culture medium components which have been pre-warmed to 37°C.
2. Prior to harvesting, cells must be at least 75% confluent with good morphology. Aspirate medium and wash cells twice with 1X PBS before addition of EDTA solution.
3. Add EDTA solution to cover the Growth area completely
4. After EDTA solution is decanted, add trypsin to disaggregate the cells. Incubate culture vessels at 25°Cor 37°C and monitor cell detachment under the microscope. Detachment time will vary.
5. After cells detach, add medium to stop trypsinization and to disperse the cells.
6. Transfer cells to a sterile conical tube and place on ice.
7. Determine cell quantity, e.g. Trypan Blue dye exclusion assay
8. Determine the number of cells required for each product to be Tested by multiplying the plating density by the surface area. Plating density for HEL 299 cell line is 2.0x104/cm^2.
9. Dilute cells into growth medium and Seed cell culture product.
10. Incubate cells in a 37°Cincubator with 5% CO for seven days to 2 form a confluent monolayer.
11. Decant medium. Add reagent alcohol, 95%, for 5 to 10 minutes for fixation, then decant.

    Add crystal violet or methyl violet stain, 0.1-0.4%, to cover the surface for 5 to 10 minutes, then decant and wash with water.
12. Evaluate the monolayer when dry. (See Figure 1.)

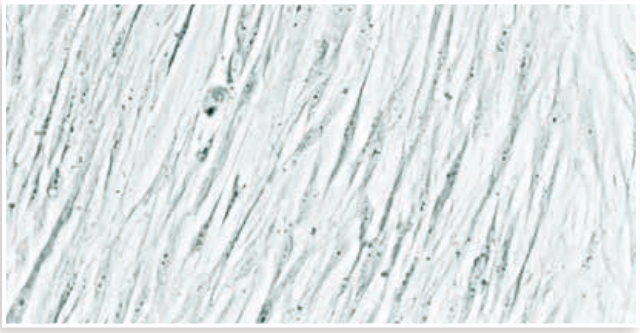


Figure 1:
HEL 299 cells after seven days incubation at 37°C, cultured on a Nunclon Δ polystyrene surface, stained with 0.4% crystal violet. Calibration bar is 40m.

Certification Results

When used for Nunclon. Certification, HEL 299 cell line results are evaluated as a percentage of surface coverage, per test sample.

- The average percent value must be within 10% of the values of the control products tested with HEL 299 cells.
- Cell growth must be consistent over the entire growth surface.

If these two conditions are met, product passes HEL 299 testing.

Culturing L929 Cell Line on a

Nunclon Δ Cell Culture Treated Surface

Introduction

NUNC™ Brand Nunclon Δ cell culture products are tested for cell growth and plating efficiency using several different cell lines. NunclonΔ products are Tested with two cell lines L929, HEL 299 or F2002 and one Primary Chick Embryo cell culture for monolayer Formation, plus cell line V79(-4) for cloning efficiency. L929 is a fibroblast-like cell line cloned from strain L. The parent strain was derived from normal subartaneous areolar and adipose tissue of a male C3H/An Mouse.

This TechNote describes a procedure for culturing L929 cell line on a Nunclon Δ treated surface.

Materials and Methods

- L929 Cells (ATCC CCL 1)
- Minimum Essential Medium Eagle (MEM)
- Bovine Calf Serum (BCS), iron supplemented or Newborn Calf Serum (NCS)
- L-Glutamine, 200 mM
- Non-essential Amino Acids (NEAA), 100X
- Dulbecco's Phosphate Buffered Saline, 1X (without Ca^{2+} or Mg^{2+})
- Trypsin Solution, 1X
- Antibiotic/Antimycotic Solution, 100X
- Crystal Violet or Methyl Violet, 0.1-0.4 % in aqueous alcohol solution
- Reference lots

Prepare growth medium for L929 cell line as follows:

MEM 1X	500.0 mL
BCS	57.0 mL
L-glutamine	5.7 mL
NEAA	5.7 mL
Antibiotic/Antimycotic	5.7 mL
Total	574.1 mL

Culturing Procedure

1. Place culture vessels (samples and reference lots, as appropriate) in a laminar flow hood along with the culture medium components which have been pre-warmed to 37°C.
2. Prior to harvesting, cells must be at least 75% confluent with good morphology. Aspirate medium and wash cells twice with 1X PBS before Trypsinization.
3. Add trypsin to disaggregate the cells. Incubate culture vessels at 25°C or 37°C and monitor cell detachment Under the microscope. Detachment time will vary.
4. After cells detach, add medium to stop trypsinization and to disperse the cells.
5. Transfer cells to a sterile conical tube and place on ice.
6. Determine cell quantity, e.g. Trypan Blue dye exclusion assay.
7. Determine the number of cells required for each product by Multiplying the plating density by the surface area. Plating density for L929 cell line is 1.5 x 104/cm^2.
8. Dilute cells into growth medium and seed cell culture product.
9. Incubate cells in a 37°C incubator with 5% CO for four days. A confluent monolayer of L929 cells should be formed.
10. Decant medium. Add reagent alcohol,95%, for 5 to 10 minutes for fixation,then decant. Add crystal violet or methyl violet stain, 0.1-0.4%, to cover the surface for 5 to 10 minutes, then decant and wash with water.
11. Evaluate the monolayer when dry. (See Figure 1.)

