NASH: New Research Landscape

NASH: 研究布局新趋势

A CAS Big Data Perspective on NASH R&D

透过CAS大数据看NASH研发布局新趋势
ABOUT CAS

Founded in 1907, chemists around the world understood the value to research in aggregating scientific information.

Today we are a global organization of expert scientists, technologists, and business leaders with a long and successful history of harnessing scientific information opportunities.
CAS notes three clear trends in published research over the past few years
通过对近年公开报道研究分析，CAS发现了三个显著的发展变化

**Explosive growth of scientific information**
科技信息爆炸性增长

**Increasingly complex patent filings**
专利申请复杂性增加

**Growing interconnectedness of research fields**
不同研究领域关联性增长
The volume of discovery and IP is increasing dramatically

科学发现文献和专利数量急剧增长

Scientific and Patent Data and Information

2x Growth in volume of Scientific Information since year 2000

Cumulative Articles & Patent Applications (Millions)

Peer Reviewed Scientific Journal Articles

Patent Applications

Source: CAS Proprietary data, CAS Analytics & Insights

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Patents contain more information and are increasingly **complex**

专利包含更多信息，且日益复杂

Source: CAS Proprietary data, CAS Analytics & Insights
Research across disciplines and compounds is more interconnected

Example:
Ginkgo Biloba research area relationship mapping

Source: CAS Proprietary data, CAS Analytics & Insights
How does NASH research align with these trends, and what insights does the data hold?
NASH的研究如何契合这些趋势，且从这些数据背后可以洞见什么？
The volume of NASH patents has jumped over 300% in the past 10 years…
过去的十年，NASH专利数量已经激增3倍多
... though interestingly we find that NASH research in particular is increasingly global.

NASH 研究增长趋于全球化
The complexity (e.g. number of therapeutic compounds in patent filings) initially grew, but more recently has countered the overall pharma research trend…

复杂性（例如，专利申请中药物的数量）呈波浪性增长，但总趋势是向上的
… as effort has focused on fewer, more promising leads
研发聚焦于更有前景的先导化合物

obeticholic acid (Ocaliva) was synthesized
Intercept Pharmaceuticals was formed for Ocaliva’s application to PBC
Ocaliva Phase II results in NASH
2019 Ocaliva Phase III results in NASH
Where is this research being done and filed?
这些研究在哪里完成，并在哪里提出申请？
On the surface Chinese firms may seem to be relatively new to patenting NASH research; however…
表面上看，中国企业似乎刚开始申请NASH专利；然而…
... a different perspective based on journals shows China’s strong efforts in NASH research started much earlier

基于期刊数据的不同视角显示，中国在较早的时候就在NASH研究上投入了巨大努力
China’s NASH research is having a global impact

Two important findings:

• CNIPA only receives filings within China; however a substantial portion of its NASH patents were also filed with WIPO and USPTO.

• Historically Chinese firms file almost exclusively with the home patent office CNIPA; however a substantial portion of its NASH patents were also filed with WIPO and USPTO.

China’s NASH research has global impact
CAS QUESTION
此次探讨的问题

What treatment and compound research is of greatest competitive interest?
哪种治疗和化合物具有最大的竞争潜力？
NASH research shows a high correlation with other disease research, highlighting recent combination therapies research.

NASH与其他疾病研究显示了高度的相关性，突显近期的联合疗法。
Over 150,000 distinct compounds are indexed in NASH publications with various functions and roles.
~90,000 distinct compounds have therapeutic indication potential, including drug candidates from leading organizations.

约90,000个独特化合物具有治疗适应症的潜力，包括来自领先机构的药物候选物。

Leading drug candidates by highest research-producing organizations

<table>
<thead>
<tr>
<th>Compound</th>
<th>Leading Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td>Boehringer Ingelheim, Perle Bioscience, Inc.</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>Virginia Commonwealth University, Nara City Hospital, Aichi Medical University, Perle Bioscience, Inc.</td>
</tr>
<tr>
<td>Pioglitazone</td>
<td>Salk Institute for Biological Studies, Relypsa, Inc.</td>
</tr>
<tr>
<td>Thiazolidinedione</td>
<td>Salk Institute for Biological Studies, Sanofi-Aventis</td>
</tr>
<tr>
<td>Rosiglitazone</td>
<td>Salk Institute for Biological Studies, Saint Louis University, Relypsa, Inc.</td>
</tr>
<tr>
<td>Obeticholic acid</td>
<td>Intercept Pharmaceuticals, Enanta Pharmaceuticals, Amarin Pharmaceuticals Ireland, GlaxoSmithKline</td>
</tr>
<tr>
<td>Nicotinic acid</td>
<td>Catabasis Pharmaceuticals, Inc., Relypsa, Inc.</td>
</tr>
<tr>
<td>Ursodeoxycholic acid</td>
<td>NGM Biopharmaceuticals, Inc., Dr. Falk Pharma GmbH, Amarin Pharmaceuticals Ireland</td>
</tr>
<tr>
<td>Atorvastatin</td>
<td>Relypsa, Inc., Hiroshima University, Catabasis Pharmaceuticals, Inc., Amylin Pharmaceuticals, Pfizer, Perle Bioscience, Inc.</td>
</tr>
<tr>
<td>Exenatide</td>
<td></td>
</tr>
</tbody>
</table>

These same compounds are then quickly investigated by others...

Speed to market is critical for success!
Information enables speed: CAS Products and Services

Information加速研发速度：CAS产品及服务
This industry leadership requires broad thinking

行业领导需要战略性的思考

A looming global intellectual property crisis: Is your organization at risk?

Can enhanced search engine relevance drive increased R&D pipeline velocity?

It's not just a haystack anymore: Why research leaders must prioritize information strategy to drive innovation

Accelerate discovery by standing on the shoulders of giants

Innovation drives transformation: 3 ways AI is accelerating research breakthroughs

The importance of human-curated data enrichment for big data analysis

https://www.cas.org/blog
CAS is proud of our partnership with leaders in every industry who rely on our solutions
各行业的领导者都信赖CAS解决方案，我们为彼此的伙伴关系感到自豪

48 of the top 50 Pharmaceutical Companies
20 of the top 25 Biotechnology Companies
48 of the top 50 Chemical Companies
100 of the top 100 Chemistry Schools
96% of Patent Applications

1. Pharm Exec’s Top 50 Companies 2017
2. The Top Biotech Companies of 2017
3. C&EN’s Global Top 50
4. Shanghai Ranking’s Global Ranking of Academic Subjects 2017 – Chemistry
Thank You

CAS is a global team of scientists helping scientists

For more than 110 years, CAS has been the leader in developing cutting-edge information solutions to advance innovation across the spectrum of science and technology.

Every day at CAS hundreds of scientists analyze the world’s disclosed scientific discoveries and, leveraging the latest technologies, infuse insights to deliver answers.