Culture Collection of Antimicrobial Resistant Microbes

Seoul Women’s University
Eunju Shin

eunjunio@knrrc.or.kr
Need for Antimicrobial Resistant Microbes

**Clinical**
Emergence of strains with existing antimicrobial resistance
Rapid diagnosis of resistant microbes and select and use appropriate antimicrobials

**Environment**
Regulatory measures for agricultural use of antimicrobials are urgent
Emergence of resistant strains due to abuse of antimicrobials and entry of resistant strains and genes that exist naturally in the environment into the human body
Regulation policy for antimicrobials
Rapid diagnosis of resistant microbes and select appropriate antimicrobials

**Pharmaceuticals**
Ineffectiveness of existing antimicrobials
Development of new antimicrobials (New target site)
Development of antimicrobials that can overcome resistance
SAR: Structure–Activity Relationship

Antimicrobial resistant microbes, resistance mechanisms, data sharing
Mission

Undertake the Central Role in Interdisciplinary Science

Research on Resistance Mechanisms

Clinic, Environment
Emergence of strains with existing resistance to antimicrobials

New Drug Development
Structure - Activity Relationship

Share Data
on antimicrobial resistant microbes and resistance mechanisms

Provide Information

Preservation
- Establishment of basic techniques and acquisition of clinical stains through taking part of new drug development research in collaboration with Korea Institute of Science and Technology (KIST)

- WFCC member, NCCLS corresponding member, Participation as the national representative at ISO TC34 Food Microbiology, TC212 Susceptibility Testing
  - Acquisition (7619 strains) / Distribution (93 cases, 1443 strains) / 28 academic papers published (15 at SCI level)

- WFCC member, CLSI corresponding member, Participation as the national representative at ISO TC34 Food Microbiology, TC212 Susceptibility Testing, ISBER member
  - Acquisition (10,100 strains) / Distribution (174 cases, 1,794 strains) / 64 academic papers published (36 at SCI level)

- WFCC member, CLSI corresponding member, Participation as the national representative at ISO TC34 Food Microbiology, TC212 Susceptibility Testing, ISBER member
  - Cooperation with frontier projects, International Vaccine Institute, Korea Polar Research Institute and Foreign Centers
    - Acquisition (2,629 strains) / Distribution (225 cases, 2,934 strains) / 50 academic papers published (32 at SCI level)
From Collection to Distribution

Collect from Animal, Human, Environment

Deposition by researchers (domestic and international)

Identification
Antimicrobial Susceptibility Testing

Antimicrobial Resistant Mechanism Study
Target site mutations, permeability, efflux pump, degrading enzymes, modifying enzyme / PFGE, & MLST analysis

Classification by Antimicrobial Resistant Type

Antimicrobial Activity Screening

Storage
Lyophilizing, Deep freezer, LN2

Distribution

Screening Service

Research Collaboration Consulting

Antimicrobial Activity Screening
Target site mutations, permeability, efflux pump, degrading enzymes, modifying enzyme / PFGE, & MLST analysis

Classification by Antimicrobial Resistant Type

Storage
Lyophilizing, Deep freezer, LN2

Distribution

Screening Service

Research Collaboration Consulting
Facilities and Equipments

- Storage Room
- Main office, Laboratory
- Freeze Dryer
- Preparation Room
- Freezer Room
- Analyzing Equipment
- Microscopy
- HPLC
Collections

Collection

Isolation & Identification

Resistant mechanisms

Phylogenetic study
Research and Development

- Antimicrobial susceptibility testing
  - CLSI (Clinical Laboratory Standard Institute) guideline
  - EUCAST (European Committee on Antimicrobial Susceptibility Testing)
- Resistance mechanism study
Preservation and Storage

At least two different storing methods are employed:

- Deep Freezer
- Liquid Nitrogen
- Freeze drying
# Collections of CCARM

<table>
<thead>
<tr>
<th>Code (Accession No.)</th>
<th>Reference strains</th>
<th>E. coli</th>
<th>Pseudomonas</th>
<th>Staphylococcus</th>
<th>Septococcus</th>
<th>Enterococci</th>
<th>Aeromonas</th>
<th>Vibrio</th>
<th>Salmonella</th>
<th>Haemophilus</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of strains</td>
<td>232</td>
<td>6867</td>
<td>230</td>
<td>1517</td>
<td>133</td>
<td>282</td>
<td>40</td>
<td>14</td>
<td>283</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code (Accession No.)</th>
<th>Moraxella</th>
<th>Propionibacterium</th>
<th>K. pneumonia</th>
<th>Proteus, Morganella</th>
<th>Campylobacter</th>
<th>Candida</th>
<th>Acinetobacter</th>
<th>Alcaligenes, Enterobacter</th>
<th>Citrobacter</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of strains</td>
<td>4</td>
<td>206</td>
<td>252</td>
<td>4</td>
<td>392</td>
<td>24</td>
<td>51</td>
<td>3</td>
<td>10</td>
<td>20,250 strains</td>
</tr>
</tbody>
</table>

**TOTAL**: 10,570 strains

**TOTAL**: 20,250 strains
Resource Management

Certified Microorganisms
- Collection
- Development

Preservation
- Lyophilization
- Liquid Nitrogen
- Deep Freezer
- Others
  - DNA, sample slide, etc.

Optimization for Long Term Storage
- Cryoprotectant
- Maintenance of resistance characteristics
- Optimal Equipments
- Quality control

DB
- Inventory
  - Entry-
  - MDS (Minimum data set)
  - RDS (Recommend data set)
## Customized Sets for Specific Researches

<table>
<thead>
<tr>
<th>Set Description</th>
<th>Strains</th>
</tr>
</thead>
<tbody>
<tr>
<td>A set for primary activity screening of a drug</td>
<td>20</td>
</tr>
<tr>
<td>ESBL producing environmental isolates of <em>E. coli</em></td>
<td>20</td>
</tr>
<tr>
<td>A set for secondary activity screening of a drug</td>
<td>77</td>
</tr>
<tr>
<td>A set of nalidixic acid-resistant conjugation recipients</td>
<td>8</td>
</tr>
<tr>
<td>A set of Gram-positive resistant bacteria</td>
<td>96</td>
</tr>
<tr>
<td>A set of vaginal isolates</td>
<td>4</td>
</tr>
<tr>
<td>A set of methicillin-resistant <em>S. aureus</em></td>
<td>96</td>
</tr>
<tr>
<td>A set of dermatologic isolates</td>
<td>10</td>
</tr>
<tr>
<td>A set of vancomycin-resistant Enterococci</td>
<td>5</td>
</tr>
<tr>
<td>A set of MLST of <em>S. aureus</em></td>
<td>86</td>
</tr>
<tr>
<td>ESBL producing clinical isolates of <em>E. coli</em></td>
<td>85</td>
</tr>
<tr>
<td>A set of fluoroquinolone reduced susceptible Salmonella</td>
<td>15</td>
</tr>
<tr>
<td>Resistant variants for quinolone-resistance</td>
<td>41</td>
</tr>
<tr>
<td><em>P. aeruginosa</em>-PAO1, Deletion mutant</td>
<td>7</td>
</tr>
<tr>
<td>A set for efflux pump study in quinolone-resistant <em>S. pneumoniae</em></td>
<td>12</td>
</tr>
<tr>
<td>A set of ESBL producing strains</td>
<td>11</td>
</tr>
<tr>
<td>A set of macrolide-resistant <em>S. pneumoniae</em></td>
<td>15</td>
</tr>
<tr>
<td>A set of fluoroquinolone reduced susceptible <em>Salmonella</em></td>
<td>250</td>
</tr>
<tr>
<td>A set of <em>E. coli</em> size variant of colony</td>
<td></td>
</tr>
</tbody>
</table>
Online System

Server manager

Resource manager

www.ccarm.or.kr

Resource DB

member DB

Membership

Item selection, information

Application form

Via online, E-mail & FAX

Material transfer agreement

Check & decision

Acceptance

Process

Packing

Dispatch

Reject

Mailing to

applicant and resource manager

Log-in

Viability failure

www.ccarm.or.kr

Resource DB

member DB

[Server]
OS : Linux
Web : Apache, JSP
DB : Oracle

Document

• DB update
• Homepage

Online System

14
Documents

Application Forms - KNRRC (Korea National Research Center)
Hello,
Thank you very much for visiting the website of the Culture Collection of Antimicrobial Resistant Microbes (CCARM).