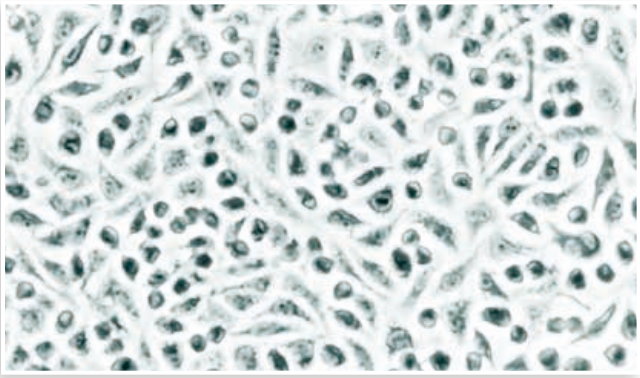


Figure 1:
L929 cells after four days incubation at 37°C, cultured on a Nunclon Δ polystyrene surface, stained with 0.4% crystal violet. Calibration bar is 40µm.

Certification Results

When used for Nunclon ΔCertification, L929 cell line results are evaluated as a percentage of surface coverage, per test sample.

- The average percent value must be within 10% of the values of the control products tested with L929 cells.
- Cell growth should be consistent over The entire growth surface.

If these two conditions are met, product passes L929 testing.

Culturing Primary Chick Embryo Cells on a Nunclon Δ Cell Culture Treated Surface

Introduction

NUNCTM Brand NunclonΔ cell culture products are tested for cell growth and plating efficiency using several different cell lines. NunclonΔ products are tested with two cell lines L929, HEL299 or F2002 and onePrimary Chick Embryo (PCE) cell culture formonolayer Formation, plus cell line V79(-4) for cloning efficiency. Primary Chick Embryo cells are used to assess primary cell growth.

This TechNote describes a procedure for culturing cells isolated from chick embryos on a NunclonΔ treated Surface.

Materials and Methods

- Fertile Eggs (10 to 12 day gestation)
- Minimum Essential Medium Eagle (MEM)
- Bovine Calf Serum (BCS), iron supplemented or Newborn Calf Serum (NCS)
- L-Glutamine, 200 mM
- Non-essential Amino Acids (NEAA), 100X
- Dulbecco's Phosphate Buffered Saline, 1X (without Ca^{2+} or Mg^{2+})
- Trypsin Solution, 1X
- Antibiotic/Antimycotic Solution, 100X
- Crystal Violet or Methyl Violet, 0.1-0.4 % in aqueous alcohol solution
- Reference lot

Prepare growth medium for primary chick embryo cells as follows:

MEM 1X	500.0 mL
BCS	57.0 mL
L-glutamine	5.7 mL
NEAA	5.7 mL
Antibiotic/Antimycotic	5.7 mL
Total	574.1 mL

Culturing Procedure

A. Preparation of Chick Embryos

1. Place eggs, smaller (pointed) end up, in a sterile beaker.
2. Sterilize shell with 70% ethanol.
3. Pierce egg shell with sterile forceps and continue in a circular pattern to enlarge the opening until an intact circle of shell can be lifted from the Egg.
4. Extricate the embryo and decapitate. Place the body into a sterile 150x15 mm Petri dish.
5. Remove the limbs of the embryo with sterile scissors.
6. Place the remaining embryo in a 250 mL beaker and rinse twice with 1X PBS before mincing with sterile scissors.
7. Add 10 mL of trypsin (37°C, pH 7.5 to 8.0).
8. Stir the embryo-trypsin mixture on a magnetic stirrer for 45 minutes to 1 hour at 25°C.
9. Filter the mixture using sterile gauze Premoistened with 10 mL of 1X PBS.
10. Place the filtrate in a 50 mL conical tube and centrifuge for 10 minutes at 580 xg at 20°C.
11. After centrifugation, decant supernatant and resuspend cells in 10 mL of medium.

B. Culturing Procedure

1. Place culture vessels (samples and controls, as appropriate) in a laminar flow hood along with the culture Medium components which have been pre-warmed to 37°C.
2. Determine cell quantity, e.g. Trypan Blue dye exclusion assay. Each embryo yields approximately 3 x 108 cells.
3. Determine the number of cells Required for each product under test by multiplying the plating density by the surface area. Plating density for PCE cells is 1.5 x $10^5/cm^2$.
4. Dilute the appropriate number of cells in growth medium and seed cell culture product.
5. Incubate cells in a 37°C incubator with 5% CO_2 for three days to form a confluent monolayer.
6. Decant medium. Add reagent alcohol, 95%, for 5 to 10 minutes for fixation, then decant. Add crystal violet or methyl violet stain 0.1-0.4%, to cover the surface for 5 to 10 minutes, then decant and wash with water.
7. Evaluate the monolayer when dry. See Figure 1.

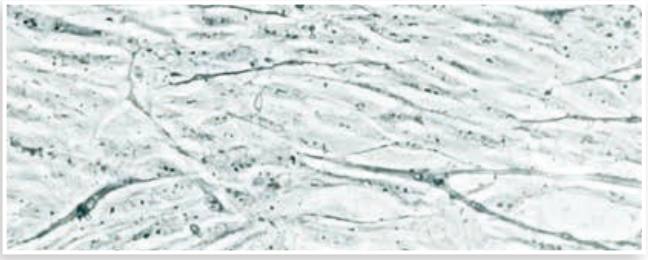


Figure 1:
Primary chick embryo cells after three days incubation at 37°C, cultured on a NunclonΔ polystyrene surface, stained with 0.4% crystal violet. Calibration bar is 40µm.

Certification Results

When used for NunclonΔ Certification, primary cell growth results are evaluated as a percentage of surface coverage per test sample.

- The average percent value must be within 10% of the values of the control products tested with PCE cells.
- Cell growth must be consistent over the entire growth surface.

If these two conditions are met, product passes PCE testing.

Culturing V79-4 Cell Line

on a Nunclon Δ Cell Culture Treated Surface

Introduction

NUNC™ Brand NunclonΔ cell culture products are tested for cell growth and plating efficiency using several different cell lines. NunclonΔ products are tested with two cell lines L929, HEL 299 or F2002 and one Primary Chick Embryo cell culture for monolayer formation, plus cell line V79-4 For cloning efficiency. V79-4 is a fibroblast-like cell line derived from the lung tissue of a male Chinese hamster. It has a relatively high plating efficiency and short generation time.

This Tech Note describes a procedure for culturing V79-4 cell line on a NunclonΔ treated surface.

Materials and Methods

- V79-4 Cells (ATCC CCL 93)
- Minimum Essential Medium Eagle (MEM)
- Bovine Calf Serum (BCS), iron supplemented
- Fetal Bovine Serum (FBS)
- L-Glutamine, 200 mM
- Non-essential Amino Acids (NEAA), 100X
- Dulbecco's Phosphate Buffered Saline, 1X (without Ca^{2+} or Mg^{2+})
- Trypsin Solution, 1X
- Antibiotic/Antimycotic Solution, 100X
- Crystal Violet or Methyl Violet, 0.1-0.4% in aqueous alcohol solution
- Product Controls

Prepare growth medium for primary chick embryo cells as follows:

MEM 1X	500.0 mL
BCS	57.0 mL
L-glutamine	5.7 mL
NEAA	5.7 mL
Antibiotic/Antimycotic	5.7 mL
Total	574.1 mL

Culturing Procedure

1. Place culture vessels (samples and controls, as appropriate) in a laminar flow hood along with the culture medium components which have been pre-warmed to 37°C.
2. Prior to harvesting, cells must be at least 75% confluent with good morphology. Aspirate media and wash cells twice with 1X PBS before Trypsinization.
3. Add an appropriate volume of Trypsin to disaggregate the cells. Incubate culture vessels at 25°C or 37°C and monitor cell detachment under the microscope. Detachment time will vary.
4. After cells detach, add media to stop trypsinization and to disperse the Cells.
5. Transfer cells to a sterile conical tube and place on ice.
6. Determine cell quantity by the Trypan Blue dye exclusion assay.
7. Determine the number of cells required for each product by multiplying the plating density by the surface area. Plating density for V79-4 cell line is 6.0 x 10/cm^2.
8. Dilute the appropriate number of cells into growth media and seed cell culture product.
9. Incubate cells in a 37°C incubator with 5% CO_2 for six days to form distinct colonies.
10. Decant media. Add reagent alcohol, 95%, for 5 to 10 minutes for fixation, then decant. Add crystal violet or methyl violet stain, 0.1%-0.4%, to cover the surface for 5 to 10 minutes, then decant And wash with water.
11. Evaluate cloning efficiency when dry. (See Figure 1).

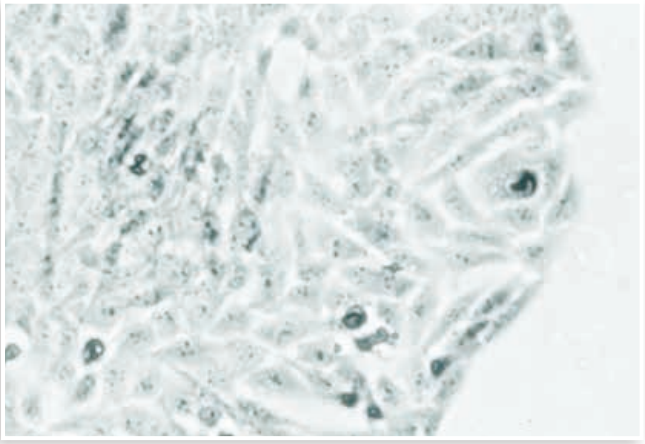


Figure 1:
V79-4 cells after six days incubation at 37°C, cultured on a NunclonΔ polystyrene surface, stained with 0.4% crystal violet. Calibration bar is 40 µm.

Certification Results

When used for NunclonΔ Certification, V79-4 cell line results are evaluated as number of colonies per test sample.

- The average number of colonies must be within 15% or less of the average colonies observed in the control products tested with V79-4 cells.

If the previous condition is met, product passes V79-4 testing.

Serum-free Transient Expression of Antibodies

Using 40 Tray Cell Factories

Peter Schlenke, Katrin Boetzel, Thilo Grob, Frank Kohne, Hans Hofer, Ulrike Brandle, Kurt Russ and Ralf Fehrenbach

Abstract

A serum-free transient expression method for antibodies in HEK Cells and a standardized purification protocol were developed. The methods described enable the fast and cost-effective production of hundreds of milligrams of different antibodies that can be used for test purposes. The N-Glycan profile of the antibodies obtained is comparable to that of antibodies expressed in stable CHO cell lines, confirming the suitability of the system to produce material for target validation studies.

Introduction

For target validation studies, significant amounts of antibodies are required. Because most of the biopharmaceuticals require specific post-translational modifications for proper bioactivity, e.g. Glycosylation, mammalian cells are mainly used as expression systems.

The generation of stable cell lines is expensive and time consuming and therefore restricted to a small number of antibody candidates, consequently transient expression of the antibodies offers a suitable method.

We have developed a transient serumfree expression method in HEK 293 cells using calcium-phosphate precipitation. The transfection of the cells is performed during cultivation in 40 Tray Cell Factories (CF 40), each with a culture area of about 25.000 cm^2. Due to the adherence of the cells, repeated harvesting is easily possible and results in a significant increase in the final product yield (see Fig.1). After a 3-step purification process a highly purified material is obtained. Analysis of the NGlycan structures released from the purified antibodies confirmed the suitability of the system to produce antibodies with characteristic glycosylation pattern.