The Culture Collection of Antimicrobial Resistant Microbes was designated to take part in the specialized participation project of the Ministry of Education, Science and Technology and Korea Science and Engineering Foundation, and is operated with the support of the Ministry of Education, Science and Technology and National Research Foundation of Korea.

Treatment for diseases caused by antimicrobial resistant microbes has emerged as a critical issue worldwide. The abuse of antimicrobials in clinical as well as agricultural products in Korea has led to a high rate of occurrence of antimicrobial resistant microbes. There is a need for communication and cooperation between researchers in diverse fields in order to solve the resistance to antibiotics, and the objective of the Culture Collection of Antimicrobial Resistant Microbes is to play the central role in making that happen.

Although development of antimicrobials that can inhibit antimicrobial resistant microbes is very urgent, research on the antimicrobial resistance mechanisms and structure–activity research (SAR) are not as actively conducted.

In order to overcome this, there is a need to accumulate information regarding resistant microbes in clinical, agricultural, environmental fields that are discovered in Korea.
Resource Search

이미지 설명

이미지에는 CCARM Resource Search 기능과 관련된 내용이 포함되어 있습니다. 아래의 내용은 한국어로 작성되어 있습니다.

1. **소재검색 및 분양신청**
   - **항상형 조건** 추가하여 항상형 다음검색 하심 수 있오, 해당 조건에 따라 검색 시간에 자연될 수 있십시오.

2. **소재분류**
   - Microorganism
   - Bacteria

3. **분류체계**
   - Escherichia
   - coli

4. **일반명**
   - 논리적
   - 분리로

5. **균주세트**
   - 균주세트 선택

6. **통도**
   - 검색결과

7. **조건 추가**
   - Ampicillin
   - Ciprofloxacin

8. **검색결과**
   - Total: 2
   - Page: 1

<table>
<thead>
<tr>
<th>일자리</th>
<th>소재분류</th>
<th>분류체계</th>
<th>바이오네임</th>
<th>보관</th>
<th>분리로</th>
<th>검색결과</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A004</td>
<td>microorganism</td>
<td>bacteria</td>
<td>Escherichia</td>
<td>coli</td>
<td>대장균</td>
<td>2004-12-01</td>
</tr>
<tr>
<td>1B018</td>
<td>microorganism</td>
<td>bacteria</td>
<td>Escherichia</td>
<td>coli</td>
<td>대장균</td>
<td>2004-12-01</td>
</tr>
</tbody>
</table>

이미지 설명에 대한 추가 정보는 해당 페이지의 상세 설명을 참조하기 바랍니다.
Resource Search

On-line Distribution System
Newsletter Publication

Culture Collection of Antimicrobial Resistant Microbes Newsletter

주 / 요 / 내 / 용

항생체내성균주은행 개소 10주년 기념

은행동정

최근발표논문

Mini Review

News

계시판

발 행 인
서울여자대학교 미생물

일 행 처
국가생물연구소 항생체내성균주은행

간 설 인
신진주, 이기운, 이학미, 윤범완, 김현희, 백지혜

저작권
경찰청 (한국리서치)

운영위탁
이민희 (서울여대)
박용호 (서울여대)
이 용 (대명수산부)

TEL 0292-5825, 7224 FAX 0292-5829, 5901
(139-776) 서울 노원구 화랑동 652 서울여자대학교
제1 과학관 403호
홈페이지 http://www.ccarm.or.kr

CCARM
Collaboration

Antimicrobial susceptibility testing
DNA, RNA, protein extraction
Enzyme activity test
Efflux pump assay

Commissioned study

Identification
Safety deposit
Depository

Depository service

Set for specific research
Development of reference strain

Customized sets

Consulting

Research information
Advisory comment
Workshops and Seminars
Outcomes

Journal articles

New drug development

Drug improvement

CCARM
Thank you!