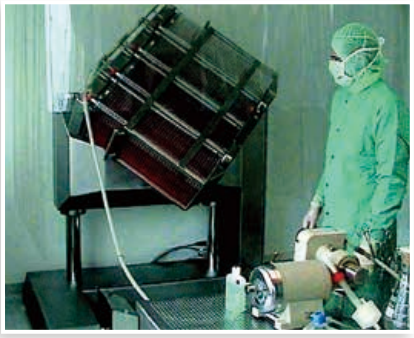


Fig. 1 Harvesting of the antibody containing supernatant and replacement with fresh production medium using an Automatic Cell Factory

Results Transient expression

Two IgGs were expressed in HEK293 cells cultivated in 4 CF40. In each case 4 harvests were performed repeatedly after 3-4 days of cultivation. Production volume was 4 L/CF40, resulting in a total harvest volume of 64 L per IgG. The expression level reached up to 12 mg/L in serum-free culture conditions. For the two IgGs expressed a final product yield of about 530 resp. 430 mg was achieved. The results obtained are summarised in Tab. 1.

Tab. 1 Summary of the results obtained after large scale transient expression of two human IgGs

	1st IgG			2rd IgG		
Harvest	Titer [mg/L]	Volume [L]	Yield [mg]	Titer [mg/L]	Volume [L]	Yield [mg]
1	12	16	192	10	16	160
2	9	16	144	9	16	144
3	8	16	128	6	16	96
4	4	16	64	2	16	32
			☐ 528			☐ 432

Purification of the IgGs

The IgGs were purified from the 64 L cell culture supernatant using a standardised 3-step protocol after concentration by ultrafiltration. SDS PAGE analysis, isoelectric focusing and HPLC analysis (data not shown) confirmed, that the purification strategyresulted in a highly purified product (see Fig. 2).

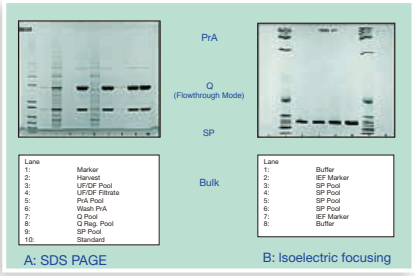


Fig. 2 SDS PAGE analysis and isoelectric focusing. The IgG was analysed during and at the end of the purification process. After separation the IgG was visualized by silver staining.

Analysis of the N-Glycan structures

The main N-Glycans detected after desialylation were complex-type biantennary structures without terminal Gal (36.6%), with 1 terminal Gal (44.9%) and with 2 terminal Gal (15.1%). Only about 2% of the NGlycans were sialylated. The analysis confirmed the ability of the transiently transfected HEK293 cells to synthesise N-Glycan structures similar to those obtained after stable expression in e.g. CHO cells.

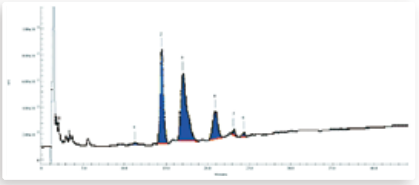


Fig. 3 HPAEC PAD profile of the desialylated NGlycans released from IgGs after transient expression in HEK293 cells. The structures detected are summarised inTab. 2.

Tab. 2 Desialylated N-Glycan structures found on an IgG after transient expression in HEK293 cells.

Peak	Retention [min]	Structure Code	Area [%]	Structure
1	11.23	CoreF1GN1GOS0	0,9	
2	14.43	CoreF1GN2GOS0	36,6	
3	17.60	CoreF1GN2G1S0	44,9	
4	20.87	CoreF1GN2G2S0	15,1	
5	23.13	not determined	1,35	
6	24.30	not determined	1,18	

GlcNAc ■ Man ● Gal ■ Fuc ◆

Conclusion

- By transient expression of two human IgGs in 4x40 Tray Cell Factories, a final product titer of 530 respectively 430 mg was obtained.
- A 3-step purification process using a standardised protocol resulted in a highly purified product.
- The N-glycosylation pattern of the IgGs,after transient expression in HEK293 cells, were similar to IgGs synthesised in stably transfected CHO cell lines.

Application Note

Production of Poliovirus using Vero Cells Cultured in Nunc Cell Factories, T-Flasks and Roller Bottles with HyQ SFM4MegaVir

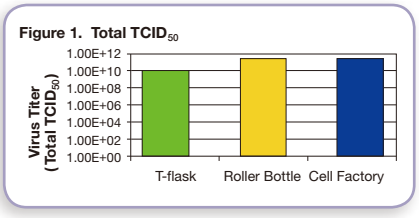
Overview

Biopharmaceutical markets demand that many products be made on a large scale. As researchers develop new products, they are required to take a process from bench scale to production scale.Those who have gone through the scale up process realize that simply putting more of the same ingredients in a larger container may not produce the same results. Also, container scale up may not be feasible. For instance, if a researcher required a 100-fold increase in virus, the surface area required for a T-flask would need to be increased from 75 cm^2 to 7,500 cm^2. Imagine the size of a T-7500 flask (7,500 cm^2 or 8 square feet!).

Many approaches exist for cell culture scale up and the production of virus. Three cell culture vessels (Nunc Cell Factories, Corning T-75 flasks, and Corning roller bottles) are compared here in terms of why and how each is used, protocol differences, and virus production performance.

The biopharmaceutical industry is moving away from the use of animal derived products used in the manufacturing of products. The MegaVir medium and non-mammalian trypsin replacement used in this study were selected to follow this trend. MegaVir is a protein-free medium that is used without the addition of animal serum. MegaVir has been shown to sustain anchorage-dependent VERO cell cultures over long periods. Vaccine manufacturers use VERO cultures to produce viruses such as the poliovirus used in this study.

Figure 1. Total $TCID_{50}$



Materials and Methods

VERO cells (ATCC CCL-81, African Green Monkey, adult kidney, epithelial) were adapted from serum-containing conditions to MegaVir medium (HyClone) and carried over 20 passages. Cells were then cultured in Corning T-75 cell culture flasks and scaled up to Nunc Cell Factory 10-layer unit (CF10) and 850 cm^2 roller bottles (Corning) on a Bellco Technology Cell-Production Roller Apparatus for virus propagation studies. Surface area and medium volumes for each vessel type are outlined in table 2.

Cells were cultured at an initial density of 8,000 cells/cm^2, cultured at 37°C in a 5% CO / 95% air environment, and observed daily under a microscope until at least 2 90% confluency was achieved. Medium was then removed from the cell culture vessel, cells were rinsed with phosphate buffered saline solution (PBS), and nonmammalian trypsin replacement was applied at 6-10 mL per 75-cm^2 area. Cells were observed until all cells had detached from the culture surface (typically 15-20 minutes), then cell counts and viability were performed, recorded, and analyzed for doubling times. The non-mammalian trypsin replacement was not removed from the culture. New vessels were seeded for scale up at 8,000 cells/cm^2.

Upon reaching 90% confluency the cultures were inoculated with poliovirus at an approximate MOI of 0.1. The culture was then incubated at 37°C for 72 h, followed by aseptic removal and storage of the supernatant. Any cells remaining attached to the growth surface of the CF were removed using non-mammalian trypsin replacement, and added to the supernatant. In order to lyse all cells the supernatant was completely frozen at -70°C then thawed completely at 37°C. This process was repeated twice to lyse cells and release virus particles. Lysate was then collected and centrifuged to pellet and remove cellular debris. The supernatant containing virus was used to prepare 10 log dilutions of each sample. Titrations for each 10 clarified sample were performed in 96 well micro-titer plates using TCID assays 50 described previously.

Specific protocols and advantages for each vessel are outlined in Table 1.

Table 1	Market Application	Additional Equipment Required	Gas Transfer Mechanism	Fluid Movement
T-Flask	Research	Incubator/ Pipetting System	Cap	Pipette
Roller Bottles	Research and Industry	Incubator, Pipetting System, Roller Apparatus	Cap	Pipette
Cell Factories	Research and Industry	Incubator/ Pipetting System	Filter	Pipette and Gravity Feed via Tubing

Results and Discussion

Vero cells in this study reached confluency normally in all vessels tested with good surface attachment, normal morphology, and even distribution of cells. All doubling times and peak cell densities at the times of passage fell in a normal range for protein-free cell culture conditions. Constant doubling times (approximately 40 hours) and good viability were maintained.

No detrimental affects were observed from the use of non-mammalian trypsin replacement. Handling was reduced since there is no need to centrifuge cells to remove the cell detachment solution before reseeding a culture vessel.

Scaling from a T-75 to a CF1 to a CF10 unit was possible in two passages. The 85-fold increase of surface area/ cell mass is similar to scaling up suspension cultures from a 250 mL volume shaker flask to a 15-L bioreactor in two passages.

Virus Production

T-flasks are typically used for research applications, developing cell lines, etc., but not convenient for large scale applications since considerable time is required to handle the large number of vessels required. Roller bottles are an improvement over T-flasks since a greater surface area is available compared to T-flasks while using less media. A disadvantage of the roller bottle method is the requirement for a roller bottle apparatus to rotate the cylinders, supplying nutrients and gas exchange to the entire surface. Also, the app aratus greatly increases the footprint or incubator surface area required for operation. Physical space is often a highly coveted property in labs and production facilities.

A great advantage of the Nunc Cell Factory is its small footprint and its scalability from R&D through large-scale production (see table 2). A short learning curve occurs as operators learn to dispense media, trypsin, and PBS into and out of the vessel (see manufacturer`s instructions for a detailed description). Larger Cell Factories (CF10 and CF40) would require the use of a non-mammalian trypsin replacement. Larger vessels mean larger volumes of media that make centrifugation necessary to remove cell-damaging trypsin. It is possible to leave a non-mammalian trypsin replacement in cell passages. This method decreases the labor involved as well since centrifugation is not required.

Figure 1. Total $TCID_{50}$

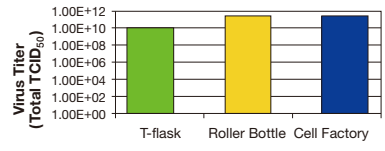


Table 2. Comparing surface area, reagent volume, total footprint, labor, and additional equipment requirements for T-flasks, roller bottles, and Nunc Cell Factories.

Criteria	Cf10	T-75	Roller Bottle
Surface Area (cm^2)	6,320	75	850
Media Volume/Vessel (mL)	2,000	50	200
Units Required for 6,320 cm^2 area	1	85	8
Total Media Required for 6,320 cm^2 area (mL)	2,000	4,250	1,600
Total Footprint (cm^2)	670	2,670*	4,250**
Total Non-Mammalian Trypsin Replacement (mL)	250	510***	160**
Total Volume PBS (mL)	250	850***	160****
Labor Hours to Harvest	0.5	2.0	0.5
Virus Titer ($TCID_{50}$/ mL)	1.26×10^8	2.61×10^8	1.13×10^9
Total Virus Titer ($TCID_{50}$)	2.52×10^{11}	1.31×10^{10}	2.26×10^{11}

* Based on stacking T-75 flasks four high

** Based on Bellco Technology Cell Production Roller Apparatus

*** Based on 6 mL non-mammalian trypsin replacement and 10 mL PBS/flask

**** Based on 20 mL non-mammalian trypsin replacement and 20 mL PBS/flask

Summary

Protein-free cell culture is becoming more commonplace in biopharmaceutical production. The combination of HyQ SFM4MegaVir and the non-mammalian trypsin replacement suit this role and perform well in cell growth and virus production. The medium contains no animal derived components and the monolayer-detaching enzyme used is a non-trypsin, non-mammalian reagent that is well suited for biopharmaceutical production methods.

Since HyQ SFM4MegaVir performs equally well in all systems tested, the choice of which vessel to use will depend on interests in time, convenience, and space savings. Roller bottles may outperform Cell Factories on virus production per mL of medium used, but footprint and labor savings may outweigh the media savings benefit.

Ordering Information

Vendor	Description	Part Number	Volume	Delivery System
HyClone	HyQ SFM4MegaVir	Sh30552	500mL-1000mL	PETE Bottles
			5L-500L	CX5-14 BPC

Vendor	Description	Part Number	Number of Trays	Units per Case
Nalge Nunc	CF-10 Nunc Cell Factory	164327	10	2
		170009	10	6

Scaleable, controlled growth of adherent cells

in a disposable, multilayer format

Extending Cell Factories with uniform gas-distribution

Edwin Schwander, Hans Rasmusen, NUNC A/S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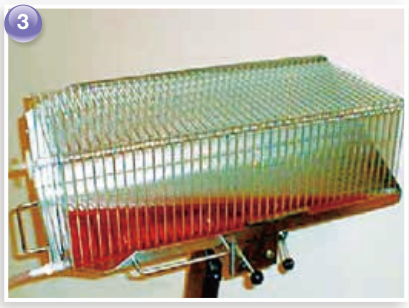
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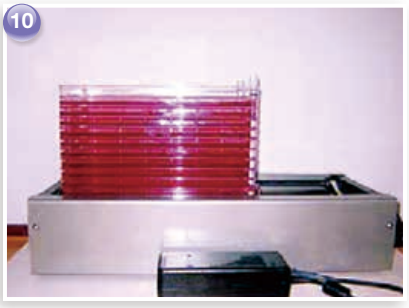
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History

Until the 1970's, the larger scale production of adherent cells was mainly performed in bottles, where the distribution of cells and medium was achieved by a rotating motion. This technology has the advantage of being simple and easy in operation, achieving an increased volume-surface ratio of about 0.3 cm^2/cm^3 (standard Roller Bottle). Bottles contain a sufficient volume of gas with reasonable gas transfer rates, but are limited in terms of size, to about 4000 cm^2 per unit. They are cumbersome to operate manually, when scaling up is needed.

In 1975, Nunc A/S began to produce a new generation of devices, in collaboration with Bioferon (Renschler Biotechnology).This device, called Cell Factory, consists of trays with a surface of 632 cm^2 each. Stacked trays of up to 40 layers (with a total surface of 25,280 cm^2 per unit) achieve a surface-volume ratio of 0.5 cm^2/cm^3. This creates a format, for using a flask-like system from research applications up to industrial production scale.

In order to industrialize the use of such units, a robotic system called ACFM (1) (Automatic Cell Factory Manipulator) was developed to physically manipulate 4 interconnected 40-layer units simultaneously.

In this way a surface of 101, 120 cm^2, representing the equivalent of about 120 standard Roller Bottles, could be handled as one closed unit. With limited space requirements (less than 150 m^2), batches of several thousand liters can be produced with little labour involved. Gradually, a whole line of equipment, from handling/supports for single units (2+3) to shakers (4), rack-systems (5), incubators (6), warm-room-shelves (7), was developed.

Nunc also has a series of new products under development such as simple gassing stations(8), microscopes (9) and motion-generators (10).

This system found its way into the pharmaceutical community for the production of vaccines and proteins (polio-, rabies-, Hep-A-vaccine, EPO, interferons, hGH and others products) at intermediate to very large scale production of several thousand liter per batch.

Key aspects of multilayer format

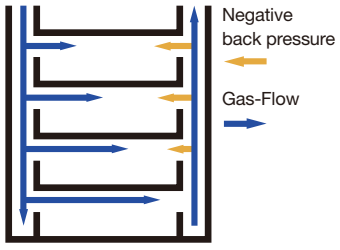
The Cell Factory as a device compared to Roller Bottles offers the significant advantages that with a 120 x surface, compared to standard Roller Bottles, labour time and contamination risks are drastically reduced.

This compact format is realized mainly by the reduction of the air volume above the culture.

In recent years, the use of different, partly modified, cell lines created a situation, where the availability of oxygen became a limiting factor in some cultures.

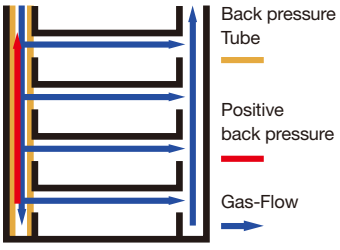
Gassing the devices, by just putting airfilters on both channels, is possible, but delivery of the gasses is uneven within the device due to negative back pressure (see figure 1).

figure 1



In order to overcome this problem, Nunc created a patented product extension, where a back pressure tube is inserted in one of the filling channels (see figure 2). This tube with 0.4 mm pinch holes for each layer, creates sufficient back pressure to insure that the gasses are distributed equally over the individual layers at a moderate flow rate of 50 mL per tray.

figure 2

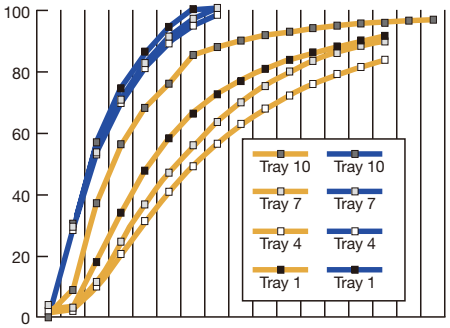


In an experimental set-up, oxygensensors were placed in tray 1, 4, 7 and 10 (counted from the top) of a gassed 10- layer Cell Factory and a 10-layer unit of a competitor. Units were filled with 2 liter of a buffer and oxygen was depleted by extensive flushing with nitrogen.

Then units were gassed with a constant flow (0,5l/min) of atmospheric air and oxygen saturation was measured over a period of 90 minutes.

In figure 3 the results are shown. While with the gassed unit an almost identical pattern of saturation with oxygen can be seen, the competitor product shows a significant difference in saturation in time, indicating clearly a non-identical cell culture environment.

figure 3



First results comparing active gassed to non-gassed cultures

Nadia De Bernardi, Luisa Nolli, Areta International srl

In order to investigate the effects of active gassing, the following studies were initiated at Areta International srl (Gerenzano, Italy):

Cells were cultivated under active gassed and non-gassed conditions, monitoring glucose/lactate and comparing cell density.

First results obtained from these experiments indicate the following:

- Higher growth rate was observed when gassing CF's
- Cell densities reached were on average 20-40% higher under gassing
- Expression of proteins (IgG) was higher under active gassing conditions
- Faster adaptation to serum free medium (SFM) was observed in experiments

In each experiment, different cell lines, both suspension and anchorage dependent, were cultivated.In all experiments 1x104 cells/ cm^2 in 400 mL of medium were used for seeding the devices.

The cells were maintained in culture for 4 days. During the culture period, the medium was sampled daily from each CF to test viability, cell number and at the end of the culture time, the productivity.

In gassed CF' s a pump was set to pass 2 litres of gas into the CF's for one minute every four minutes. The non gassed CF's were maintained in an incubator with 5% CO_2.

figure 4

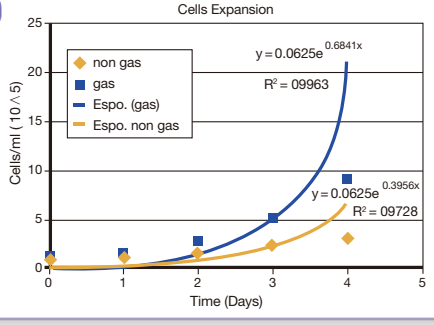


figure 5

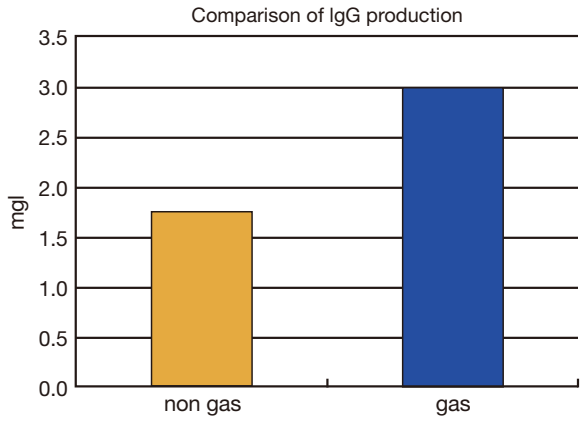
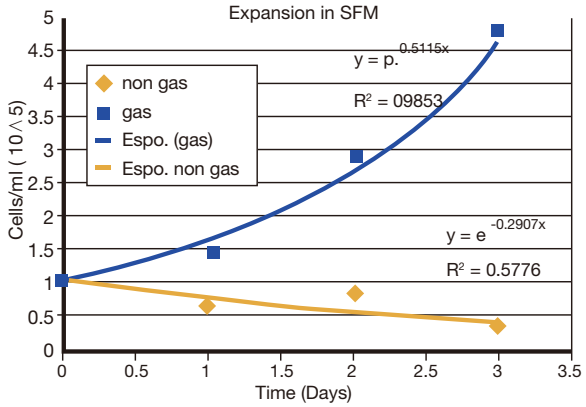


figure 6



The figures below show data and results obtained.

In summary gas is beneficial for:

- Cell expansion (figure 4: cell density is increased by up to 73% when seeded in Cell Factories with gassing)
- Productivity (the production is 58% higher in a gassed Cell Factory) (figure 5)
- Serum free adaptation: the cell growth is faster in CF with gas in SFM. (figure 6)

Many disposable systems for cultivating adherent cells have appeared on the market during the last 30 years, but few of them reached a broad public, and some did not progress beyond the proto-type stage. Nunc's Cell Factory has proven to be a viable format for the production of adherent cells. The fact that competitors recently started to copy the product, both confirms the security of the market position, and shows that the Cell Factory format has reached a mature status.

The key factor when deciding on a system is an assurance of the commitment of the supplier to support its product over a long period of time. In this respect, over 3 decades Nunc has proven to be strongly committed to Cell Factory products.

Continuous ongoing improvements and customized product extensions are part of our philosophy.

Acknowledgements

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Thermo Scientific Nunc Cell Factory System extractable review

How product design influences an extractable profile

Stephanie Carter, Application Scientist; Joseph Granchelli, PhD, Manager, Applications and Technical Support Thermo Fisher Scientific, Rochester, New York

Key Words

Cell Factory System, extractables, UV-cured adhesive, ultra-sonic welding, product design, risk, safety

Introduction

Biopharmaceutical manufacturers have an obligation to ensure the safety and efficacy of the products they produce. This requirement drives the selection of products and materials used in manufacturing operations and define the necessary risk assessment of those materials.

One of the areas of concern are the chemicals that can be extracted from cell culture vessels and other containers used in the storage and manufacture of the pharmaceutical. To mitigate these risks, biopharmaceutical manufacturers often use extractables data to perform a risk assessment to determine if they need to take action to reduce risk or if further studies are required. These studies are performed using conditions which are exaggerated to ensure that the list of potential extractables is comprehensive.

Suppliers can assist manufacturers by incorporating an understanding of extractables into the design of their products. Not only is the selection of materials important, but designing products in a way that minimizes the number of materials can reduce the amount of time it takes to assess risk and help save manufacturers' time. The more individual materials you incorporate into a product design, the greater the potential to increase the number of extractables observed.

Thermo Scientific™ Nunc™ Cell Factory™ systems reflect an understanding of the impact of product design on the potential to generate extractables. The Nunc Cell Factory System minimizes the number of materials that could generate extractables by relying on ultrasonic welding to fuse individual layers of the Cell Factory system together. A Competitor uses an adhesive to bond individual layers Thermo Scientific Nunc Cell Factory System extractable review - How product design influences an extractable profile Stephanie Carter, Application Scientist; Joseph Granchelli, PhD, Manager, Applications and Technical Support Thermo Fisher Scientific, Rochester, New York of their multilayer vessel, creating the potential for materials from that adhesive to migrate from the vessel into the cell culture media. The Nunc Cell Factory system has no adhesives; therefore, extractables associated with UV-cured adhesive are absent from this system.

An extractable study was conducted to demonstrate the potential for an adhesive to leach from the Competitor's multilayer cell culture vessel in comparison to the adhesive-free Nunc Cell Factory and Thermo Scientific™ EasyFill™ Cell Factory™ systems.

Materials

Nunc Cell Factory 4-Layer Standard System; Catalog number 140004; Lot number 1099245; Dates of Manufacture: July 03 to 09, 2013

Nunc EasyFill Cell Factory 4-Layer System; Catalog number 140360; Lot number 136652; Dates of Manufacture: November 2013

Competitor 5-layer vessel; Date of Manufacture: December 17, 2013

Methods

The Nunc Cell Factory Standard System, Nunc EasyFill Cell Factory System, and a Competitor's multilayer vessel were filled with 800mL of phosphate buffered saline (PBS, pH 7.4), or 20% isopropyl alcohol (IPA), and were incubated for 20 days at 40° C to exaggerate conditions of use (n=1 per test condition[1]). PBS was chosen because it is very similar in ionic strength and polarity to cell culture media and to human biological fluids, and as a result should represent a physiologically relevant solution. IPA is slightly more aggressive than PBS in terms of its ability to dissolve certain chemicals.

All extractions and analysis were performed at a thirdparty laboratory.

The extractions were analyzed by Direct Injection GC/MS, Headspace GC/MS, and LC/MS for semi-volatile organic compounds, volatile organic compounds, and non-volatile organic compounds, respectively.

No assessment was made of the toxicological implications of the presence or quantity of the extractables detected in any

[1] We expect from reasonable scientific principles that we should find the signature of an adhesive in an extractables report for the competitive product and not in the Cell Factory product. The sample size of one is confirmatory.

Table 1. Extracted Materials Identified in the Nunc Cell Factory and EasyFill Cell Factory Systems

Nunc Cell Factory 4-Layer Standard System		Nunc EasyFill Cell Factory 4-Layer System	
IPA Extracts	**PBS Extracts**	**IPA Extracts**	**PBS Extracts**
Benzaldehyde	None Detected	Benzaldehyde	None Detected
Styrene		One Unknown Compound	
Two Unknown Compounds			

Table 2. Extracted Materials Identified in the Competitor 5-layer vessel

Competitor's Multilayer Vessel	
IPA Extracts	**PBS Extracts**
(1-hydroxycyclohexyl)phenyl-methanone*	(1-hydroxycyclohexyl)phenyl-methanone*
2,4,6-Trimethylbenzaldehyde	N,N-dimethyl-2-propenamide*
Benzaldehyde	Four Unknown Compounds
Exobornyl Acetate*	
Isobornyl Alcohol*	
N,N-dimethyl-2-propenamide*	
Silicone	
16 Unknown Compounds	

* Known components of adhesives

vessels. No suggestion of suitability or unsuitability for any application should be implied based on these analyses.

Results and Discussion

The extractables profile of the Nunc Cell Factory Systems differed as expected (Table 1). Additional extractables were detected in the competitive device. The compounds detected in the competitor's vessel are consistent with what would be expected from an adhesive (Table 2). No adhesive is used in the construction of the the Nunc Cell Factory systems. As expected, no extractables from adhesive were detected in the Cell Factory products.Conclusions

Conclusions

Specific design features have trade-offs. In the present example, the use of an adhesive to bond layers of a multilayer tray together imparts certain advantages in manufacturing and makes these joints more resistant to breakage under certain conditions. However, the presence of this additional material also carries with it other consequences that may or may not introduce a risk to the products produced in that device. This study demonstrates that the presence of an additional material alters the extractable profile of that device by generating additional extractables. The magnitude and significance of the risk posed by these additional extractables must be assessed where that product is used to produce a biopharmaceutical. Risk assessment can be a timeconsuming process and can lead to the decision to perform expensive follow-up tests, which can delay the introduction of a product to the market. Minimizing the number of materials in the product design is one way suppliers can assist customers in simplifying the risk assessment process.

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